

Sure Cross® Vibration and Temperature Sensor



Datasheet

The Sure Cross Vibration and Temperature Sensor works in a variety of machines to identify and predict failures in rotating machinery.



- Detects dual-axis vibration
- Provides high accuracy vibration and temperature measurements
- Manufactured with a robust zinc alloy housing
- Connects via a 1-wire serial interface
- Designed to work with *FlexPower* 1-Wire Serial Interface Node models DX80N9X1S-P6 and DX80N2X1S-P6, the 10 to 30 V dc powered 1-Wire Serial Interface Node models DX80N9X6S-P6 and DX80N2X6S-P6, MultiHop M-H6 and M-H6L radios, and Wireless Q45 Sensor Nodes DX80N2Q45VT and DX80N9Q45VT



WARNING: Not To Be Used for Personnel Protection

Never use this device as a sensing device for personnel protection. Doing so could lead to serious injury or death. This device does not include the self-checking redundant circuitry necessary to allow its use in personnel safety applications. A sensor failure or malfunction can cause either an energized or de-energized sensor output condition.

For additional information, updated documentation, and accessories, refer to Banner Engineering's website, www.bannerengineering.com/surecross.

Model	Power Requirements	I/O
QM42VT1	3.6 to 5.5 V dc	Vibration and temperature using a 1-wire serial interface

Configure this sensor using the [Sensor Configuration Tool](#) and adapter cable BWA-USB1WIRE-001 (datasheet [170020](#)).

ISO 10816 provides guidance for evaluating vibration velocity severity motors, pumps, fans, compressors, gear boxes, blowers, dryers, presses, and other machines that operate in the 10 to 1000 Hz frequency range.

	Machine		Class I	Class II	Class III	Class IV
	in/s	mm/s	Small Machines	Medium Machines	Large Rigid Foundation	Large Soft Foundation
Vibration Velocity Vrms	0.01	0.28	good			
	0.02	0.45				
	0.03	0.71				
	0.04	1.12				
	0.07	1.80	satisfactory			
	0.11	2.80				
	0.18	4.50	unsatisfactory			
	0.28	7.10				
	0.44	11.2	unacceptable			
	0.70	18.0				
	1.10	28.0				
	1.77	45.9				

Figure 1. Vibration Severity per ISO 10816



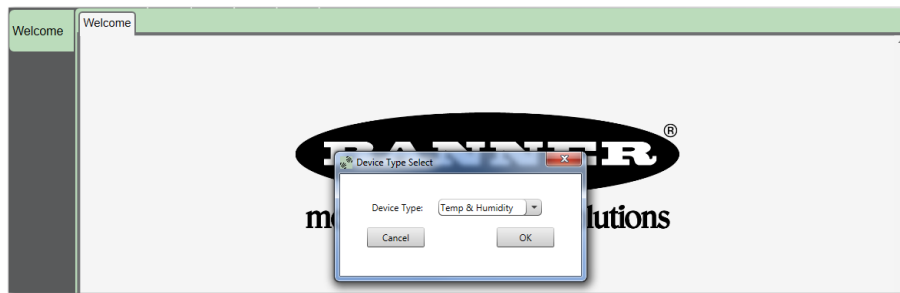
Sensor Configuration Tool

The Sensor Configuration Tool offers an easy way to manage sensor parameters, retrieve data, and visually show sensor data from a number of different sensors. The Sensor Configuration Tool software runs on any Windows machine and uses an adapter cable to connect the sensor to your computer.

Download the most recent version of the Sensor Configuration Tool from Banner Engineering's website: www.bannerengineering.com/wireless. The Sensor Configuration Tool currently supports the following sensors:

Sensor Type	Model	USB Adapter Cable
Temperature and Humidity	M12FTH3Q and M12FT3Q	Model BWA-HW-006: USB-to-RS-485 adapter cable
	M12FTH4Q and M12FT4Q	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable
Vibration and Temperature	QM42VT1	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable
	QM42VT2	Model BWA-HW-006: USB-to-RS-485 adapter cable
GPS	GPS50M	Model BWA-HW-006: USB-to-RS-485 adapter cable AND a field-wireable M12/Euro-style connector or connector with pigtail
U-GAGE K50U Ultrasonic	K50UX2RA	Model BWA-USB1WIRE-001: USB-to-RS-232 1-Wire adapter cable

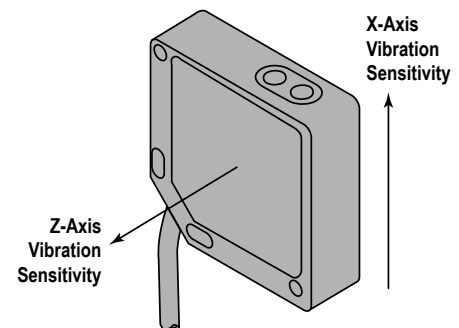
Launch the Sensor Configuration Tool and from the drop-down list, select your sensor type and click OK.



Connecting the Vibration/Temperature Sensor

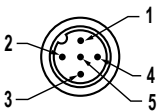
To install the sensor to a device with a 5-pin M12/Euro-style female connector:

1. Align the notch in the female connector with the key in the sensor's male connector.
2. Gently slide the sensor end into the connector.
3. Rotate the threaded nut to tighten the sensor down.



Wiring

This sensor is designed to be plugged directly into compatible Nodes. The Node powers the sensor and periodically requests data using the 1-wire serial interface.

5-pin M12/Euro-style Connector (Male)	Pin	Wire Color	Sensor Connection
	1	Brown	Power IN (+), 3.6 to 5.5 V dc
	2	White	1-Wire serial device select (sinking input to sensing device)
	3	Blue	Ground (-)
	4	Black	Not used/reserved
	5	Gray	1-Wire serial communications

Holding Registers

By default, data is supplied to the Node every two and a half minutes, unless the Node requests the data sooner. Use the Sensor Configuration Tool to adjust the sensor's sample rate if a different value is needed. The default configuration is shown.

Sensor Register	Output Type *	I/O Range		Holding Register Representation	
		Min	Max	Min (Dec)	Max (Dec)
1	Z-Axis RMS Velocity (in/sec)	0	6.5535	0	65535
2	Z-Axis RMS Velocity (mm/sec)	0	65.535	0	65535
3	Temperature (°F)	-1638.4	1638.3	-32768	32767
4	Temperature (°C)	-1638.4	1638.3	-32768	32767
5	X-Axis RMS Velocity (in/sec)	0	6.5535	0	65535
6	X-Axis RMS Velocity (mm/sec)	0	65.535	0	65535

The temperature = (Register value) ÷ 20.

* The sensor register output data types are user configurable. Use the Sensor Configuration Tool to change the output types. All optional output types are listed below.

Optional Output Types

Optional Output Types	I/O Range		Holding Register Representation	
	Min.	Max.	Min. (dec)	Max. (dec)
Z-Axis Peak Acceleration (G) ¹	0	65.535	0	65535
X-Axis Peak Acceleration (G) ¹	0	65.535	0	65535
Z-Axis Peak Frequency (Hz) ²	0	6553.5	0	65535
X-Axis Peak Frequency (Hz) ²	0	6553.5	0	65535
Z-Axis RMS Acceleration (G) ¹	0	65.535	0	65535
X-Axis RMS Acceleration (G) ¹	0	65.535	0	65535
Z-Axis Kurtosis ¹	0	65.535	0	65535
X-Axis Kurtosis ¹	0	65.535	0	65535
Z-Axis Crest Acceleration ¹	0	65.535	0	65535
X-Axis Crest Acceleration ¹	0	65.535	0	65535
Z-Axis Peak Velocity (in/sec) ³	0	6.5535	0	65535
Z-Axis Peak Velocity (mm/sec) ¹	0	65.535	0	65535
X-Axis Peak Velocity (in/sec) ³	0	6.5535	0	65535
X-Axis Peak Velocity (mm/sec) ¹	0	65.535	0	65535

¹ Value = Register value ÷ 1000

² Value = Register value ÷ 10

³ Value = Register value ÷ 10000

Specifications

Supply Voltage

3.6 to 5.5 V dc

Current

Default sensing: 152 μ A
 Disabled sensing: 95 μ A
 Active comms: 3.1 mA

Communication Hardware

Interface: 1-wire serial interface
 Baud rates: 9.6k, 19.2k (default), or 38.4k
 Data format: 8 data bits, no parity (default), 1 stop bit (even or odd parity available)

Communication Protocol

Sure Cross DX80 Sensor Node 1-Wire Serial Interface

Communications Line

Level Receive ON: Greater than 2 V
 Level Receive OFF: Less than 0.7 V
 Level Transmit ON: 2.7 to 3 V
 Level Transmit OFF: 0 V (pulldown resistor of 10 kOhm)

Compatible Nodes

900 MHz Models

DX80N9X1S-P6
 DX80N9X6S-P6
 DX80DR9M-H6 and -H6L
 DX80N9Q45VT

2.4 GHz Models

DX80N2X1S-P6
 DX80N2X6S-P6
 DX80DR2M-H6 and -H6L
 DX80N2Q45VT

Vibration Sensor

Mounted base resonance: 5.5 kHz nominal
 Measuring Range: 0–46 mm/sec or 0–1.8 in/sec RMS
 Frequency Range: 10–1000 Hz
 Accuracy: $\pm 10\%$ at 25 °C

Connector

3 meter cable with 5-pin M12 fitting

Indicators

Green flashing: Power ON
 Amber flicker: Serial Tx

Temperature Sensor

Measuring Range: –40 °C to +105 °C (–40 °F to +221 °F)
 Resolution: 1 °C
 Accuracy: ± 3 °C

Environmental Rating

NEMA 6P, IEC IP67

Operating Temperature

–40 °C to +105 °C (–40 °F to +221 °F)¹

Shock

400G

Mounting Options

The VT1 sensor can be mounted using a variety of methods, including 1/4"-28 hex screw, epoxy, thermal tape, or magnetic mount.

Certifications

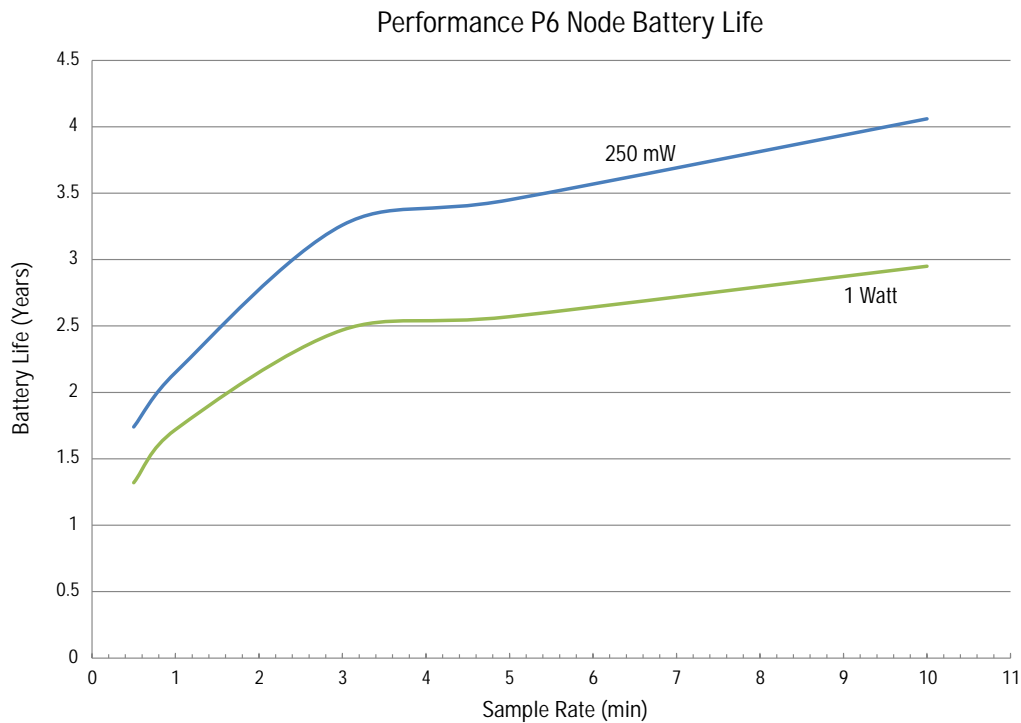


Figure 2. Battery Life of a P6 Performance Node Connected to a QM42VT1 Sensor

¹ Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

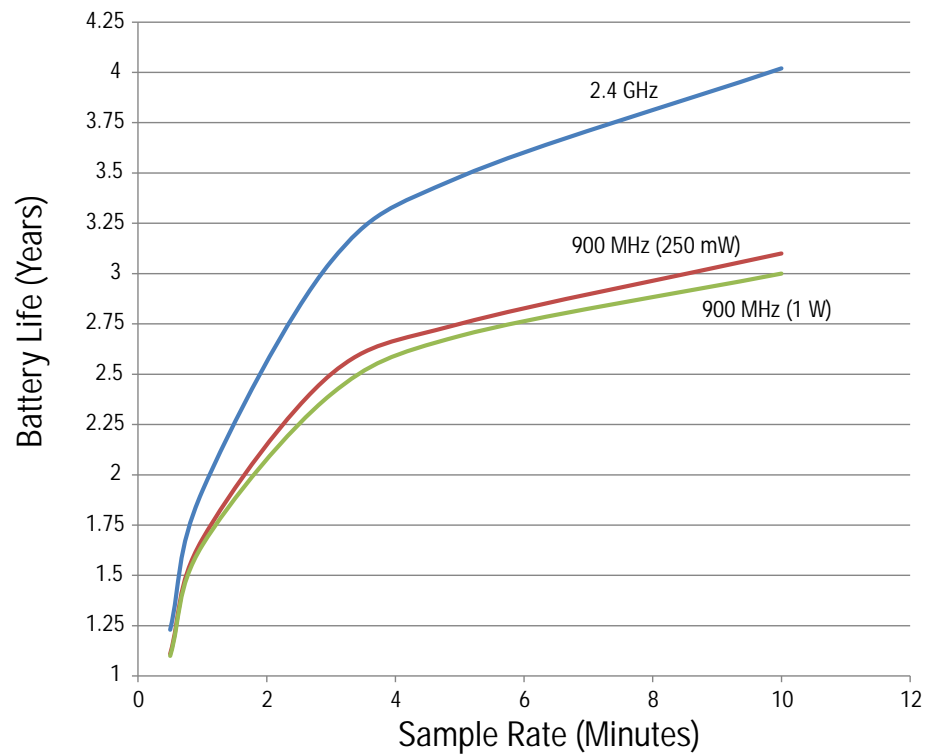
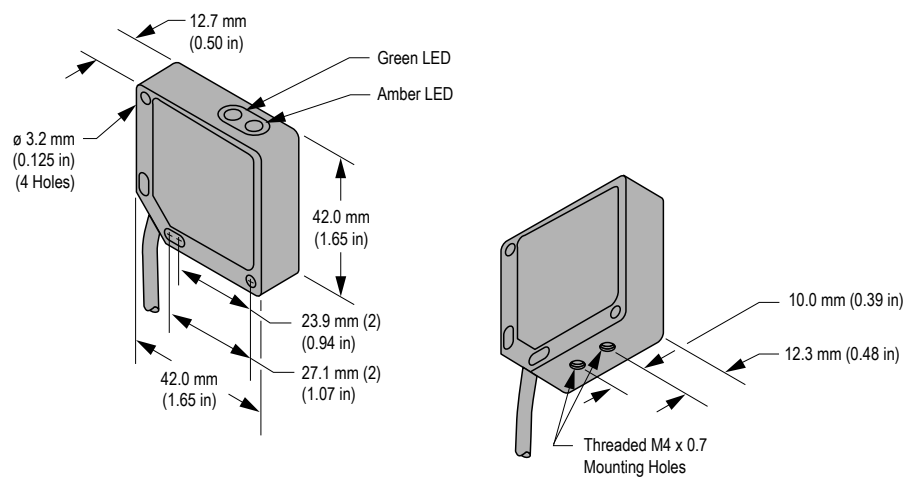
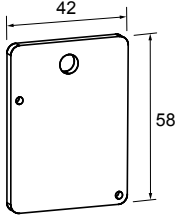
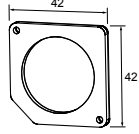


Figure 3. Battery Life of a Wireless Q45VT Node Connected to a QM42VT1 Sensor

Dimensions



Vibration and Temperature Sensor Accessories

Included with Sensor	Available for Order
<p>BWA-BK-002</p> <ul style="list-style-type: none"> Includes SMB42FL stainless steel bracket, 1/4"-28 screw mount, and 1 piece of 3M™ thermally conductive adhesive transfer tape 	<p>BWA-BK-001</p> <ul style="list-style-type: none"> Includes magnetic mounting bracket SMB42FLM12 and 2 mounting screws 
<p>BWA-HW-057</p> <ul style="list-style-type: none"> 3M™ Thermally Conductive Adhesive Transfer Tape 8820 Provides a heat-transfer path between heat-generating components and heat sinks or other cooling devices 3 pieces per pack Tape is 20 mils (0.50 mm) thick; liner is 1.5-2 mil (37.5-50 µm) thick Thermally conductive ceramic filler Dual liner using silicone-treated polyester: easy-release PET liner is clear, tight side PET liner is blue 	<p>BWA-USB1WIRE-001</p> <ul style="list-style-type: none"> PC USB to 1-wire serial interface converter Use with the Sensor Configuration Tool software to communicate directly with 1-wire serial interface sensors Refer to datasheet 170020 for more information about wiring the adapter cable to this sensor

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