# Vibration and Predictive Maintenance Solution Guide (Performance)

## Overview

The Solutions Kit provides visual status of up to 40 Banner 1-wire serial or All-in-One Vibration Sensor Nodes (assets) that are bound to the included DXM Wireless Controller.

The Condition Monitoring VT/CT Node (CM1L) can also take advantage of current measurements in combination with the vibration and temperature measurements.

The Solutions Kit uses the Banner Vibration Monitoring and Predictive Maintenance Solution Guide software to program the DXM Wireless Controller.

The Sensor Nodes take a data sample every 5 minutes and the software uses the raw data to detect whether an asset is running, creates a baseline of the four vibration characteristics (RMS Velocity (10-1000 Hz) and RMS High Frequency Acceleration (1000-4000 Hz) on Z and X axis) and generates warning and alarm thresholds for those characteristics. Only data from an operational asset is used to create the baselines or thresholds and only that data is used to trigger warnings or alarms. Data from assets that are not operational appear on the graphs but is not used in the analysis.

RMS Velocity identifies problems such as: imbalance, misalignment, looseness, and other low frequency machine issues. RMS high frequency acceleration is used to indicate early bearing wear issues.

## Hardware

The items included with the Vibration Monitoring and Predictive Maintenance Solutions Kit are:

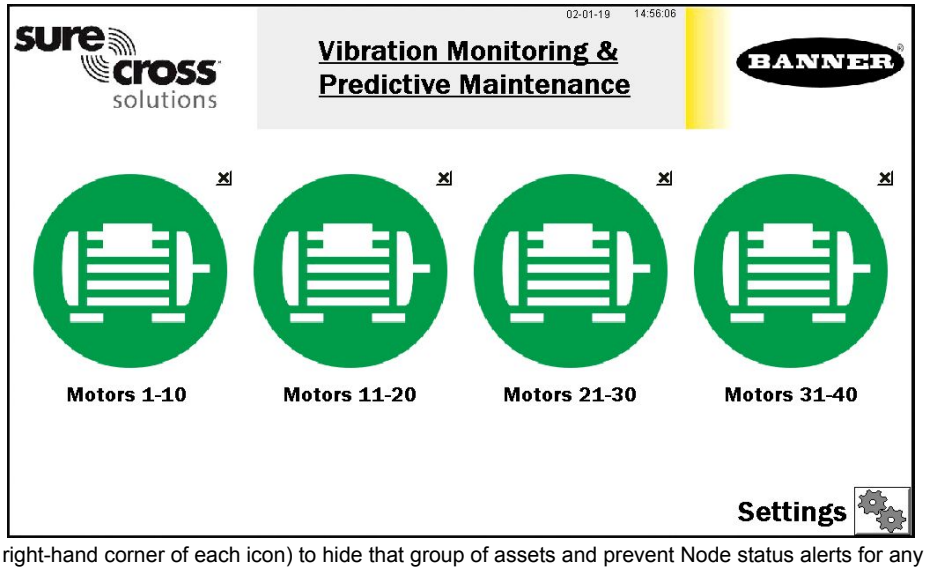
- 10" Banner Touch Screen HMI with Ethernet connection
- DXM700-B1R1 Wireless Controller
- 5-port Ethernet switch
- M12 power input connector
- 14"x12" Polycarbonate enclosure, DIN rails, and terminal blocks

This kit also requires a 24 V DC Class 2 (UL) or a Limited Power Source (LPS) (CE) power supply that is sold separately. Banner recommends model **PSW-24-1** (FCC/CE) or model **PSD-24-4** (FCC/CE) if you are powering additional indicator lights.

## HMI Home Screen

Status icons represent groups of 10 assets. Each icon is a color-coded indication of the status of vibration warnings or alarms, temperature warnings or alarms, or wireless Node connection status within that group.

The icon acts as a touch button that brings up the 10 individual icons that represent that assets' status and acts as a touch button to view that assets' screen where detailed data viewing options are available (see ).




Press **X** (in the upper right-hand corner of each icon) to hide that group of assets and prevent Node status alerts for any Nodes within that group. Press the icon that appears after pressing **X** to unhide that group for future expansion.

Press **Settings** to open access to Node binding, Node site survey, asset baselining, log file downloads, and other settings (see ).

Touch each asset group label to re-label the icon.

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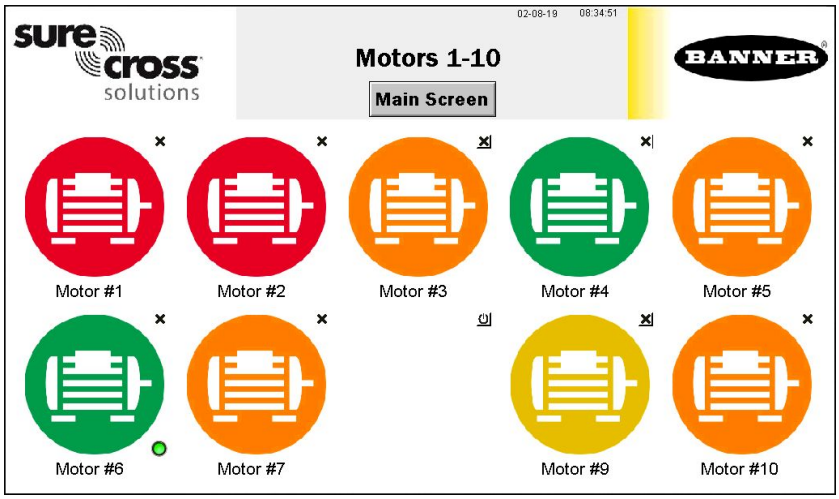
# Vibration Node Group Screens

Each asset group on the main page has a screen of icons, one for each sensor/radio pair. These icons represent the status of the motor with colored icons.




Touch any icon to bring up the individual sensor's screen that includes graphs, raw data, and alert descriptions (see ).

Touch **X** (upper right hand corner of each icon) to hide that asset and prevent connection status alerts from that senspr/radio from appearing on the main HMI screen. Use the button that appears after pressing **X** to unhide that group for future expansion. For example, asset #8 is hidden in the sample screen.

Touch each asset label to re-label the icon. That label remains in non-volatile memory and appears on the Node's status screen, binding screen, site survey screen, and baselining screens.

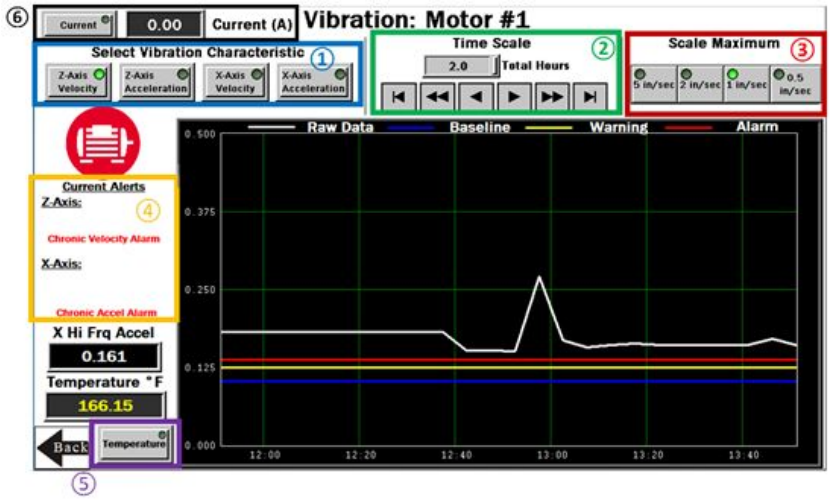
A small green lamp in the bottom right corner of a Node's icon indicates when that Node is baselining. Only temperature warnings and alarms appear during the baselining phase. After baselining is complete, the threshold levels are established and vibration alerts may begin to appear.

If a sensor appears out of sync (orange), that means the radio it is attached to is no longer in sync with the main controller. This may indicate you need to replace the battery in the radio or interference is preventing the radio from remaining in sync. After replacing the battery or improving the radio's site survey results, use the network reformation button (see ).




# Individual Radio (Asset) Status Screen

Select a sensor/radio icon to open that sensor/radio's status screen. Use the **Back** button to return to the previous screen.





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**Select Vibration Characteristic (1)**

Use **Select Vibration Characteristic** to graph raw data.

Options include: Z-Axis Velocity, Z-Axis High Frequency Acceleration, X-Axis Velocity, and X-Axis High Frequency Acceleration. The bottom left of the screen shows a real-time readout of the selected characteristic. Velocity is displayed in in/s (mm/s for Vibemetric versions) and acceleration is displayed in g. Note: Velocity values of 6.5535 and/or acceleration values of 5.355 indicate a sensor error. The system ignores these data points to avoid affecting the saved baseline or trended data. The system will not baseline when the raw data values appear as those values. Contact Banner support for troubleshooting.

**Time Scale (2)**

Select the **Time Scale** of the graph from 1 to 168 total hours.

Use the arrow keys to scroll right or left to see different periods of the collected data. The maximum viewable data on the HMI is 168 hours or 7 days. The graphing data loggers have a fixed number of data points. If you are using the DEMO MODE button on the Settings page, the increased sample rate reduces the number of data points available for viewing until those data points have rolled off the end of the timeline.

**Scale Maximum (3)**

Select the data **Scale Maximum**. For acceleration, the range is 0.25 g to 5 g (g-force). For velocity, the range is 0.5 in/s to 5 in/s (10 mm/s to 60 mm/s for metric versions).

**Current Alerts (4)**

The **Current Alerts** section shows any warnings or alarms based on the Axis, Vibration Characteristic, and type (Chronic or Acute) that the system is detecting.

Acute alerts are those crossing the threshold for five samples in a row (or the user setting on the Settings screen) and Chronic alerts are when a 100 point moving average crosses the thresholds. Only data from an operational asset is used to calculate averages and alerts.

**Select Temperature (5)**

Use **Select Temperature** to view the temperature graph over the selected time period.

Directly above the button is the current temperature in degrees Fahrenheit of the selected Node. The readout color is white if it's nominal, yellow if it's in a warning state, and red if it's in an alarm state. The warning and alarm temperature settings are 158 °F and 176 °F respectively. A raw temperature value of 327.67 indicates a sensor error. Contact Banner's technical support for troubleshooting.

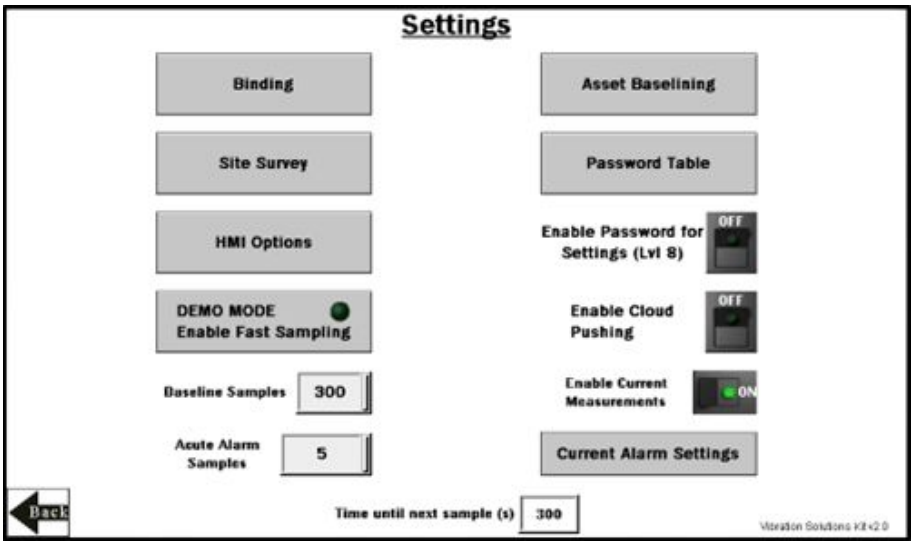
**Select Current (6)**

Use **Select Current** to view the current graph over the selected time period.

Directly to the right of the button is the raw current reading in Amps of the selected Node. The readout color is white if it's normal, yellow if it's in a warning state, and red if it's in an alarm state. Requires the use of the Banner CM1L Condition Monitoring VT/CT node. This option only appears if **Enable Current Measurements** is turned on within the **Settings** screen. Warning and alarm settings are set on the **Current Alarm Settings** screen within the **Settings** page.

In the upper right corner of the screen is the Sensor's Modbus ID and the radio ID to which the sensor is attached. This can be useful in finding which radio a sensor is connected to if the orange Out of Sync status icon appears. Signal quality or battery replacement may be necessary for a radio that loses connection status.

# Settings Screen




**Acute Alarm Samples**

The default number of samples above the warning or alarm threshold before an alert is triggered is five consecutive samples. Use the numeric entry box to adjust the default value up or down.

**Asset Baselining**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Nodes bound into the system automatically begin baselining. This button opens a screen to enable creation of new baselines and thresholds of each sensor Node individually, displays the remaining samples in the current baseline, and allows manual threshold limits to be set for both vibration and temperature on each sensor Node (see ).

**Baseline Samples**

The Solutions Kit takes a baseline of the first 300 running samples of an asset. This can be adjusted up or down by clicking on this numeric entry box to any desired sample. Samples are taken at a fixed 5 minute interval.

**Binding**

Opens a screen to allow binding of each sensor Node to the Solutions Kit (see ).

**DEMO MODE**

Use only for demonstration purposes when fast sampling is required. Demo mode enables the Teach mode on all the bound sensor Nodes, putting them into a 2 second sample rate and changing the HMI graphs to log at a 2 second sample rate for 15 minutes (status indicated by the green light within the button).

We also recommend you reduce the Baseline Samples to less than 30 for demonstration purposes. Using **Demo Mode** drains the battery faster and creates a larger log file that fills up memory quicker, so only use this mode when to demonstration the kit, not during standard operation.

**Enable Cloud Pushing**

Turn ON/OFF the switch to enable to the DXM to begin pushing data to a cloud webserver at 5 minute intervals. This requires additional set up and modification of the XML file in the DXM to point to the correct web server with the correct site ID. Cloud pushing also requires connecting the DXM to a local network via Ethernet or a separately sold cellular modem.

**Enable Current Measurements**

Turn ON this rocker switch when using the Banner VT/CT CM1L Condition Monitoring Node to enable current measurements and graphs on individual asset screens. This setting also enables the **Current Alarm Settings** button below the rocker switch to set the scale, warning, and alarm settings for the current measurements on each Node.

**Enable Password for Settings (Lvl 8)**

Turn ON/OFF the switch to enable/disable a password to access the settings menu. The default password for User Level 8 is “88888888”. This can be modified by clicking the Password Table button above and changing the password for level 8 to any number password up to 9 numbers long.

**HMI Options**

Provides the ability to copy/manage HMI log files, HMI configuration for advanced options, functional HMI options, and an Icon Legend as well as a Graph Legend.

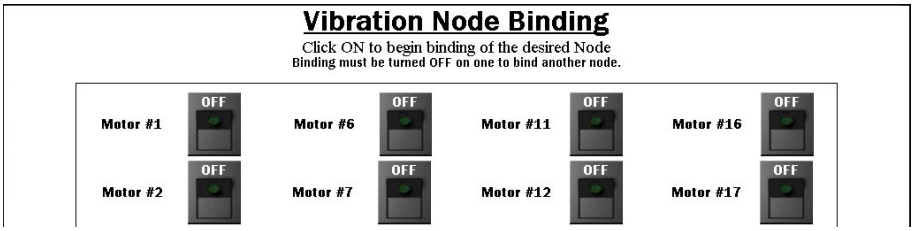
**Site Survey**

Opens a screen to perform a site survey on any sensor Node bound to the Solutions Kit network (see ).

**Time until next sample (s)**

Displays the time (in seconds) until the Solutions Kit samples data from all bound sensor Nodes and updates graphs and other visual indicators.

# Vibration Node Binding Screen




## Bind the Nodes (Assets)

Bind the Banner Wireless Q45 or P6(L) Nodes combined with Banner’s QM42VT Vibration and Temperature Sensors or the Q45VA All-in-One Vibration Sensor Node to the DXM Wireless Controller to begin communicating.

Follow these instructions to assign the Q45/P6 Nodes a Node address and begin communicating with the DXM Controller. Nodes and sensors are purchased separately and after they are combined, must be bound individually. A new Q45/P6 Node and sensor can be added to the network at any time by using the binding procedure.

1. On the HMI screen, touch the ON/OFF rocker switch for the desired Node to turn on binding.
2. On the Node, enter binding mode.
   - For Q45 models, triple-click the binding button under the lid.
   - For P6 or P6L Node Models, triple-click button 2. For the P6, follow the Node’s datasheet to set the rotary dials before entering binding mode.

   After the Node is bound, the LEDs stay solid momentarily, then flash four times. The Node automatically exits binding mode.
3. On the HMI screen, touch the same ON/OFF rocker switch to turn the switch to off to take the DXM out of binding mode. After the DXM is out of binding mode, the indicator LED on the Node flickers green when the Node is in sync with the DXM.
4. Repeat steps 1 through 3 for as many Nodes as are needed for the network. Use the **Nodes #1-20** and **Nodes #21-40** tabs to access binding switches for up to 40 sensor Nodes.

   Entering binding mode causes all Nodes to go out of sync until the DXM exits binding mode. The Nodes will resume communicating with the DXM within a few seconds.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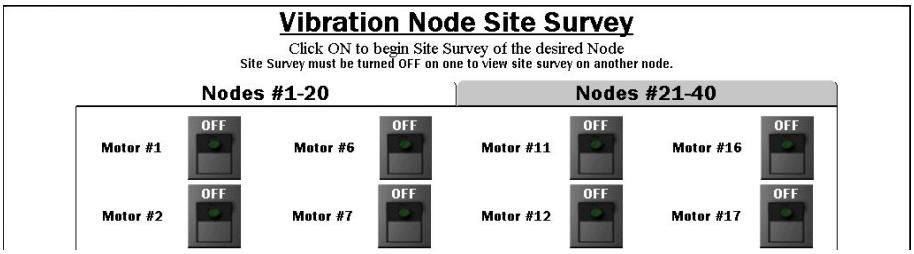
# Vibration Node Site Survey Screen




## Perform a Site Survey

Perform a site survey on each Node after they are installed to analyze the wireless communication between the Nodes and DXM.

1. On the HMI, touch the ON/OFF rocker switch for the desired Node to turn on Site Survey mode for that Node.
   If the Node is communicating with the DXM, the results display at the bottom of the HMI screen. The results add up to a total of 100. It takes several seconds for the first 100 packets to display complete results.
2. Follow the interpreting section of the Conducting a Site Survey and Interpreting the Results technical note on www.bannerengineering.com.
3. After the site survey is complete, touch the ON/OFF rocker switch to turn Site Survey mode off.
4. Repeat for each additional Node.

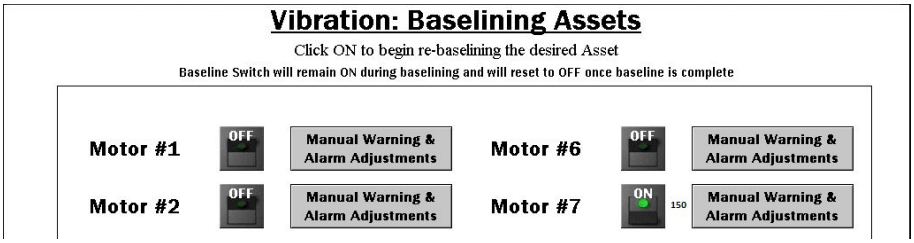
   Use the tabs **Nodes #1-20** and **Nodes #21-40** to access site survey switches for up to 40 sensor Nodes. Note that entering site survey mode causes all the Nodes to go out of sync with the DXM until the DXM exits Site Survey mode. The Nodes will resume communicating with the DXM within a few seconds.

# Baseline a Sensor/Radio (Asset)

After the sensor/radio is installed and the system is powered on, the software automatically begins collecting data and determines if the asset is running.

The software generates a baseline and thresholds based on the first 300 data samples or about 24 hours of asset running time (unless modified on the Settings page).

When an asset is replaced, repaired, or has heavy maintenance done, create a new baseline. If the sensor is moved after the initial baseline is calculate, generate a new baseline.




1. Turn on baselining for the appropriate Nodes if a new baseline needs to be generated.
   The initial baseline is generated any time a new sensor is connected to the system (or bound to the controller radio) and begins sending data without the need to trigger these switches. The number of baseline samples remaining displays next to the ON/OFF switch. The baseline switch remains on during baselining and resets to off after the baseline is complete.
2. Use the tabs Assets #1-10, Assets #11-20, Assets #21-30, and Assets #31-40 to access the baseline switches for the sensors/radios.
3. Use the corresponding **Manual Warning & Alarm Adjustments** button for each sensor/radio to open an individual windowed screen where current baseline threshold settings are visible.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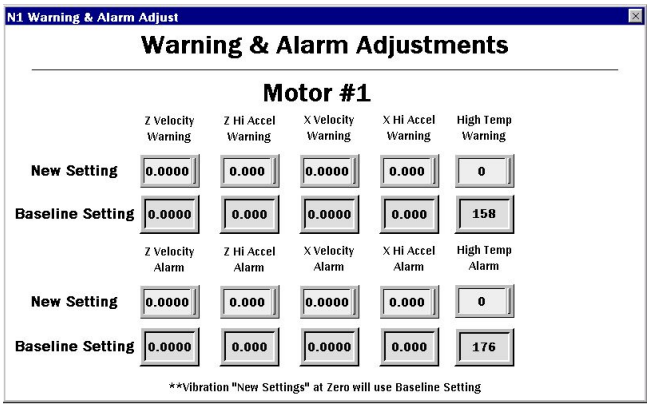



4. Touch the numeric entry box in any of the **New Settings** rows to manually enter a new value for any or all the warning or alarm thresholds, including temperature.
5. Set vibration settings back to zero to use the original baseline setting.
6. Manually set the temperature back to the baseline setting by entering 158 °F (70 °C) for warning or 176 °F (80 °C) for alarm. Temperature is not a baselined value. Although it displays a baseline value, the value is for reference if the new setting is changed.

# Current Alarm Settings Screen

After enabling the Current measurements rocker switch, users can adjust the CT scale, current warning, and alarm measurements. The CT scale from the DIP switch settings of the Condition Monitoring VT/CT Node are read and populated into the scale field.

**CT Scale**

Default setting will be based on the DIP switch setting of the Condition Monitoring Node. If the user replaces the 20A or 150A CT provided with the Condition Monitoring Node, adjust the scale manually.

**Current Warning**

Set the warning level for the current data to trigger yellow motor icons when in a warning state.

**Current Alarm**

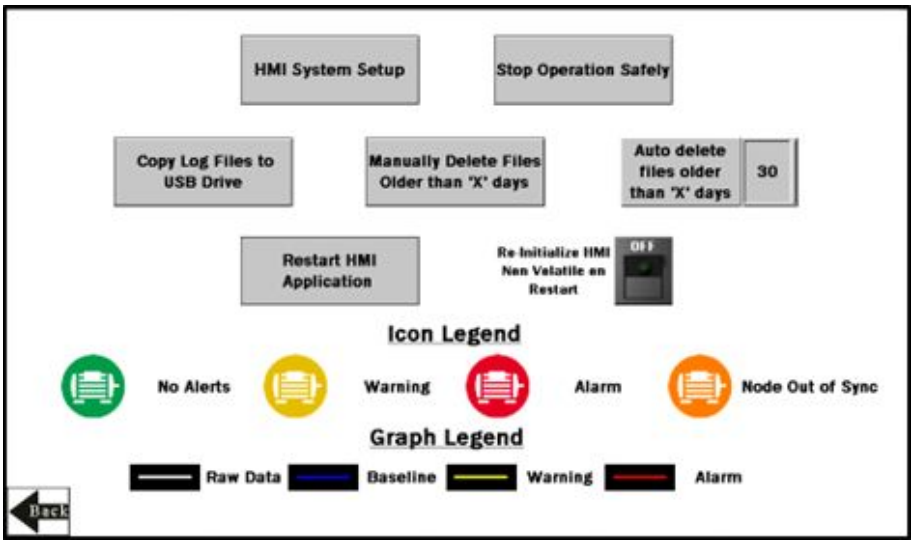
Set the alarm level for the current data to trigger red motor icons when in an alarm state.

Use the Nodes #1-10, Nodes #11-20, Nodes #21-30, and Nodes #31-40 tabs to access the scale, warning, and alarm settings for up to 40 Sensor Nodes.

# HMI Options Menu Screen

The HMI Options screen provides some added HMI functionality along with icon and graph legends.

The HMI also provides data logging of all the raw data, baselines, and thresholds. This data is saved to a file every 10 minutes and a new file is generated every day and stored in monthly folders. The HMI has storage for about 75 days of log files.




**Auto Delete Files Older than 'X' Days**

The HMI automatically deletes files older than the selected number of days.

is 30 days with a maximum of 45 days for MulitHop radio kits and 60 days for Performance radio kits.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**Copy Log Files to USB Drive**

Plug a USB drive into the back of the HMI and click here to select the log files or folders to copy.

**HMI System Setup**

Enters HMI Panel Setup.

Use for setting Time, Date, and Advanced Options. Entering this screen will clear any logged data from the graphs but will not clear any data saved to files.

**Manually Delete Files Older than 'X' Days**

Deletes files older than a specified number of days immediately.

Use this option if the HMI is warning about an inability to save data or a lack of storage space. Shortening the auto delete days parameter may be necessary.

**Re-Initialize HMI Non-Volatile on Restart**

Flip the switch to ON before restarting the HMI to reinitialize default settings and labels.

**Restart HMI Application**

Restarts the HMI application, which clears all graphed data but retains the saved logs.

**Stop Operation Safely**

Stops HMI operation safely without data corruption before you power off the HMI.

**Always use this button before powering down to avoid data file corruption.** If a **Failed to write logged data to file** or **Failed to save** message appears, this is because of a power loss during the saving process. You must delete this file (from the day of the power loss) by using the HMI System Setup menu.

# Advanced Options

## Install a Warning or Alarm Light

Add a tower light or indicator light (such as a K70, TL50, TL70, etc.) to the solution box for added local indications of all clear, warnings, or alarms.

The DXM Controller uses PNP outputs with a maximum of 100 mA per output. An interposing relay may need to be added to accommodate higher amperage lights.

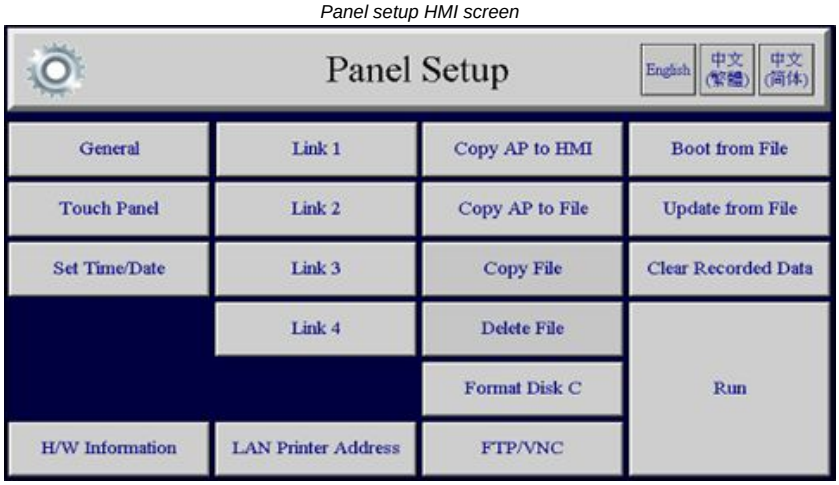
1. Cut a hole in the box and mount the light accordingly.
2. Wire the DC ground to the light or an interposing relay from the bottom row of the gray two-row terminal blocks inside the kit on the DIN rail adjacent to the DXM Controller.
3. Wire the input of the light or interposing relay to the DXM.
    a. O1 – Pin 5 – indicates a radio/asset in an Alarm condition.
    b. O2 – Pin 6 – indicates a radio/asset in a Warning condition.
    c. O3 – Pin 7 – indicates a radio/asset in either a Warning or an Alarm condition.
    d. O4 – Pin 8 – indicates no Warning or Alarm conditions exist.

## Connect the DXM and HMI to a Wide Area Network (WAN)

By default, the HMI and DXM Controller are configured to communicate using static IP addresses. To connect to a WAN, configure the two devices to have a new static IP address on the new network or to acquire their own IP address via DHCP.

Connecting to a WAN allows the devices to be configured by any computer on the network and allows the DXM to be configured to push data to a cloud webserver for remote monitoring.

*Panel setup HMI screen*




1. Open the enclosure and connect an Ethernet cable from the WAN to the Ethernet switch inside the enclosure.
2. On the DXM: With power applied to the DXM, use the arrow keys to select **System Config**. Press **Enter**.
3. Use the arrow keys to select **Ethernet**.
4. Set the IP address.
    - If you are using a static IP address, select the IP address shown and press **Enter**. Then use the arrow and **Enter** keys to set the new static IP address.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- If you are using DHCP, press **Enter** on DHCP. Use the arrow keys to select DHCP ON and press **Enter**.

A device reboot is requested if any changes are made to these settings.

5. If you are using DHCP, navigate to the **System Info › Ethernet** and write down the IP address to enter into the HMI. The subnet mask can be adjusted here as well if needed.
6. On the HMI: From the main screen, go to the **HMI Options** screen and choose **HMI System Setup**.
7. In the **Panel Setup** screen, select **General**.
8. On the pop-up screen that appears, set up DHCP in one of two ways:
   - Type in the IP address and network information for a static IP address by selecting the appropriate fields.
   - Toggle from false to true in the field next to **Get an IP address automatically**, then press **OK**.
9. Press **Link 1** and select the IP address field.
10. Enter in the IP address of the DXM from earlier and press **OK**.
11. Press **Run**.

# Push Information to BannerCDS

The DXM Wireless Controller can connect to the Web via Ethernet or an internal cell module. The controller pushes data from the DXM 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).

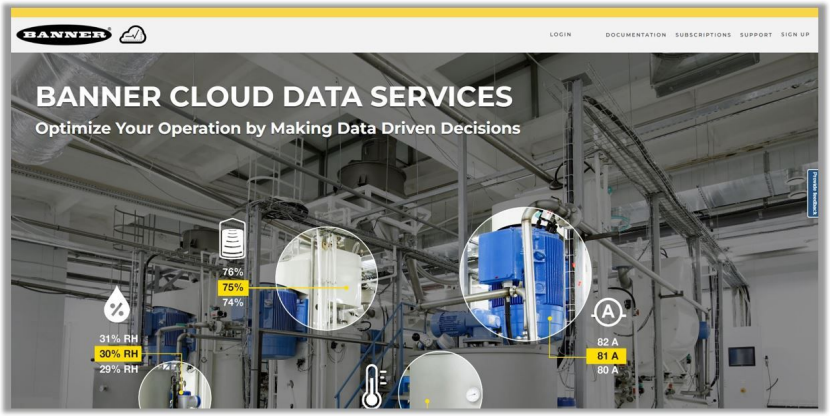
## Logging into the Web Service

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

Within a few minutes of your purchase, you will receive an email with your authorization code and details regarding the data subscription service. If the authorization code is not received within 10 minutes, please check your spam folder or contact Banner Engineering at 1-888-373-6767 to obtain the code.

Use both the website and the DXM Configuration Software to set up and configure your data collection. 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*




## Create a New Gateway

After you log into the Banner Cloud Data Services website, the **Overview** screen displays. Follow these steps to create a new monitoring site.

1. 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.
2. Verify **Traditional** is selected for the **Gateway Type**.
3. Enter a **Gateway Name**.
4. Select the **Company** from the drop-down list.
5. Copy the **Gateway ID** number located within the prompt window to your computer's clipboard.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The **Gateway ID** number created by the web server is a required parameter in the configuration of the DXM. The **Gateway ID** is the address the webserver uses to store the data pushed from the DXM.

6. Click **Submit** to close the prompt window.

## Connect the DXM700 to the Software and Download the Existing Configuration

Follow these steps to connect your DXM to the configuration software and download the existing configuration file from your DXM to your hard drive.

1. On the computer, download the DXM Configuration Software v4 from the Banner Engineering website and install it.
2. On the DXM: Apply power to the DXM.
3. Connect the DXM Controller to the computer with a USB cable or skip if the DXM is connected to the same network as the computer.
4. On the computer: Launch the DXM Configuration Software.
5. From the **DXM Model** drop-down list, select DXM700.
6. On the menu bar, go to **Device › Connection Settings**.
    - If you are using the USB cable, select **Serial**, then select the COM port that the USB cable is plugged into. Click **Connect**. If you are unsure which COM port and multiple appear, attempt to connect to each one of them until successful.
    - If you are connected to the same network as the DXM, select **TCP/IP** and enter the DXM IP address. Click **Connect**.
7. After the DXM is connected to the software, click **Device › Get XML configuration from DXM** to download the current XML file.
8. Name and save the file to the computer.

## Configure the DXM to Push Information to the Cloud

1. Within the DXM Configuration Software, go to the **Settings › Cloud Services** screen.
2. Set the **Server name/IP** to push.bannercds.net.
3. Select the appropriate **Push interface** to either Cellular or Ethernet.
    - To set up Ethernet, use the **Settings › Network** screen.
    - To set up cellular, refer to the Activating a Cellular Modem (p/n 205026) technical note.
4. Leave the **Cloud push interval** and **Sample count** unchanged. The DXM script controls this to push every 5 minutes.
5. Modify the **Cloud Permissions** for the registers.

    Registers are preselected to push to the cloud. Some registers can be removed if you are not using all 40 Nodes. Additional registers can be added by going to the Local Registers tab on the left. The preselected READ registers are 1-200 for the raw Node data, 201-240 for vibration failure mask info, 281-320 for Node connection status, and 5181-5660 for baseline/threshold data. The preselected READ/WRITE registers are 321-360, which are the re-baselining registers. READ/WRITE is used so the Baseline registers can be updated from the website from a 0 to a 1 to trigger a new baseline remotely.
    - Click on each register and edit the **Cloud Permissions** at the bottom of the screen; or
    - Choose the **Modify Multiple Registers** tab at the bottom of the **Local Register** screen to edit the **Cloud Permissions** for a block of registers
6. In the Web Server section, keep the **Site ID** is drop-down selection as GUID and paste the copied ID from the webpage into the **Site ID** field.

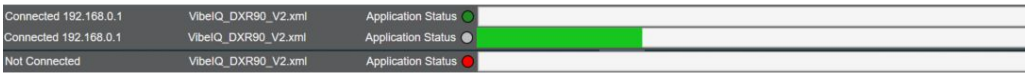
## Save and Upload the Configuration File

After making any changes to the configuration, you must save the configuration files to your computer, then upload it to the device.

Changes to the XML file are not automatically saved. Save your configuration file before exiting the tool and before sending the XML file to the device to avoid losing data. If you select **DXM › Send XML Configuration to DXM** before saving the configuration file, the software will prompt you to choose between saving the file or continuing without saving the file.

1. Save the XML configuration file to your hard drive by going to the **File › Save As** menu.
2. Go to the **DXM › Send XML Configuration to DXM** menu.

*Status indicator bar*




- If the Application Status indicator is red, close and restart the DXM Configuration Tool, unplug and re-plug in the cable and reconnect the DXM to the software.
- If the Application Status indicator is green, the file upload is complete.
- If the Application Status indicator is gray and the green status bar is in motion, the file transfer is in progress.

After the file transfer is complete, the device reboots and begins running the new configuration.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### Upload the XML Configuration File to the Website

To upload an XML configuration file to the website, follow these instructions.

1. On the BannerCDS website, select **Gateways** on the **Overview** screen.
2. On the row displaying your **Gateway**, click the **Details** under **View**.
3. Select **Edit Gateway**.
   The **Edit Gateway** prompt appears.
4. Click **Select File** under **Update XML**.
5. Select the file that was just updated to the DXM and click **Open**.
   After the XML file is loaded into the webserver, the webserver uses the register names and configurations defined in the configuration file. The same XML configuration file is now loaded on both the DXM and the Website. After some time, the data should be seen on the website.
6. To view the data from the Gateway's screen, click on the **Details** link for each **Gateway**.
   The Gateway **Details** screen lists the **Sensor** objects and default **Alarms** for that gateway. You may view the individual register information by selecting **Registers**.

Completing these steps creates continuity between the **Gateway** created on the website with the DXM used in the field. The DXM pushes data to the website, which can be viewed at any time.

## VNC Viewing on Laptop and Mobile Devices

The Solutions Kit HMI can be viewed and controlled through a VNC application on either a mobile phone, tablet, or laptop connected to the same network as the Solutions Kit. Follow the steps in the Tech Note to set up VNC remote viewing and control: View Solutions Kit Data on a Mobile Device or PC (b_4492805)

This creates continuity between the site created on the website with the DXM. If the DXM has network connection, it will upload data on its next cloud push interval.

To access a Demo version of the website, contact your local Banner distributor and follow the instructions in the technical note Connecting DXM Wireless Controller to Banner Web Services Demo Site for modified instructions on how to send data to the Demo site.

For additional advanced options using the DXM, such as sending email or SMS/text alerts, refer to the Vibration & Predictive Maintenance Solution Guide on the Banner Engineering website. NOTE: The files used in the Solutions Kit are slightly different than those used with the Solutions Guide and should NOT be installed on the DXM being used with the HMI. Use the DXM Configuration Software and perform a **Device › Get XML configuration from DXM** to make modifications to the file pre-loaded to the DXM in the Solutions Kit.

For additional information on any products, visit www.bannerengineering.com.

# Specifications for the Vibration Solutions Kit

**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

**Radio Range**

A 2 dB antenna ships with this device.

Transmit power and range are subject to many factors, including antenna gain, installation methods, characteristics of the application, and environmental conditions.

Please refer to the following documents for installation instructions and high-gain antenna options.

Installing Your Sure Cross® Radios (151514)
Conducting a Site Survey (133602)
Sure Cross® Antenna Basics (132113)

**Antenna Minimum Separation Distance**

900 MHz radios transmitting at ≥ 500 mW: 4.57 m (15 ft) with the supplied antenna

2.4 GHz radios transmitting at 65 mW: 0.3 m (1 ft) with the supplied antenna

**Radio Transmit Power**

900 MHz Conducted: 27 dBm (500 mW); EIRP with the supplied antenna: < 36 dBm

2.4 GHz Conducted: < 18 dBm (65 mW); EIRP with the supplied antenna: < 20 dBm (100 mW)

**Antenna Connection**

Ext. Reverse Polarity SMA, 50 Ohms

Max Tightening Torque: 0.45 N·m (4 lbf·in)

**Spread Spectrum Technology**

FHSS (Frequency Hopping Spread Spectrum)

**900 MHz Compliance (SX7023EXT Radio Module)**

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX7023EXT

Contains IC: 7044A-SX7023EXT

**2.4 GHz Compliance (SX243 Radio Module)**

Radio module is indicated by the product label marking

Contains FCC ID: UE3SX243

Radio Equipment Directive (RED) 2014/53/EU

Contains IC: 7044A-SX243

**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 octagon 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)


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**Operating Conditions**

HMI: 0 °C to +50 °C (+32 °F to +122 °F)
DXM: –40 °C to +85 °C (–40 °F to +185 °F)
DXM LCD: –20 °C to +80 °C (–4 °F to +176 °F)
Micro SD Card (if applicable): –25 °C to +85 °C (–13 °F to +185 °F)
90% maximum relative humidity (non-condensing)

**Certifications**

CE/UKCA approval only applies to 2.4 GHz models

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Park Lane, Culliganlaan 2F bus 3
1831 Diegem, BELGIUM

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

ANATEL
Agência Nacional de Telecomunicações
03737-22-04042

## 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.

## ANATEL

Este equipamento não tem direito à proteção contra interferência prejudicial e não pode causar interferência em sistemas devidamente autorizados.  Para maiores informações, consulte o site da ANATEL www.gov.br/anatel/pt-br/

ANATEL
Agência Nacional de Telecomunicações

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**THIS LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES WHETHER EXPRESS OR IMPLIED (INCLUDING, WITHOUT LIMITATION, ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE), AND WHETHER ARISING UNDER COURSE OF PERFORMANCE, COURSE OF DEALING OR TRADE USAGE.**

This Warranty is exclusive and limited to repair or, at the discretion of Banner Engineering Corp., replacement. **IN NO EVENT SHALL BANNER ENGINEERING CORP. BE LIABLE TO BUYER OR ANY OTHER PERSON OR ENTITY FOR ANY EXTRA COSTS, EXPENSES, LOSSES, LOSS OF PROFITS, OR ANY INCIDENTAL, CONSEQUENTIAL OR SPECIAL DAMAGES RESULTING FROM ANY PRODUCT DEFECT OR FROM THE USE OR INABILITY TO USE THE PRODUCT, WHETHER ARISING IN CONTRACT OR WARRANTY, STATUTE, TORT, STRICT LIABILITY, NEGLIGENCE, OR OTHERWISE.**

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For patent information, see www.bannerengineering.com/patents.

## Notas Adicionales (con Antena)

Información México: La operación de este equipo está sujeta a las siguientes dos condiciones: 1) es posible que este equipo o dispositivo no cause interferencia perjudicial y 2) este equipo debe aceptar cualquier interferencia, incluyendo la que pueda causar su operación no deseada.

Banner es una marca registrada de Banner Engineering Corp. y podrán ser utilizadas de manera indistinta para referirse al fabricante. "Este equipo ha sido diseñado para operar con las antenas tipo Omnidireccional para una ganancia máxima de antena de 6 dBd y Yagi para una ganancia máxima de antena 10 dBd que en seguida se enlistan. También se incluyen aquellas con aprobación ATEX tipo Omnidireccional siempre que no excedan una ganancia máxima de antena de 6dBd. El uso con este equipo de antenas no incluidas en esta lista o que tengan una ganancia mayor que 6 dBd en tipo omnidireccional y 10 dBd en tipo Yagi, quedan prohibidas. La impedancia requerida de la antena es de 50 ohms."

**Approved Antennas**


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**BWA-9O2-C**--Antena, Omni 902-928 MHz, 2 dBd, junta de caucho, RP-SMA Macho
**BWA-9O5-C**--Antena, Omni 902-928 MHz, 5 dBd, junta de caucho, RP-SMA Macho
**BWA-9O6-A**--Antena, Omni 902-928 MHz, 6 dBd, fibra de vidrio, 1800mm, N Hembra
**BWA-9Y10-A**--Antena, Yagi, 900 MHz, 10 dBd, N Hembra

## Mexican Importer

Banner Engineering de Mèxico, S. de R.L. de C.V. | David Alfaro Siqueiros 103 Piso 2 Valle oriente | San Pedro Garza Garcia Nuevo Leòn, C. P. 66269

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