Pressure Monitoring Solutions Kit

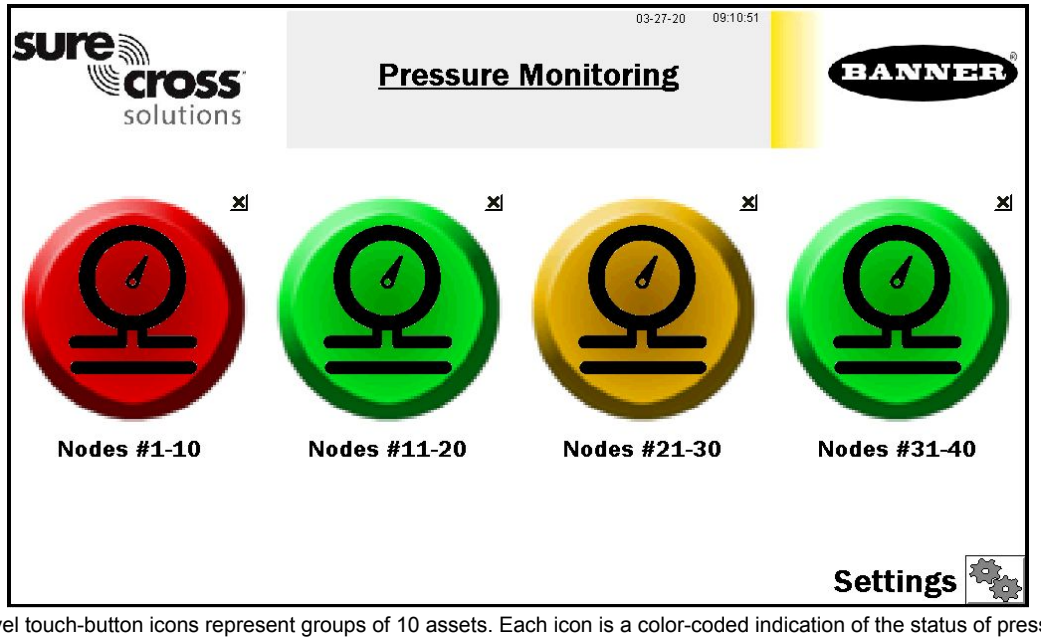
The Pressure Monitoring Solutions Kit provides visual status for up to 40 Banner pressure sensors attached to Performance Series Nodes that are bound to the included DXM Wireless Controller. This provides a simple and effective way of monitoring the pressure of many locations from one centralized point.

The Solutions Kit uses a unique version of the Banner scripting software to program the DXM Wireless Controller. The sensor Nodes take a data sample every five minutes and the software compares the sensor data to user-defined low or high warnings and/or alarms for a visual indication of a potential problem. The kit also indicates the communication status for each Sensor Node.

The following items are included with the Pressure Monitoring Solutions Kit:

- 10" Banner Touch Screen HMI with Ethernet connection
- DXM700-B1R1 Wireless Controller (900 MHz)
- Five-port Ethernet switch
- M12 power input connector
- 14 inch x 12 inch Polycarbonate enclosure, DIN rails, and terminal blocks

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



The four top-level touch-button icons represent groups of 10 assets. Each icon is a color-coded indication of the status of pressure warnings or alarms or wireless Node connection status within that group. Touch each button to display the status of the Nodes and access more details about each Node.

Touch the **X** in the upper right corner of each icon to hide that group of assets and prevent Node status alerts for any Nodes within that group. Use the button that appears after pressing the X to unhide that group for future expansion.

Settings accesses Node binding, Node site survey, alarm settings, log file downloads, and other settings.

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

Original Instructions
10-Oct-24

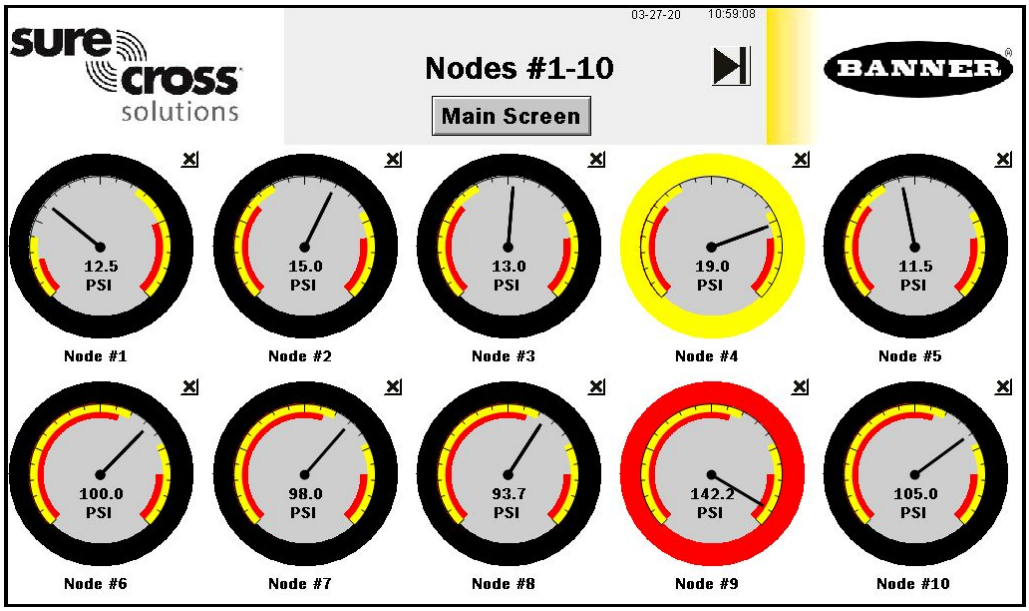
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216324
p/n: 216324 Rev. F

ПРОМЭЛЕКТРОНИКА/ sales@prom-elec.com

Pressure Node Group Screens

Each asset/Node group on the main page has a screen of 10 individual icons, one for each Sensor Node. These icons represent the alarm status along with a pressure gauge and raw sensor readings as shown.



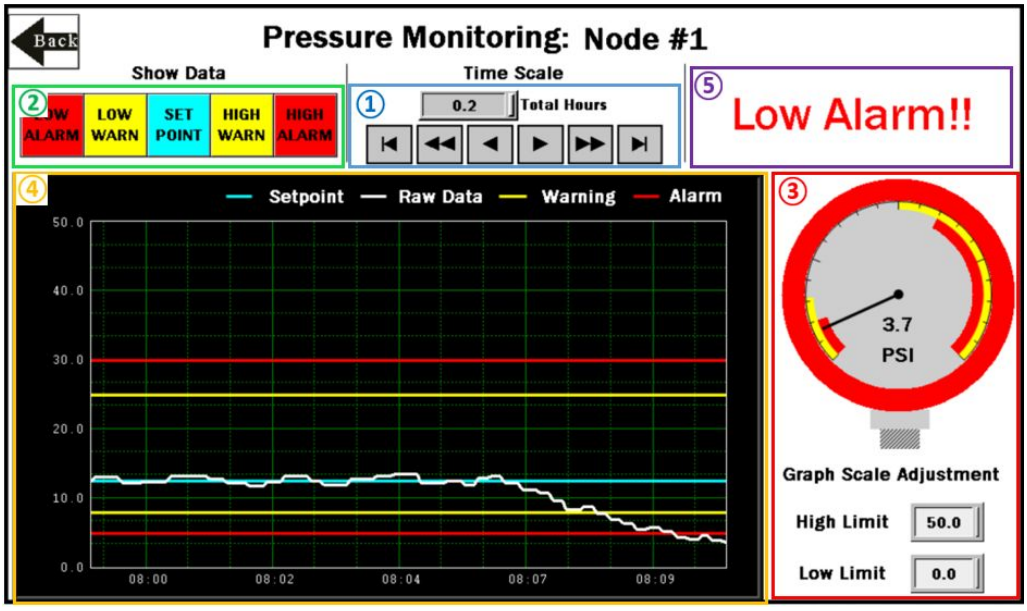
Touch any icon to access that Sensor Node's screen, which includes historic graphs and raw data.

Touch the **X** in the upper right corner of each icon to hide that Node and prevent that Node's status alerts from appearing on the main HMI screen. Touch the button again to unhide that Node.

Touch the Node's label to edit the label. The label remains in non-volatile memory and appears on the Node's status screen, binding screen, site survey screen, and alarm setting screens.

Pressure Node Status Screen

Select an individual Node icon to display that Node's status.

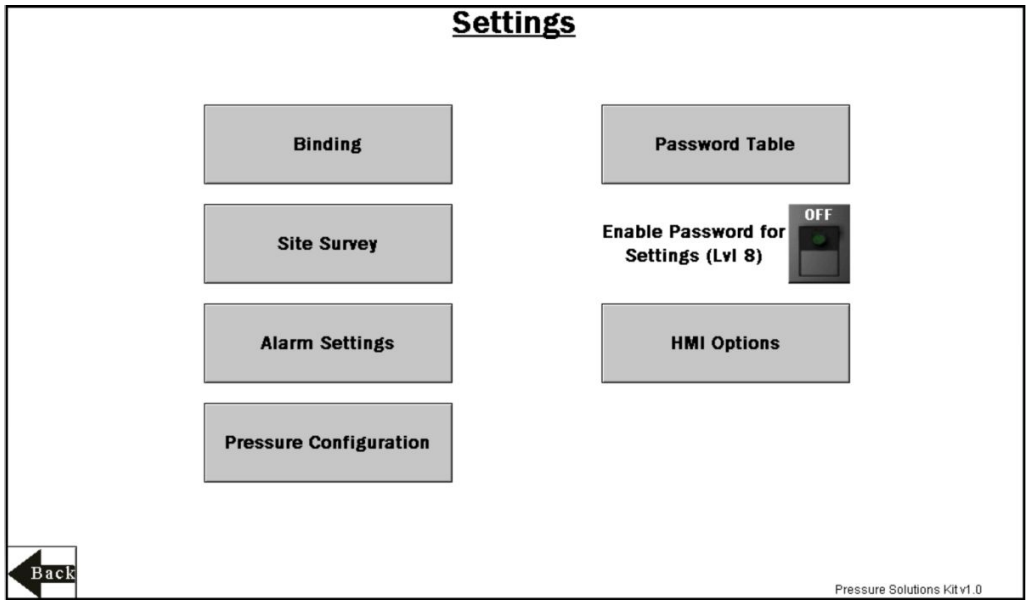


1. Select the time scale of the graph from 0.1 to 168.0 total hours. The arrow keys scrolls right or left to see different periods of the collected data. The 168 hours (7 days) is the maximum for viewable data on the HMI.
2. This area allows you to turn the warning, alarm, and setpoint lines on or off. This is only for the trend graph and does not disable the warning and alarms. If a value is 0 in the Pressure Alarm Settings page, the Sensor Node defaults to an off state.

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3. Scaled data of the pressure level including units. The outside of the gauge indicates the warning or alarm state of the Node based on the thresholds set on the alarm settings screen. High and low limits of the gauge and graph match the values set by **Graph Scale Adjustment**. These values default to the full scale of the Node but can be adjusted to show a more specific range.
4. Graphical representation of pressure, setpoint, warning levels, and alarm levels.
5. Current warnings or alarms are displayed here.

Settings Screen



Alarm Settings

Assign setpoint (optional) and set alarm and warning thresholds for pressure on both high and low levels.

Binding

Bind each Sensor Node to the Solutions Kit.

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 888888888. To change your password, click **Password Table** and change the password for level 8 to any number up to 9 numbers long.

HMI Options

Copy and manage HMI log files, configure the HMI for advanced options, and display an Icon Legend and Graph Legend.

Pressure Configuration

Select the units for the entire kit and range each of the pressure Nodes.

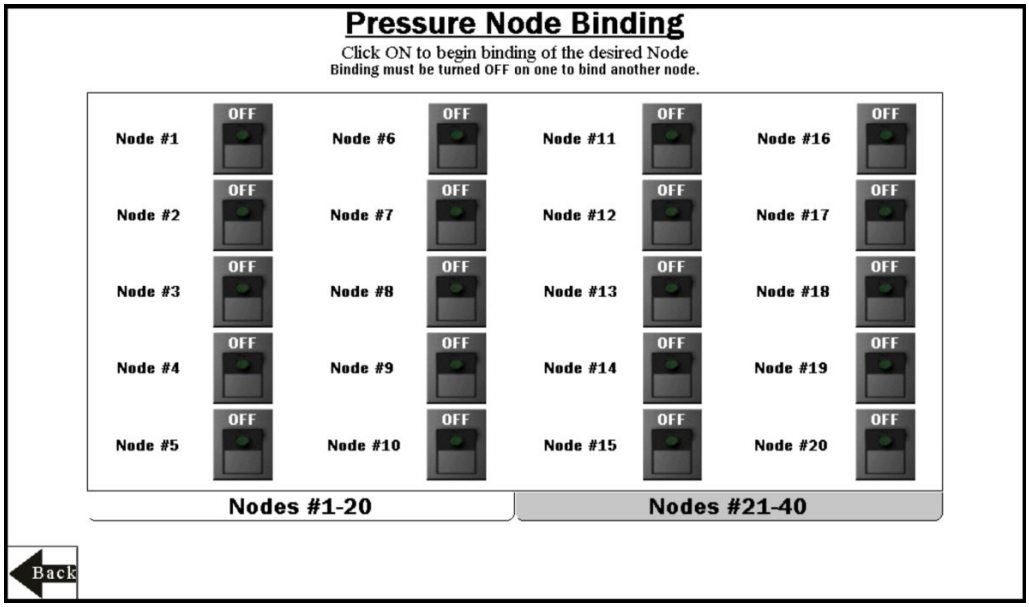
Site Survey

Perform a site survey on any sensor node previously bound to the Solutions Kit.

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Pressure Node Binding Screen

Banner Wireless Q45 or DX80 Nodes combined with Banner pressure sensors must be bound to the DXM Wireless Controller to begin communicating.



During the binding procedure, the Q45/DX80 Nodes are assigned a Node address and begin communicating with the DXM. Each Node must be bound one at a time, and a new Node and sensor can be added at any time.

Perform a site survey on each Node after they are installed to ensure proper radio communication between the Nodes and DXM.

Bind a Node

Follow these instructions to bind each of your Nodes to the DXM Controller client radio.

1. On the HMI, turn on binding for a Node by touching the ON/OFF rocker switch on the HMI screen for the desired Node.
2. Enter binding mode on the Node.
   - For Q45 Nodes—Triple-click the binding button under the Q45 lid.
   - For Performance DX80 Nodes—Triple-click button 2.

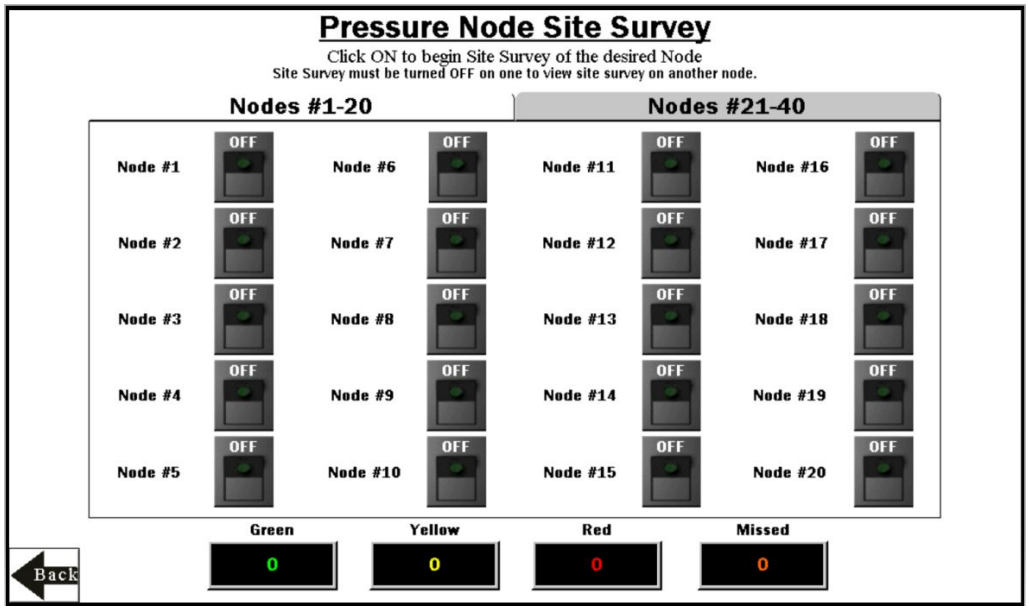
   The Node enters binding mode. After the Node is bound, the LEDs stay solid momentarily, then they flash together four times. The Node automatically exits binding mode.
3. On the HMI, touch the same ON/OFF rocker switch to turn the switch to **OFF**.
   The DXM exits binding mode. After the DXM is out of binding mode, the Node's indicator LED flickers green when the Node is in sync with the DXM.
4. Repeat steps 1–3 for as many Nodes as are needed for the system.

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

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Pressure Node Site Survey Screen

Perform a site survey on each Q45 or Performance DX80 Node after they are installed to ensure a good radio connection between the Nodes and DXM client radio.



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.

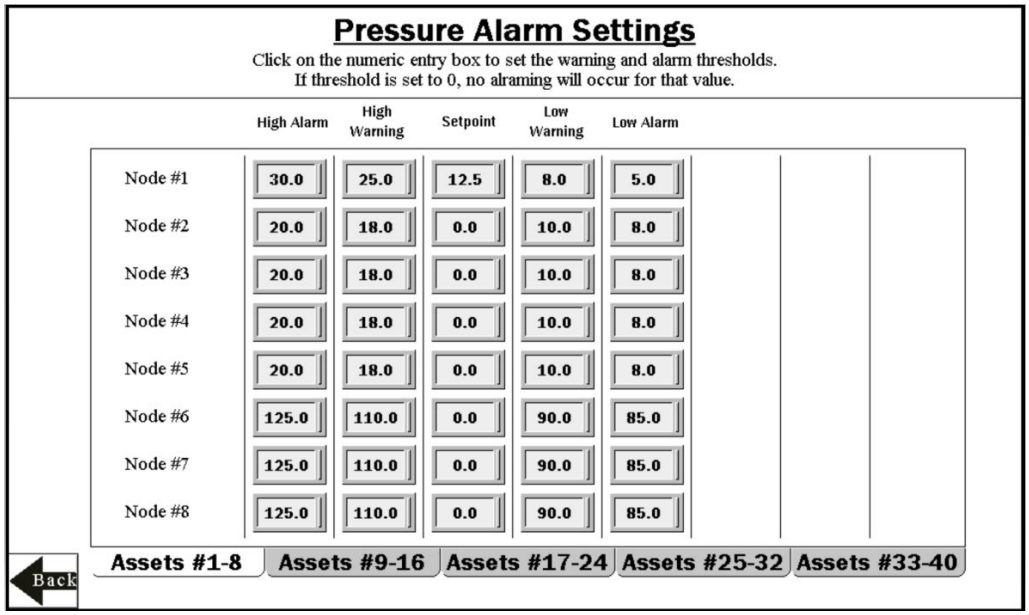
1. On the HMI, touch the ON/OFF rocker switch for the desired Node to turn on Site Survey mode for that Node.
   If the Node is communicating with the DXM, the results display at the bottom of the HMI screen. The results add up to a total of 100. It takes several seconds for the first 100 packets to 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.

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Pressure Alarm Settings Screen

Each Pressure Sensor Node reports back data in psi. The operating maximums depend on the pressure sensor that you are using. Alarm settings are saved in non-volatile memory and are not lost during a power outage or reboot.

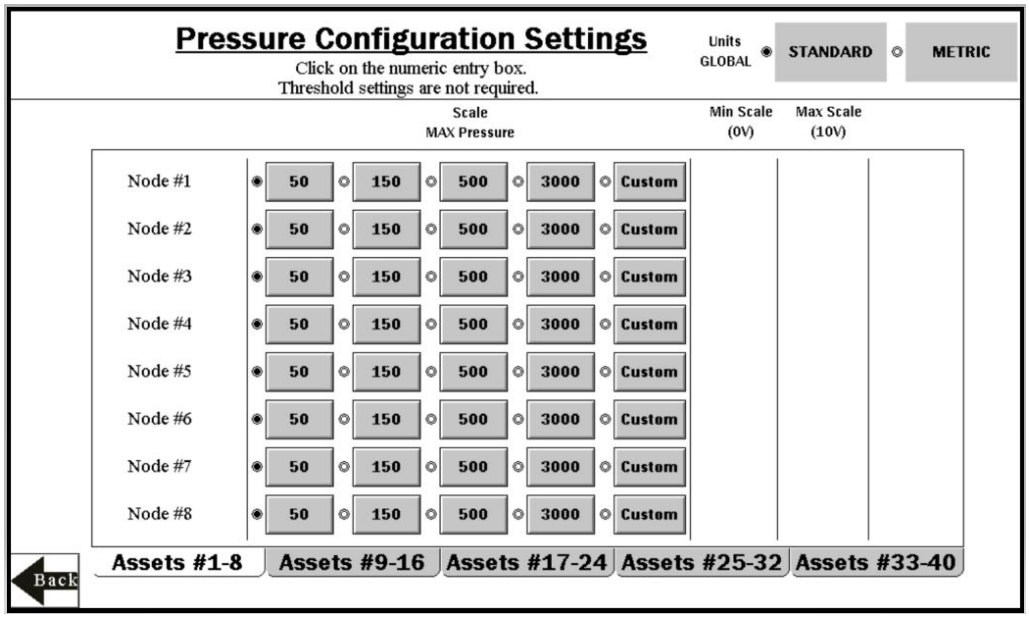


Each Pressure Sensor Node can have low and high warning and/or alarm levels. Set those values between 0 and 6500. Note that the alarm values do not change when the units change. If you change from psi to bar, adjust your values accordingly. Leave the values at 0 for Low and 3000 for High if you are not using that warning or alarm.

Use the tabs **Assets #1-8**, **Assets #9-16**, **Assets #17-24**, **Assets #25-32**, and **Assets #33-40** to access alarm settings for up to 40 Sensor Nodes.

Pressure Configuration Settings Screen

Each pressure sensor Node is scaled from the factory in psi (pounds per square inch). Select from 50, 150, 500, or 3000 psi based on the model you've purchased. This is required for the screen to display the correct values. Configuration settings are saved in non-volatile memory and remain through a power outage or reboot.



If you would like use your own pressure sensor, select the Custom value. (Banner recommends model DX80N9X1S-P14 or DX80N9X1W-P14L with a 0–10 V DC analog sensor wired into input 2). If you select Custom, you must also configure the Minimum Scale (0 V) and Maximum Scale (10V).

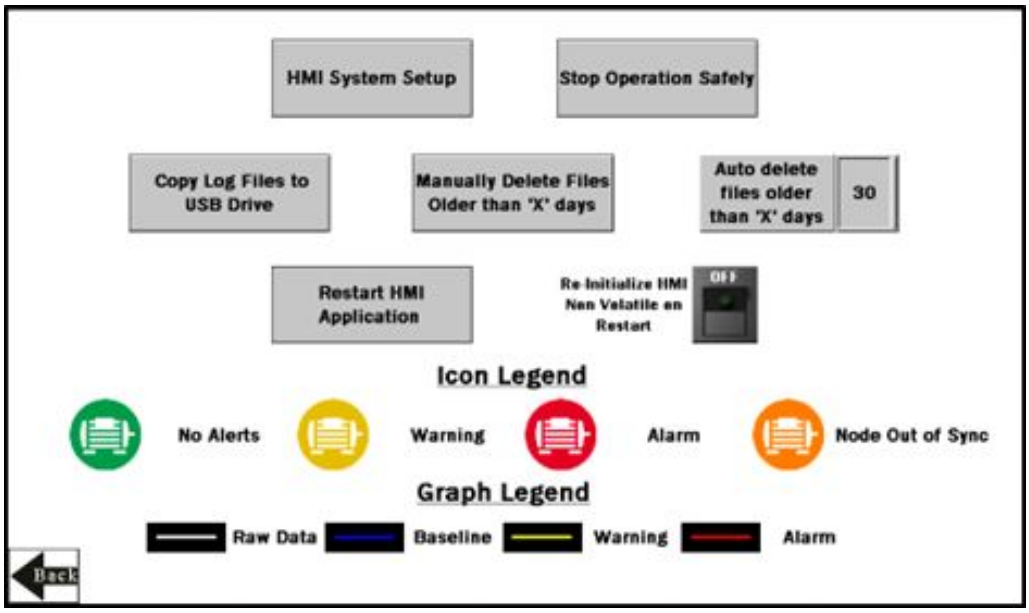
To change the values to the metric unit of pressure (bar), toggle the **Units GLOBAL** selection in the upper right corner. This re-scales the raw value but will not change any warning or alarm values that have already been configured.

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Use the tabs **Assets #1-8**, **Assets #9-16**, **Assets #17-24**, **Assets #25-32**, and **Assets #33-40** to access configuration 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 30 minutes and a new file is generated every day and stored in monthly folders. The HMI has storage for about 90 days of log files.

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.

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

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.

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.

Auto Delete Files Older than 'X' Days
The HMI auto deletes files older than the selected number of days. Default is 30 days with a maximum of 90 days.

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

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.

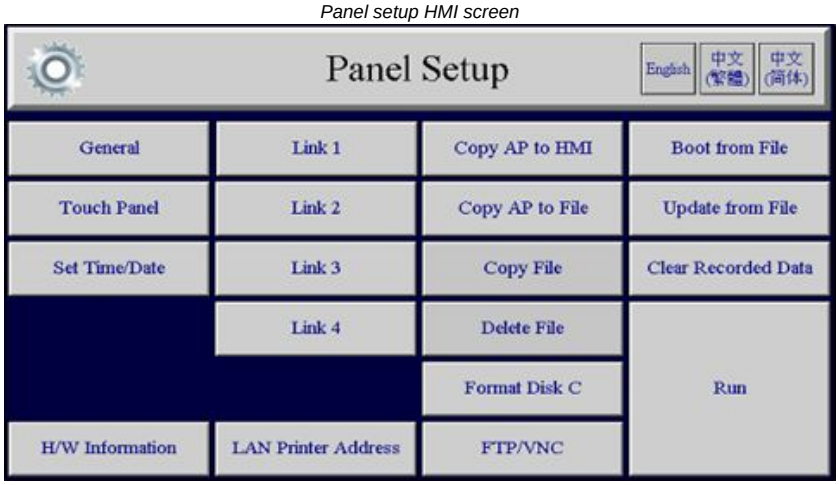
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Connect the DXM and HMI to a Wide Area Network (WAN)

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.
    - 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).

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**.

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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.

   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.

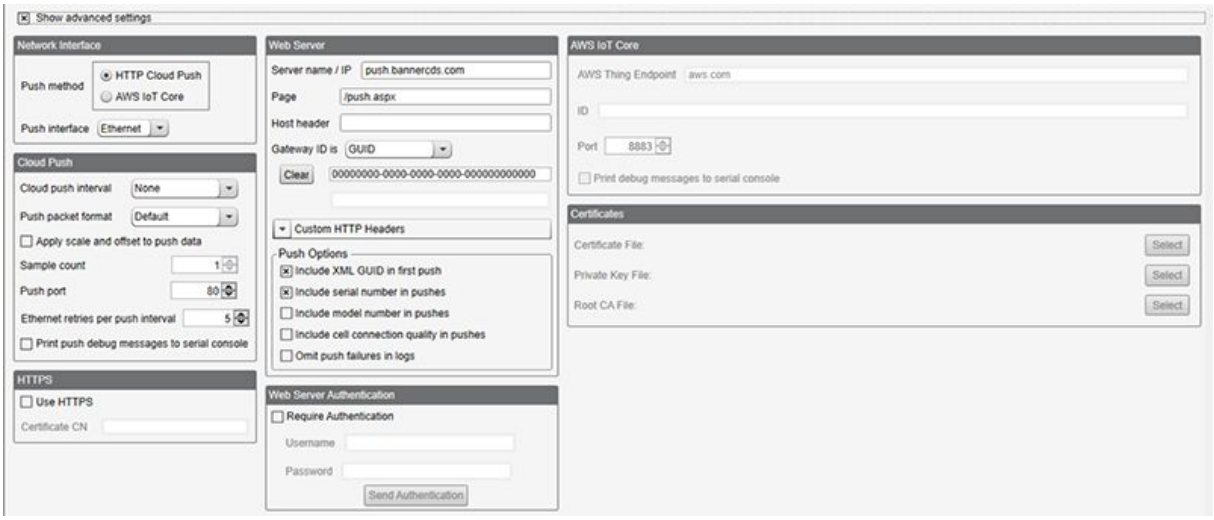
Connect the DXM700 to the Software and Download the Existing Configuration

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.com.
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 1-40 for the scaled pressure data, 41-80 for node connection status, and 301-340 for alarm bit packed information.

   The preselected READ/WRITE registers are 7001-7200 (warning and alarm level settings), 7281 (standard or metric units), 7301-7340 (pressure scale for each node), and 7401-7480 (custom scaled analog values). These READ/WRITE registers are configured to only push once per day at UTC 00:00 to avoid pushing unnecessary data points. READ/WRITE is used so the threshold registers can be updated/changed from the website.

   To modify registers either:

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- 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.

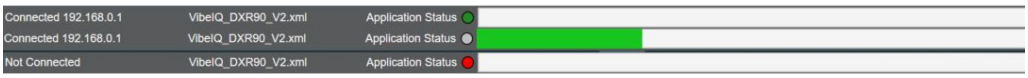
Save and Upload the Configuration File

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.

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.

Pressure Monitoring Solutions Kit Specifications

Radio Range	A 2 dB antenna ships with this device.

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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)

Supply Voltage

24 V DC (±10%) ((use only with a suitable Class 2 power supply (UL) or a SELV (CE) power supply)

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 (table top)

Power Consumption

9 W average; 30 W maximum

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)

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

Certification

CE/UKCA approval only applies to 2.4 GHz models

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

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.

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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/

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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

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

81 8363.2714

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