

PATHWAYS7

Information Systems for Industrial Automation



Streamlining critical machine parts replacements.

REAL-TIME MACHINE MONITORING

ROA WITH OEE 3

*ORGANIZATIONAL
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*VIBRATION &
TEMPERATURE
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*IIoT APPLIANCE
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*CMMS -
COMPUTERIZED
MAINTENANCE
MANAGEMENT
SYSTEM* 8

COMPANY 9

Connect CMMS to
vibration and temperature
sensors to
replace critical parts
before failure.

AVAILABILITY

Vibration sensors detect rotating machinery. The run flag's state is communicated through a secure network appliance with CMMS and ERP.

X

PERFORMANCE

All sensor data is communicated with database servers. Run-time data is used in comparison to the total planned production time of an asset.

X

QUALITY

Sensor signals are converted and connected to common database servers to be used with any software counting usable units produced.

= OEE



An increase in OEE of around 10-15% can translate to a 50% improvement in Return on Assets (ROA).

Hansen, R. C. (2002). Overall equipment effectiveness: A powerful production/maintenance tool for increased profits. NY, NY: Industrial Press.

Continuous Monitoring, Network Security, and Built-in Integration



Continuous monitoring of vibration and temperature on rotating machinery improves reliability and productivity of assets. Alarms are triggered according to algorithms using ANSI standards for bearing thresholds. Improved OEE contributes to operating income growth.



Network security designed into an IIoT appliance protects industrial control systems from Windows updates and ensures IT's network integrity. Two ethernet ports are separated by a hardware firewall, each with their own unique Network Interface Card (NIC).



Built-in integration of device drivers for industrial control systems and database connectors simplify CMMS operation and reporting. Maintenance workflow processes are triggered from sensor signals mapped with database records for use with CMMS and ERP.

Real-time Machine Monitoring

3 Options for Predicting Machine Parts Failure to Prevent Machine Down Time

1

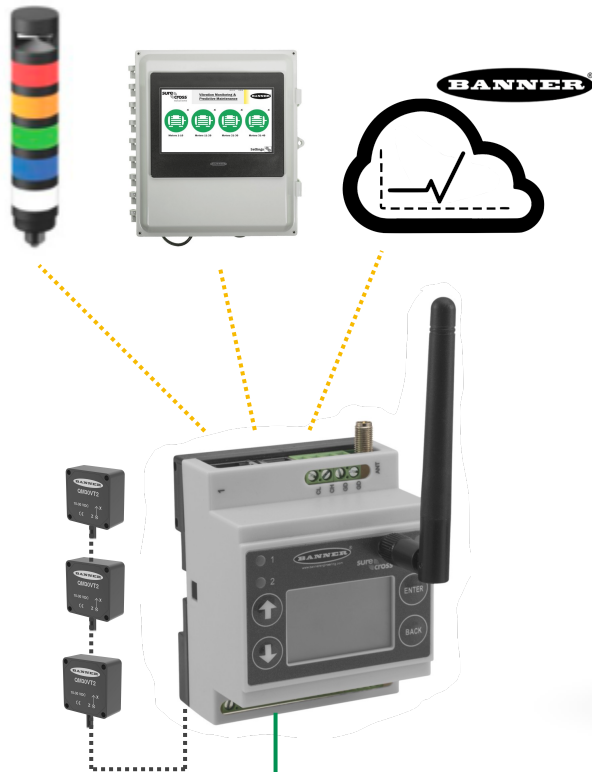
Line-side Indicators
talking directly with the gateway

2

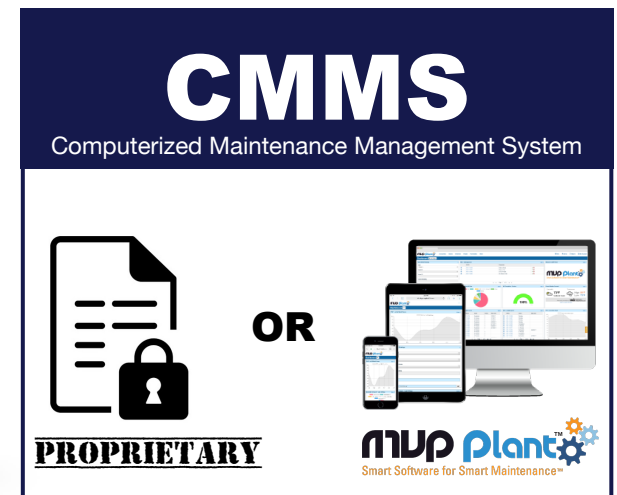
Cloud-based Dashboards
and remote monitoring

3

Secure Enterprise Solution
networked to CMMS



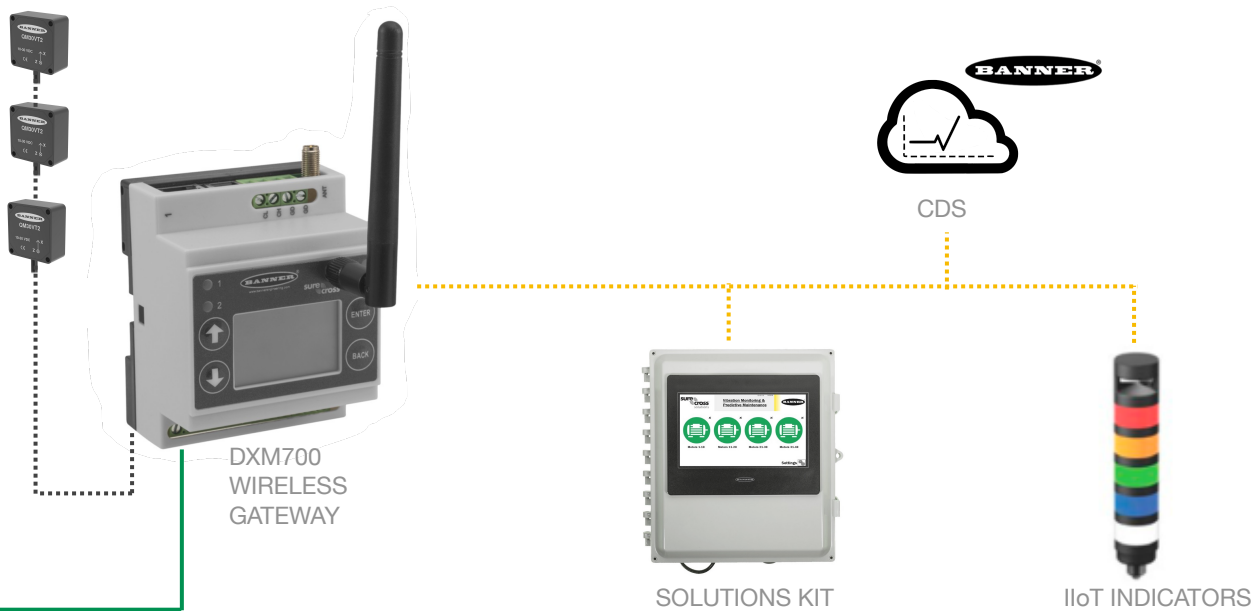
2



1

3

VIBRATION &
TEMPERATURE
MONITORING
SENSORS



Continuously monitor machine health, run time, and detect unexpected machine failures such as early bearing failure, unbalance, misalignment, etc. Connected to the IIoTA appliance server, it's the ultimate predictive maintenance tool for wireless vibration and temperature monitoring.

Modbus TCP

QM30VT Series Sensors

- Dual-axis vibration detection up to 4 kHz bandwidth
- Output actionable data such as RMS Velocity, RMS High Frequency Acceleration, Peak Velocity, etc., which is pre-processed from the vibration waveforms in the sensor.
- Provides high accuracy vibration and temperature measurements
- Industrial grade sensor with small form factor to fit into tight locations
- Manufactured with a sealed aluminum housing
- Connects to Sure Cross Wireless radios for easy set-up, fast installation, and long battery life in even the most rugged, hard-to-reach locations
- Designed to work with 1-wire serial interface radios

DXM700 Controller/Wireless Gateway

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

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

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.

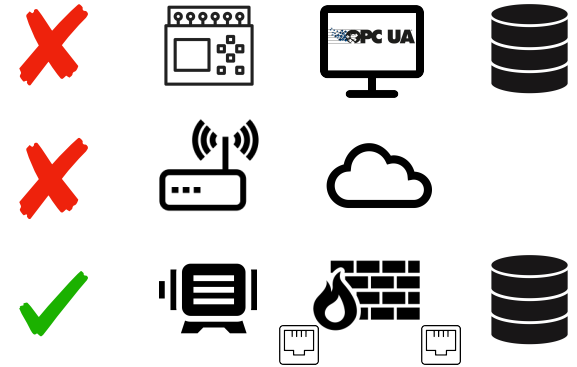
Industrial Protocols

Modbus TCP, Ethernet/IP



Built-in applications simplify IIoT communication and IT security.

Gather real-time monitoring data that can be securely communicated beyond the PLC without controls engineers or systems integrators. Maintenance can finally gather predictive data for critical assets while respecting engineering's controls and IT's security concerns.



Part Number	IIOTA-1.0-xxx *	IIOTA-MiNi-xxx*
Network Interface #1	1000/100/10baseT	1000/100/10baseT
Network Interface #2	100/10baseT	100/10baseT
Network Security	Integrated Hardened Gateway	Integrated Hardened Gateway
Device Connections	0 to 100 (increments of 5)*	0 to 100 (increments of 5)*
Drag & Drop Dashboard Tool	Yes (Licensing Required)	No
Pre-Installed Database Server	Yes - DB2 (Licensing Required)	Yes - MySQL (Included)
Compatible App's (Included)	Workflow Manager Dashboard Designer	Web Server - Apache MySQL Database Server
Power	+5V @ 1.2A, 115/240 VAC	24 Volt @ 0.25A
Case	Cast Aluminum Enclosure	Metal DIN-Style Enclosure
Dimensions WxHxD in/(mm)	7.08" x 7.28" x 3" (180 x 185 x 76)	2.125" x 5.98" x 4.09" (54 x 152 x 104)
Cooling	Passive	Passive
Temperature	-60°C to 80°C	0°C to +70°C
Hardware Warranty	12 months Limited Warranty	12 months Limited Warranty
Certifications	UL, CE	UL, CE
Included in Package	AC power plug, quick start guide	24VDC



OEE is drastically improved with predictive vibration and temperature alarms securely connected to Computerized Maintenance Management Systems - CMMS. Sensor monitoring data recorded in gateway registers are mapped to database server fields that trigger proactive work orders according to maintenance processes.



Name	Modbus Registers	Range	Description
Vibration Data	40000	1-200	Z Axis Velocity
	40001		Z Axis Hi Freq Acceleration
	40002		X Axis Velocity
	40003		X Axis Hi Freq Acceleration
Temperature Data	40004		Temperature



CMMS

Computerized Maintenance Management System



PROPRIETARY

Database Drivers

- IBM DB2 Universal Database
- IBM DB2/400
- IBM WebSphere
- Microsoft SQL Server
- MySQL
- Oracle
- OSIPI Data Archive
- PostgreSQL
- Raima Database Manager (RDM)
- SAP MII, HANA
- MongoDB

Cloud Connectors

- Azure
- AWS
- Google Cloud Platform
- MindSphere

Web Services

- Web service SOAP
- HTTP



MVP Plant APIs

- Database: Microsoft SQL Server
- HTTP: OData - RESTful



Banner Engineering

- FTP
- XML Payloads

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