Temperature and Humidity Sensor


M12FTH4Q and M12FT4Q

A simple way to verify conditions in locations that were once too difficult to access via traditional monitoring methods. With no software required, you can replace cables and extend the range of temperature and humidity signals with minimal effort.

Key Features:

• Achieves temperature accuracy of ± 0.3 °C and humidity accuracy of ± 2% relative humidity

• Temperature and relative humidity sensing elements housed in a robust metal housing

• Traceable to NIST standards

• Temperature and Humidity or Temperature-only Sensor to choose from

• Each sensor comes with a Certificate of Factory Calibration

• Reduces labor costs by obviating manual checks and reducing error

Simple Wire Replacement

Red/Green bi-color alarm light

Temperature and/or humidity
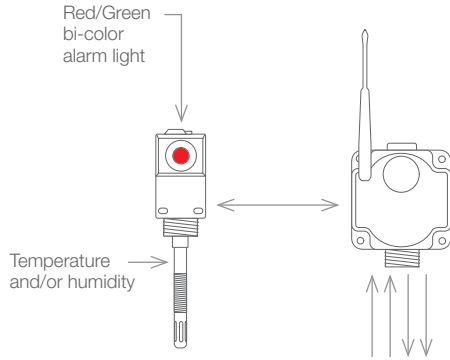
- Sourcing Discrete In for red alarm indicator light
- Sourcing Discrete In for green alarm indicator light
- 4 to 20 mA Analog Out for scaled temperature
- 4 to 20 mA Analog Out for scaled humidity

## Host Controlled via Modbus RTU (up to 47 Nodes)

Red/Green bi-color alarm light

Temperature and/or humidity

+   +   +   + up to 47 Nodes

Modbus RTU
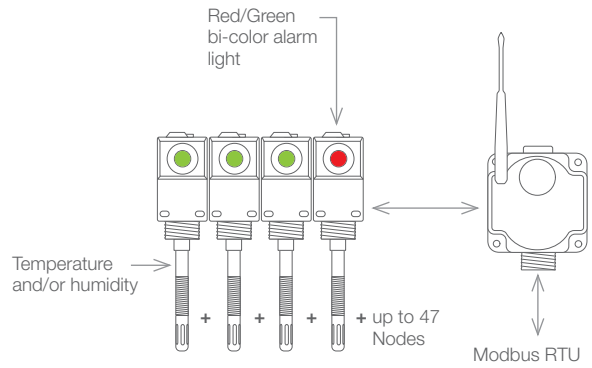
Models	Description
M12FTH4Q	Temperature and relative humidity via a 1-wire Serial Interface
M12FT4Q	Temperature via a 1-wire Serial Interface

Use with		
DX80N9Q45TH	Q45 Temperature/Humidity Node with integrated batteries	
DX80N2Q45TH		
DX80N9Q45U	Q45 Universal Node with integrated batteries	see page 16
DX80N2Q45U		
DX80N9X1S-P6	1-wire Serial Performance Node with integrated battery	
DX80N2X1S-P6		
DX80N9X6S-P6	1-wire Serial Performance Node	see page 50
DX80N2X6S-P6		
DX80DR9M-H6	1-wire Serial Modbus MultiHop Slave with integrated battery	see page 58
DX80DR2M-H6		

M12FTH4Q and M12FT4 Specifications

Supply Voltage	3.6 to 5.5 V dc
Current	Default sensing: 28 µAmps Disabled sensing: 15 µAmps Active comms: 4.7 mA
Mounting Threads	M12 x 1
Indicators	Green flashing: Power ON Red flicker: Serial Tx
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 Transmit ON: 2.7 to 3 V Level Receive OFF: Less than 0.7 V Level Transmit OFF: 0 V (pulldown resister of 10 kOhm)
Humidity	Measuring Range: 0 to 100% relative humidity Resolution: 0.1% relative humidity Accuracy: ±2% relative humidity at 25 °C NOTE: Humidity measurements are only available with the M12FTH4Q model. The M12FT4Q model does not include the humidity sensor.
Temperature	Measuring Range: –40 to +85 °C (–40 to +185 °F)[2] Resolution: 0.1 °C Accuracy: ±0.3 °C at 25 °C
Environmental Rating	NEMA 6, IEC IP67
Operating Conditions	–40 to 85 °C (–40 to 185 °F)
Shock and Vibration	IEC 68-2-6 and IEC 68-2-27 Shock: 30g, 11 millisecond half sine wave, 18 shocks Vibration: 0.5 mm p-p, 10 to 60 Hz

Temperature and Humidity Sensor
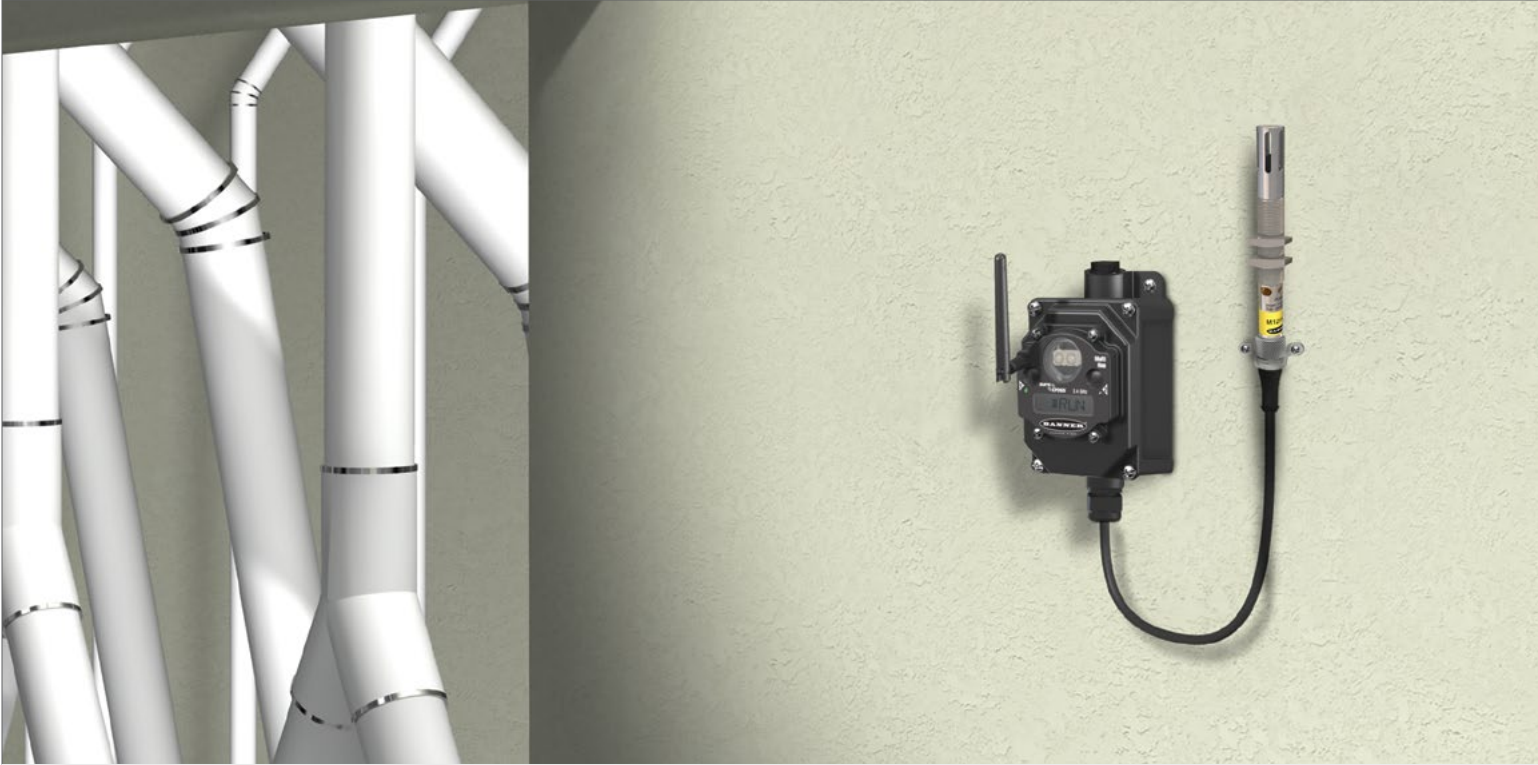
M12FTH3Q and M12FT3Q

This temperature and humidity solution works in a variety of environments to wirelessly provide temperature and humidity measurements via Modbus RTU, RS-485.

Key Features:

• Achieves humidity accuracy of ±2% relative humidity and temperature accuracy of ± 0.3 °C

• Manufactured with a robust metal housing

• Traceable to NIST standards

• Functions as a Modbus slave device via RS-485

| Models	Description
M12FTH3Q	Temperature and humidity sensor with Modbus RTU, RS-485 Interface
M12FT3Q	Temperature sensor with Modbus RTU, RS-485 Interface

Used with		
DX80DR9M-H1	Inputs: Four discrete, two 0 – 20 mA analog, one thermistor, one counter Outputs: Two NMOS discrete Switch Power Outputs: Two Serial Interface: RS-485	
DX80DR2M-H1		
DX80DR9M-H1E		
DX80DR2M-H1E		
DX80DR9M-H2	Inputs: Four discrete, two 0-20 mA analog Outputs: Four sourcing discrete, two 0-20 mA analog Serial Interface: RS-485	
DX80DR2M-H2		see page 58
DX80DR9M-HB1	Inputs: Two NPN discrete, two 0-20 mA analog Outputs: Two NMOS discrete Switch Power Outputs: Two	
DX80DR2M-HB1		
DX80DR9M-HB2	Inputs: Two PNP discrete, two 0-20 mA analog Outputs: Two PNP discrete, two 0-20 mA analog	
DX80DR2M-HB2		
DX80SR9M-H	Serial Interface: RS-232, RS-485	
DX80SR2M-H		

M12FTH3Q and M12FT3Q Sensors Specifications

|		
Supply Voltage	12 to 24 V dc or 3.6 to 5.5 V dc low power option	
Current	Default sensing: 45 µAmps Disabled sensing: 32 µAmps Active comms: 4 mA	
Mounting Threads	M12 x 1	
Indicators	Green flashing: Power ON	Red flicker: Serial Tx

Communication Hardware	Interface: RS-485 Serial
	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	Modbus RTU	
Humidity	Measuring Range: 0 to 100% relative humidity Resolution: 0.1% relative humidity Accuracy: ±2% relative humidity at 25 °C NOTE: Humidity measurements are only available with the M12FTH3Q model. The M12FT3Q model does not include the humidity sensor.	
Temperature	Measuring Range: −40 to +85 °C (−40 to +185 °F)[2] Resolution: 0.1 °C Accuracy: ±0.3 °C at 25 °C	
Environmental Rating	NEMA 6, IEC IP67	
Operating Conditions	−40 to 85 °C (−40 to 185 °F)	
Shock and Vibration	IEC 68-2-6 and IEC 68-2-27 Shock: 30g, 11 millisecond half sine wave, 18 shocks Vibration: 0.5 mm p-p, 10 to 60 Hz	

Vibration and Temperature Sensor
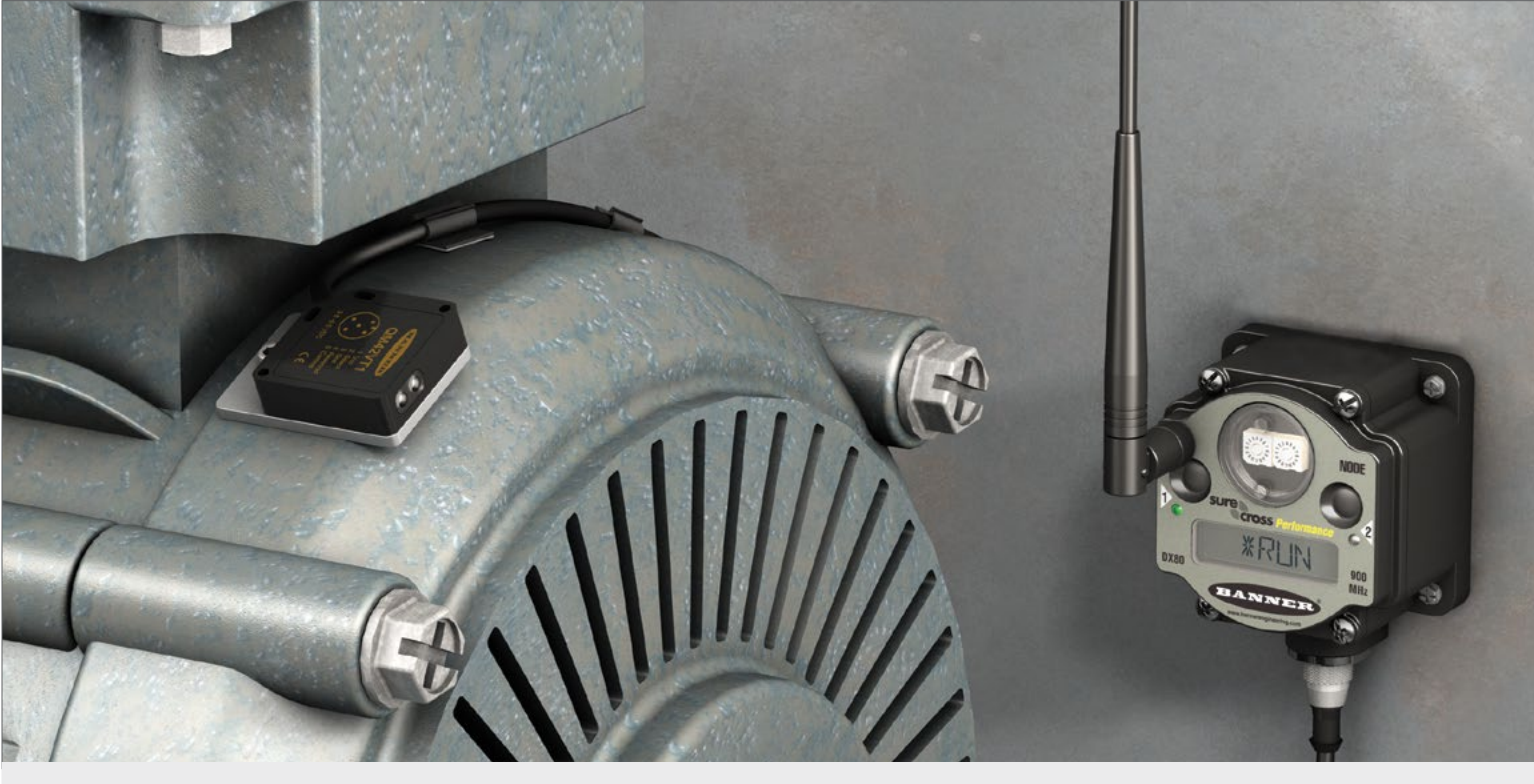
QM42VT

The QM42VT Vibration and Temperature Sensor makes it easy to monitor a machine's health. It measures RMS velocity (among other vibration characteristics) and temperature so that problems can be detected before they become too severe and cause additional damage or result in unplanned downtime. Paired with a Banner wireless Node, it can provide local indication, wirelessly send the signal to a central location, and send the vibration and temperature data to the Gateway for collection and trending.

Key Features:

• Easily monitor machine health by sending info wirelessly to wherever you need it

• Avoid machine failures and delays by detecting problems early

• Reduce downtime and plan maintenance more efficiently

• Monitor a variety of machines to suit your needs

- Motors	- Pumps	- Compressors
- Fans	- Blowers	- Gear Boxes
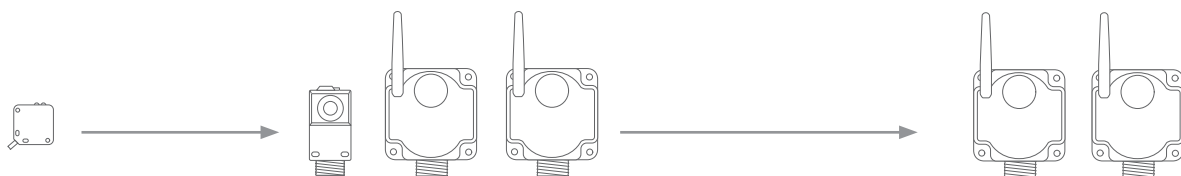
Select Node: one sensor per Node

Select Gateway:
(up to 47 sensors/Nodes) or Data Radio (up to 50+ sensors/Nodes per Master Radio)

Model	Description
QM42VT1	Vibration and temperature via a 1-wire Serial Interface
QM42VT2	Vibration and temperature that functions as a modbus slave device via RS-485

QM42VT1—Use with		
DX80N9Q45VT	Q45 Vibration/Temperature Node with integrated batteries	
DX80N2Q45VT		see page 16
DX80N9Q45U	Q45 Universal Node with integrated batteries	
DX80N2Q45U		
DX80N9X1S-P6	1-wire Serial Performance Node with integrated battery	
DX80N2X1S-P6		see page 50
DX80N9X6S-P6	1-wire Serial Performance Node	
DX80N2X6S-P6		
DX80DR9M-H6	1-wire Serial Modbus MultiHop Slave with integrated battery	see page 58
DX80DR2M-H6		

QM42VT2—Use with		
DX80DR9M-H1	Inputs: Four discrete, two 0 – 20 mA analog, one thermistor, one counter Outputs: Two NMOS discrete Switch Power Outputs: Two Serial Interface: RS-485	
DX80DR2M-H1		
DX80DR9M-H1E		
DX80DR2M-H1E		
DX80DR9M-H2	Inputs: Four discrete, two 0-20 mA analog Outputs: Four sourcing discrete, two 0-20 mA analog Serial Interface: RS-485	
DX80DR2M-H2		see page 58
DX80DR9M-HB1	Inputs: Two NPN discrete, two 0-20 mA analog Outputs: Two NMOS discrete Switch Power Outputs: Two	
DX80DR2M-HB1		
DX80DR9M-HB2	Inputs: Two PNP discrete, two 0-20 mA analog Outputs: Two PNP discrete, two 0-20 mA analog	
DX80DR2M-HB2		
DX80SR9M-H	Serial Interface: RS-232, RS-485	
DX80SR2M-H		

QM42VT Vibration and Temperature Sensor Specifications

Supply Voltage	3.6 to 5.5 V dc	
Current	Active comms: 11.9 mA at 5.5 V dc	
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	QM42VT2: Modbus RTU	QM42VT1: 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 resister of 10 kOhm)
Vibration Sensor	Mounted base resonance: 5.5 kHz nominal Measuring Range: 0–65 mm/sec or 0–6.5 in/sec RMS	Frequency Range: 10–1000 Hz Accuracy: ±10% and 25 °C
Connector	3 m 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: 0.1 °C Accuracy: ± 3 °C	
Environmental Rating	NEMA 6P, IEC IP67	
Operating Conditions	–40 to 85 °C (–40 to 185 °F)	
Shock and Vibration	400G	

Wireless Ultrasonic Sensor

K50U

The Sure Cross® U-GAGE® K50U Ultrasonic Sensor works in a variety of environments to provide a measurement of the distance between the target and the sensor. It is designed for plug-and-play use with the Q45U wireless node, creating a cost-effective and easy-to-use solution for monitoring mobile or remote tanks and totes.

Key Features:

• Provides a distance measurement from the target to the sensor

• Three meter sensing range with a 300 mm dead zone

• Built-in temperature compensation

• Rugged design for demanding sensing environments; rated IEC IP67, NEMA 6P

• Two sensor models available; one with a 1-wire Serial Interface and one that functions as a Modbus slave via RS-485

Model	Description
K50UX1RA	Ultrasonic sensor with 1-wire Serial Interface
K50UX2RA	Ultrasonic sensor that functions as a modbus slave device via RS-485

K50UX1RA—Used with		
DX80N9Q45U	Q45 Wireless Node with integrated battery	see page 16
DX80N2Q45U		
DX80N9X1S-P6	1-wire Serial Performance Node with integrated battery	
DX80N2X1S-P6		
DX80N9X6S-P6	1-wire Serial Performance Node	see page 50
DX80N2X6S-P6		
DX80DR9M-H6	1-wire Serial Modbus MultiHop Slave with integrated battery	see page 58
DX80DR2M-H6		

| K50UX2RA—Used with		
DX80DR9M-H1	Inputs: Four discrete, two 0 – 20 mA analog, one thermistor, one counter	
DX80DR2M-H1	Outputs: Two NMOS discrete	
DX80DR9M-H1E	Switch Power Outputs: Two	
DX80DR2M-H1E	Serial Interface: RS-485	
DX80DR9M-H2	Inputs: Four discrete, two 0-20 mA analog	
DX80DR2M-H2	Outputs: Four sourcing discrete, two 0-20 mA analog Serial Interface: RS-485	see page 58
DX80DR9M-HB1	Inputs: Two NPN discrete, two 0-20 mA analog	
DX80DR2M-HB1	Outputs: Two NMOS discrete Switch Power Outputs: Two	
DX80DR9M-HB2	Inputs: Two PNP discrete, two 0-20 mA analog	
DX80DR2M-HB2	Outputs: Two PNP discrete, two 0-20 mA analog	
DX80SR9M-H	Serial Interface: RS-232, RS-485	
DX80SR2M-H		

K50U Specifications

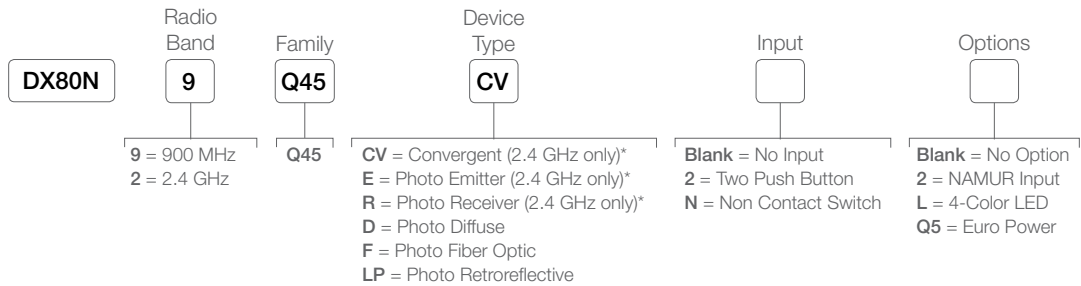|	
Supply Voltage	3.6 to 5.5 V dc or 10 to 30 V dc
Current	K50UX2RA: Active comms–11.3 mA at 30 V dc K50UX1RA: Default sensing–180 µA / Disabled sensing–40 µA / Active comms–3.3 mA
Indicators	Green flashing: Power ON Amber flicker: Serial Tx
Performance	Sensing range: 300 mm to 3 m (11.8 in to 118 in) / Ultrasonic frequency: 114 kHz / Temperature effect: 0.02% of distance/°C / Resolution: 0.1% of distance (1.5 mm minimum)
Discrete Inputs	One Sinking / Rating: 3 mA max current at 30 V dc / ON Condition: Less than 0.7 V / OFF Condition: Greater than 2 V or open
Communication Protocol	K50UX2RA: Modbus RTU K50UX1RA: 1-wire Serial Interface
Environmental Rating	NEMA 6, IEC IP67
Operating Conditions	–40 to 70 °C (–40 to 158 °F)
Construction	Housing: PBT polyester / Transducer: epoxy/ceramic composite
Connector	Integral 5-pin M12/Euro-style male quick disconnect (QD)
Communication Hardware	K50UX2RA: RS-485 Serial K50UX1RA: 1-Wire Serial Interface / Baud Rates: 9.6k, 19.2k (default), or 38.4k / Data Format: 8 data bits, No parity (default), even parity, or odd parity 1 stop bit / Do not use a termination resistor.
Communications Line	Level Receive ON: Greater than 2 V Level Transmit ON: 2.7 to 3 V / Level Receive OFF: Less than 0.7 V Level Transmit OFF: 0 V (pulldown resister of 10 kOhm)
Shock and Vibration	All models meet Mil Std. 202F requirements. Method 201A (vibration: 10 Hz to 60 Hz max., double amplitude 0.06 inch, maximum acceleration 10G). Also meets IEC 947-5-2 requirements: 30G 11 ms duration, half sine wave
Certifications	C E

Photoelectric Q45 Sensors
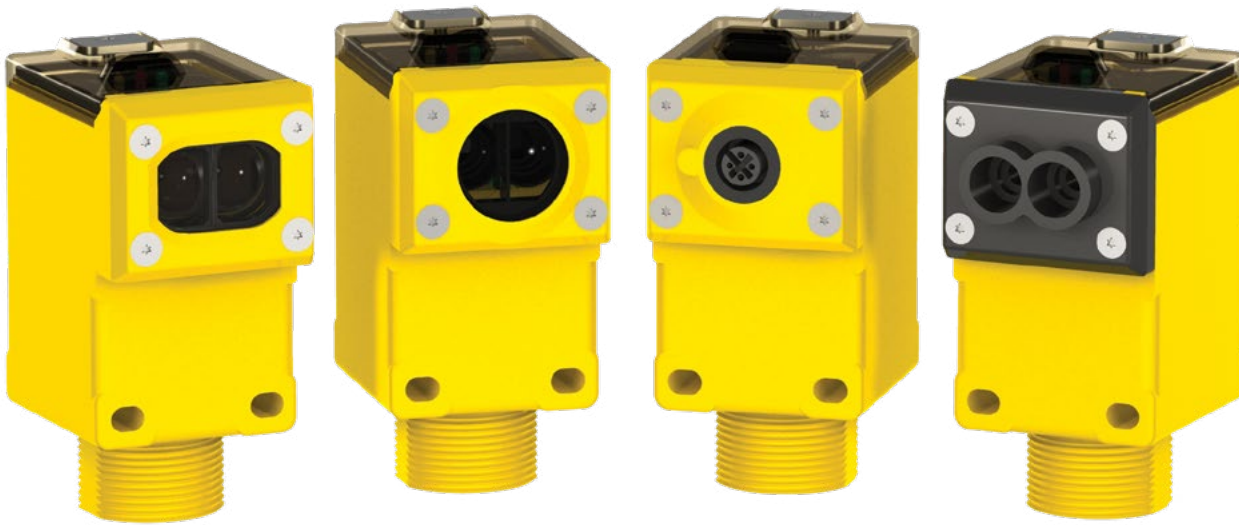
Q45 Sensors

The Sure Cross® Q45 is the first self-contained wireless standard photoelectric solution for the most challenging control and monitoring needs. Easily add a scalable wireless sensor network to improve efficiency by monitoring and coordinating multiple machines and processes without pulling cables.

Key Features:

• True self-contained wireless with no cables, cordsets or external power

• 1 km line-of-sight

• Built-in antenna

• Retroreflective and Diffuse models are preconfigured to count up to 960 parts per minute

Radio Band	Family	Device Type	Input	Options
DX80N	9	Q45	CV		

9 = 900 MHz **2** = 2.4 GHz	Q45	**CV** = Convergent (2.4 GHz only)* **E** = Photo Emitter (2.4 GHz only)* **R** = Photo Receiver (2.4 GHz only)* **D** = Photo Diffuse **F** = Photo Fiber Optic **LP** = Photo Retroreflective	**Blank** = No Input **2** = Two Push Button **N** = Non Contact Switch	**Blank** = No Option **2** = NAMUR Input **L** = 4-Color LED **Q5** = Euro Power

* Emitter and Receiver (E/R) are normally specified in pairs

Photoelectric Q45 Sensor Specifications

Radio (2.4 GHz)	Range: Up to 1000 m (3280 ft) with line of sight Transmit Power: 65 mW EIRP
2.4 GHz Compliance	FCC ID UE300DX80-2400 - This device complies with FCC Part 15, Subpart C, 15.247 ETSI/EN: In accordance with EN 300 328: V1.8.1 (2012-04) IC: 7044A-DX8024
Spread Spectrum Technology	FHSS (Frequency Hopping Spread Spectrum)
Construction	Molded reinforced thermoplastic polyester housing, oring-sealed transparent Lexan® cover, molded acrylic lenses, and stainless steel hardware. Q45s are designed to withstand 1200 psi washdown.
Typical Battery Life	Up to 2 years, typical A typical battery life assumes an average of 10 seconds between sensor changes of state and the default 62.5 millisecond sample rate. Battery life is reduced to 1 year with an average of 1 second between changes of state.
Default Sensing Interval	62.5 milliseconds
Adjustments	Multi-turn sensitivity control (allows precise sensitivity setting - turn clockwise to increase gain.
Sensing Range	Retroreflective: 0.15 m to 6 m (6 in to 20 ft) Diffuse: 101 mm to 300 mm (4 in to 12 in) Opposed: Up to 30 m (100 ft) depending on Excess Gain requirements Glass Fiber Optic: 1½-in focal point
Report Rate	On Change of State
Indicators	Red and green LEDs (radio function); amber LED (only for alignment mode)
Environmental Rating	NEMA 6P, IEC IP67
Operating Conditions	–40 °C to 70 °C (–40 °F to 158 °F); 90% relative humidity at 50 °C (non-condensing)