

# Wireless Vibration and Temperature Monitoring



Vibration monitoring and predictive maintenance made easy with a full solution from Banner

- Detect problems early
- Prevent unexpected downtime
- Plan maintenance efficiently





# Vibration Monitoring for Predictive Maintenance

## Why Monitor Vibration?

- Reduce downtime – eliminate unexpected failures
- Detect problems early – avoid additional damage to machines
- Efficiently manage replacement parts
- Track machine faults and warranty

## How Does It Work?

- Banner vibration sensors measure several vibration characteristics and wirelessly sends the data to the DXM controller
- The DXM controller collects the data and can be programmed to automatically establish baselines and set warning and alarm thresholds
- The Vibration Solutions Kit (see page 6) is completely pre-programmed and displays data locally on the HMI or can send data to the network or the cloud
- Banner's wireless vibration monitoring system easily integrates with legacy machines

### Machine Learning

- Banner's machine learning algorithm automatically establishes a machine's baseline using the first 300 data samples
- It then sets warning and alarm thresholds for both acute and chronic conditions for each machine

## What to Monitor

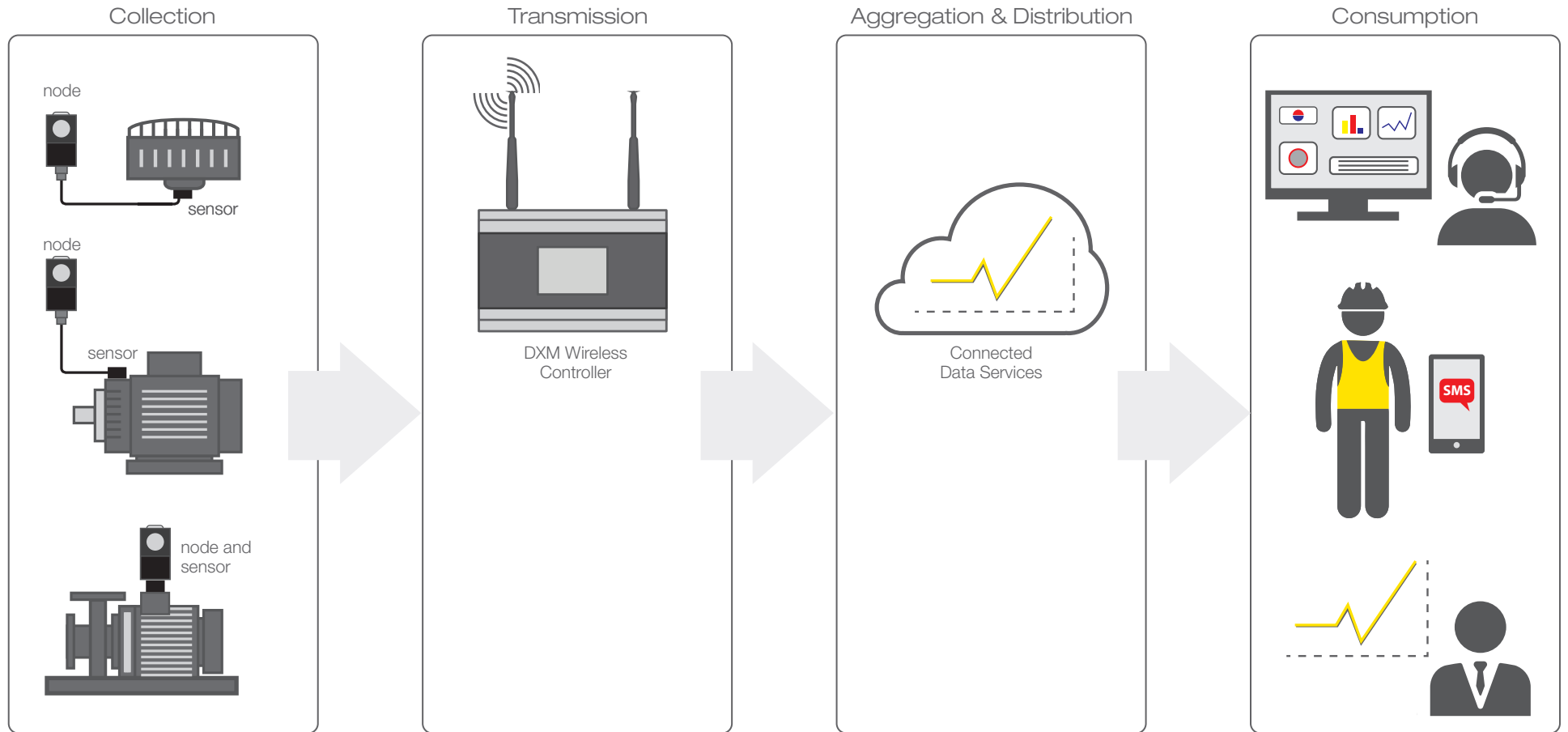
### Vibration Characteristics:

- RMS velocity = general machine health
- High frequency RMS acceleration = early bearing wear

### Common Equipment:

Motors	Compressors
Pumps	Gear boxes
Exhaust fans	Spindles
HVAC	Any rotating equipment

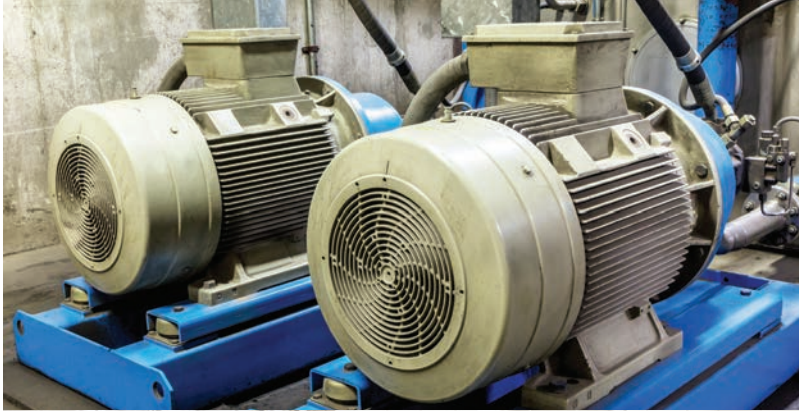
# End-to-End Vibration Monitoring Solution



## IIoT Condition Monitoring

All of the critical components of condition monitoring are provided by Banner Engineering and designed to work seamlessly together. Solution Guides are available that make it easy to setup a complete system in days, not weeks or months. Banner Connected Data Services (CDS) provides a codeless environment and easily interfaces with the DXM controller to receive vibration data from Banner vibration sensors via wireless nodes. The DXM controller, using a machine learning algorithm, establishes vibration baselines and automatically sets warning and alarm thresholds.

# Easy Installation of Wireless Remote Monitoring



## Q45VA

- All-in-one vibration and temperature sensor/node
- Uses a 1-wire serial interface
- Easy-to-deploy



OR

## QM30VT1

- 1-wire serial interface
- One vibration sensor to one node with 1-wire serial interface



Select One  
Wireless Node

OR

## QM30VT2

- Functions as a modbus slave device via RS-485
- Can be connected via a wireless or wired modbus network
- Aluminum and stainless steel housings available



Select  
Modbus  
Radio

Select  
Q45VA



### Simple Monitoring

Q45VTP

- Easy-to-use without software
- Two AA lithium batteries
- DIP switch configurable for vibration characteristics and sample intervals



### Monitor Many Sensors Over Long Distances

Performance Series Nodes

- Expandable up to 47 Nodes
- Cover large areas with 900 MHz, 1 Watt power
- D-cell lithium battery or 10 to 30 V dc
- Models available that also monitor current



### Modbus Slave

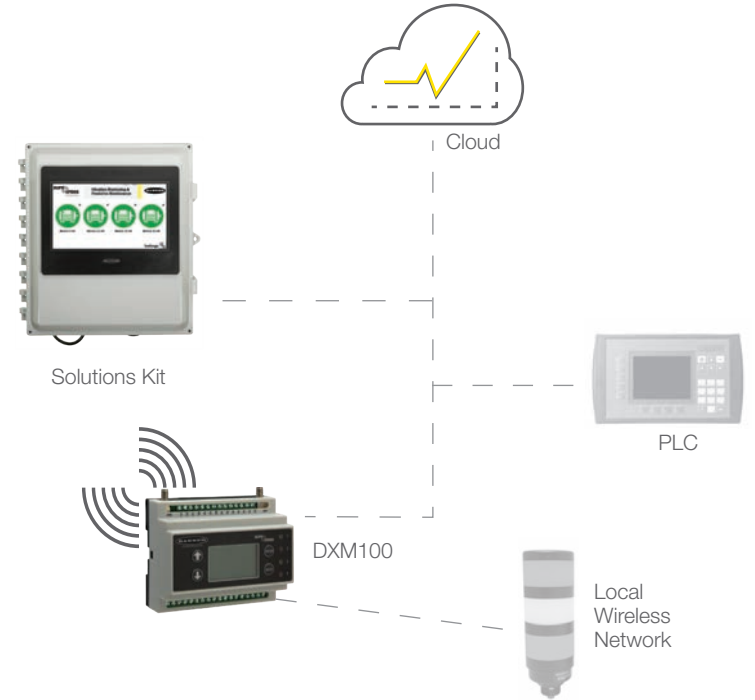
MultiHop Modbus Slave with RS-485

- Connect to any modbus network
- Expanable up to 100 slave radios
- Use repeaters to extend range and circumvent obstacles
- Modbus host controller required

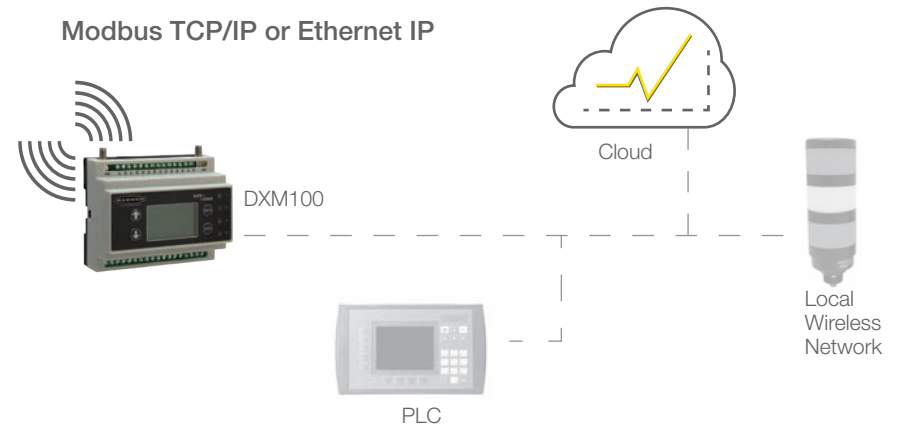
Select One

Select One

### Modbus TCP/IP or Ethernet IP



### Modbus TCP/IP or Ethernet IP





QM30VT Series Sensor

QM30VT1

- Vibration & temperature sensor
- One sensor per node
- Uses a 1-wire serial interface
- Dual axis vibration sensing
- Sealed aluminum housing

QM30VT2

- Vibration & temperature sensor
- Functions as a Modbus slave device via RS-485
- Dual axis vibration sensing
- Sealed aluminum and stainless steel housings
- Can connect to a wireless or wired Modbus network

Models	Description
QM30VT1	Vibration and temperature sensor with 1-wire serial interface; 2.09 m QD cable
QM30VT2	Vibration and temperature sensor that functions as a modbus slave device via RS-485; 2.09 m QD cable
QM30VT2-SS-9M	Vibration and temperature sensor with stainless steel housing that functions as a modbus slave device via RS-485; 9 m cable with flying leads



Q45VA Sensor/Node

- Vibration and temperature sensor and node in one compact package
- Uses a 1-wire serial interface
- Easy-to-order
- Easy-to-deploy
- DIP switch configurable for vibration characteristics and sample intervals
- Dual-axis vibration sensing

Models	Description
DX80N9Q45VA	All-in-one Vibration and Temperature sensor – 900 MHz
DX80N2Q45VA	All-in-one Vibration and Temperature sensor – 2.4 GHz



Vibration Solutions Kit

- Monitor vibration and temp on up to 40 assets
- Pre-programmed DXM700 and HMI for easy setup – no programming required
- Simply bind nodes using the HMI screen, install sensors (sold separately), and start collecting data
- Machine learning algorithm automatically sets baselines and thresholds
- Visualize data and alarms on the HMI, or send it to the network or the cloud
- Use Virtual Network Computing (VNC) to emulate the HMI screen on computers and mobile devices

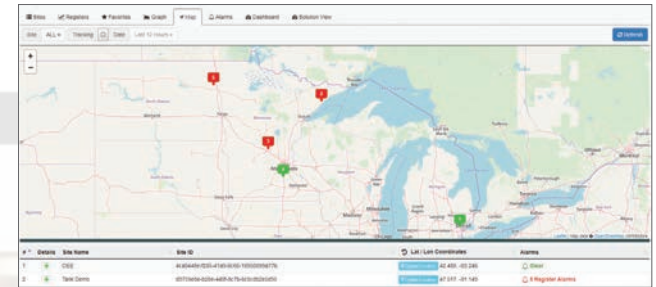
Models	Description
SOLUTIONSKIT2-VIBE	2.4 GHz; Enclosure, DXM700
SOLUTIONSKIT2-VIBE-Q	2.4 GHz; Enclosure, DXM700, one DX80N9Q45VT Node and one QM30VT1 Sensor
SOLUTIONSKIT2-VIBEMETRIC	2.4 GHz; Enclosure, DXM700 (metric)
SOLUTIONSKIT9-VIBE	900 MHz; Enclosure, DXM700
SOLUTIONSKIT9-VIBE-Q	900 MHz; Enclosure, DXM700, one DX80N9Q45VT Node and one QM30VT1 Sensor
SOLUTIONSKIT9-VIBEMETRIC	900 MHz; Enclosure, DXM700 (metric)

# Connected Data Services (CDS)

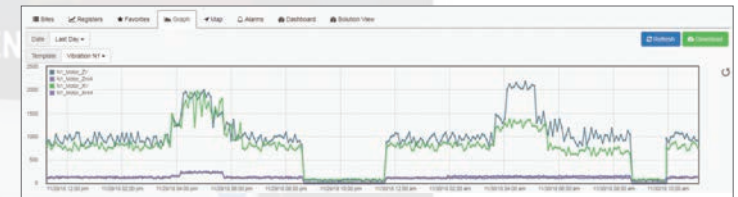
Banner CDS is a cloud-based software platform that allows users to access, store, protect, and export critical data collected by Banner's wired and wireless sensors.

The screenshot displays a 'Conglomerate/Business management tools' interface. On the left, a table lists various companies with columns for Company, Data Received, Points per Hour, Used Points/Max Points, Emails Sent, Company, Check, Email, Subscription Type, Account Type, Year, Site, Account, Email, Banner, User Login, Updates, and Front-End URL. On the right, a 'New Company' form is shown with fields for Conglomerate (set to 'Demo Midwest Region'), Company Name, Days Data Retained (330), Max Data Points (300000000), Points per hour (60000), Max Users (500), Max Sites (500), Emails per hour (500), Time Zone Offset (-5 CEST), DST (Southern Hemisphere), Banner Image (No file chosen), and Contact Email.

Conglomerate/Business management tools



Device geo information with health status



Custom graphing with alert baselines

The screenshot shows a 'Factory One Vibration' dashboard. It features multiple widgets for temperature (N1 Temp, N2 Temp, N3 Temp) and vibration (Vibration N1 Ver, Vibration N2 Ver, Vibration N3 Ver) with associated alarm indicators and data visualizations.

Customizable and codeless dashboards

Type	Alarm Name	Site Name	Condition	Timestamp	Status	Email	Email 1	Email 2	Email 3
Connectivity	Connectivity	OEE	Warning after 30 minutes. Critical after 60 minutes	11/00/2018 09:16 am	Clear				
Connectivity	Connectivity	Tank Demo	Warning after 30 minutes. Critical after 60 minutes	11/00/2018 09:17 am	Clear				
Connectivity	Connectivity	Temperature/Freezer	Warning after 30 minutes. Critical after 60 minutes	11/00/2018 09:16 am	Clear				
Connectivity	Connectivity	Temperature/House	Warning after 30 minutes. Critical after 60 minutes	11/00/2018 09:16 am	Clear				
Connectivity	Connectivity	Vibration	Warning after 30 minutes. Critical after 60 minutes	11/00/2018 09:16 am	Clear				
Register	TL1 Alarm	OEE	TL 1 Mod3 Status (0) - Critical when > 1 for 30 minutes	10/14/2018 10:53 pm	Clear				

Condition-based alerts and notifications (e-mail, SMS)

The screenshot shows an 'FTP' management interface. It includes a table for existing FTP configurations and a 'Create New FTP' form.

Edit	Site Name	Report Type	Run Frequency	FTP Address	FTP User	Status	FTP History	Retries
<a href="#">Edit</a>	ALL	Alarms	Weekly			Success	<a href="#">History</a>	0
<a href="#">Edit</a>	ALL	Registers	Weekly			Success	<a href="#">History</a>	0
<a href="#">Edit</a>	ALL	Upload Logs	Weekly			Success	<a href="#">History</a>	0
<a href="#">Edit</a>	Distribution Vibe	Registers	Hourly			Success	<a href="#">History</a>	0

The 'Create New FTP' form includes fields for Report Type (Registers), Site Name (ALL), Run Frequency (Hourly), FTP Address (adc.adreps.com), User Name (juser), and Password (pass).

Long term data storage and offloading via FTP


## Nodes

For use with VT1 Sensors

Models	Description	Frequency
 DX80N9Q45VTP	Q45 Vibration and Temperature Node with 1-wire serial interface	900 MHz
DX80N2Q45VTP		2.4 GHz
DX80N9X1S-P6	1-wire Serial Performance Node with integrated battery	900 MHz
 DX80N2X1S-P6		2.4 GHz
DX80N9X6S-P6	1-wire Serial Performance Node 10 to 30 V dc	900 MHz
 DX80N2X6S-P6		2.4 GHz
DX80N9X1W-P6L	1-wire Serial Performance Node with integrated battery, internal antenna, no LCD or rotary dials	900 MHz
 DX80N2X1W-P6L		2.4 GHz
DX80N9X1W-CM1L	Condition Monitoring Node Input: VT1 Vibration sensor and Current Transformer	900 MHz
 DX80N2X1W-CM1L		2.4 GHz
DX80DR9M-H6	1-wire Serial Modbus MultiHop Slave with integrated battery	900 MHz
DX80DR2M-H6		2.4 GHz

## Data Radios

For Use with VT2 Sensors

Models	Description	Frequency
 DX80DR9M-H	MultiHop Modbus Radio with RS-485	900 MHz
DX80DR2M-H		2.4 GHz
DX80DR9M-H1	MultiHop Modbus Radio with RS-485 and counter input	900 MHz
DX80DR2M-H1		2.4 GHz
DX80DR9M-H1E	MultiHop Modbus Radio with RS-485 and counter input — battery	900 MHz
DX80DR2M-H1E		2.4 GHz

See website for other models

## Wireless Gateways/Controllers

DXM700 Controller

Models	Description	Frequency
 DXM700-B1R1	DXM700 Controller with DX80 Gateway Performance	900 MHz
DXM700-B1R3		2.4 GHz
DXM700-B1R2	DXM700 Controller with MultiHop Data Radio	900 MHz
DXM700-B1R4		2.4 GHz

See website for other models



## Connected Data Services (CDS) Software Packages

Models	Description
806252	Starter Package 1,000 Data Points per hour Total Storage: 2 million Data Points
806253	Standard Package 4,000 Data Points per hour Total Storage: 20 million Data Points
806254	Premium Package 12,000 Data Points per hour Total Storage: 100 million Data Points

## Accessories



BWA-BK-013  
Magnet



BWA-BK-012  
Stainless Steel



BWA-BK-014  
Aluminum



BWA-BK-009



BWA-BK-010  
Magnet



5-Pin M12/Euro-Style—  
Double-Ended

Length	Model
0.31 m (1 ft)	DEE2R-51D
0.91 m (3 ft)	DEE2R-53D
2.44 m (8 ft)	DEE2R-58D



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