

Sure Cross® Temperature and Humidity Sensor



Datasheet



The Sure Cross® Temperature and Humidity Sensor works in a variety of environments to provide temperature and humidity measurements.

- Manufactured with a robust metal housing
- Functions as a Modbus slave device via RS-485
- Ships with aluminum grill filter cap; optional stainless steel 10 micrometer sintered filter available separately



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.

Models	Power Requirements	I/O
M12FTH3Q	3.6 to 5.5 V dc low power option or 12 to 24 V dc	Temperature and relative humidity via RS-485 Modbus
M12FT3Q		Temperature via RS-485 Modbus

Configure this sensor using the [Sensor Configuration Tool](#) and adapter cable BWA-HW-006 (datasheet [140377](#)).

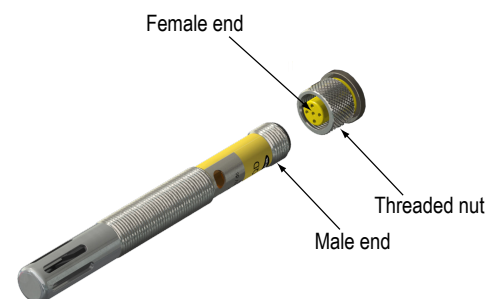
[Banner Humidity Sensor Calibration Statement](#). This calibration statement (also available online) lists the chain with which the calibration of Banner humidity sensors is traceable to NIST standards.

A Certificate of Factory Calibration ships with every temperature/humidity or temperature sensor. Although your certificate will be specific to your product, a sample certificate is available for [download](#).

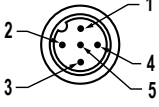
Connecting the Temperature/Humidity Sensor

To install the sensor to a device with a 5-pin Euro-style female end, follow these instructions:

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. DO NOT attempt to rotate the sensor after it is connected to the device or the cable end because this will damage the sensor.



Wiring

5-pin M12/Euro-style Male Connector	Pin	Wire Color	Sensor Connection
	1	Brown	Power IN (+). Either 3.6–5.5 V dc (Low Power Mode) or 12–24 V dc
	2	White	RS485 / D1 / B / +
	3	Blue	Ground (-)
	4	Black	RS485 / D0 / A / -
	5	Gray	For 12–24 V dc operation: Not Used For 3.6–5.5 V dc operation: Discrete NPN Select Line. Pull to ground to enable serial communications; release from ground to disable serial communications

Refer to the Class I Division 2 control drawings (p/n [143086](#)) for wiring specifications or limitations.

Low Power Mode operation (3.6–5.5 V dc operating voltage) offers the user savings in power consumption by putting the Banner Temperature and Humidity Sensor's serial communications to sleep whenever the sensor is deselected. Low Power Mode operation is ideal for battery-powered applications or any application with power consumption restrictions. When the sensor is deselected, power consumption drops to 45 µA. When the sensor is selected, power consumption is 4 mA.

To operate the Banner Temperature and Humidity Sensor in Low Power Mode, the supply voltage applied to Power In must be within the range of 3.6–5.5 V dc. Set the Select Line to 0 V (ground) to select the sensor and activate the sensor's serial communications. Release the Select Line from 0 V (ground) to deselect the sensor and disable the sensor's serial communications. When deselected, the sensor's green LED continues to blink normally. To bypass Low Power Mode, connect the Select Line to ground (0 V).

For example, to use Low Power Mode, use 3.6 V dc battery power and connect the Select Line to Discrete Output 1 (NMOS output, low active).

Modbus Registers

Sensor Address	Description	I/O Range		Holding Register Representation	
		Min Value	Max Value	Min (Dec)	Max (Dec)
40001	Humidity (%RH) ¹	0	100.00%	0	10,000
40002	Temperature (°C)	-1638.4	1638.3	-32768	32767
40003	Temperature (°F)	-1638.4	1638.3	-32768	32767
46101	Baud	0=9.6k, 1=19.2k (default), 2=38.4k			
46102	Parity	0=none (default), 1=odd, 2=even			
46103	Modbus slave address	1 (default) through 247			

The temperature = (Modbus register value) ÷ 20.

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

¹ Only available on the M12FT3Q model. Humidity sensor is not included with the M12FT3Q model.

Discrete Input

One, NPN/Sinking
 Rating: 3 mA max current at 30 V dc
 Sample Rate: 125 milliseconds
 ON Condition (NPN): Less than 0.7 V
 OFF Condition (NPN): Greater than 2 V or open

Temperature and/or Humidity Input

Sample Rate: 16 seconds

Communication

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)
 Do not use termination resistor.
 Protocol: Modbus RTU

Humidity²

Measuring Range: 0 to 100% relative humidity
 Resolution: 0.1% relative humidity
 Accuracy: $\pm 2\%$ relative humidity at 25 °C

Temperature

Measuring Range: $-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+185\text{ }^{\circ}\text{F}$)³
 Resolution: 0.1 °C
 Accuracy: $\pm 0.3\text{ }^{\circ}\text{C}$ at 25 °C

Running the sensor at higher voltages can induce internal heating that can decrease accuracy.

Environmental Rating

IEC IP67; NEMA 6

Operating Temperature

$-40\text{ }^{\circ}\text{C}$ to $+85\text{ }^{\circ}\text{C}$ ($-40\text{ }^{\circ}\text{F}$ to $+185\text{ }^{\circ}\text{F}$)

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



Certifications

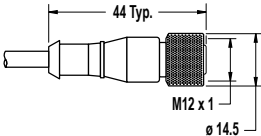
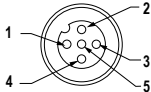
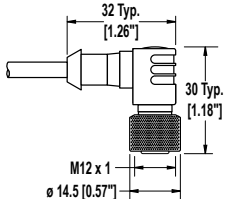


CSA: Class I, Division 2, Groups A, B, C, D — Certificate 1921239

Refer to the Class I Division 2 control drawings (p/n [143086](#)) for wiring specifications or limitations. All battery-powered devices must only use the lithium battery manufactured by Xeno, model XL-205F.

Accessories

Replacement Filters	Description	
FTH-FIL-001	Aluminum grill filter cap (factory default, ships with M12FT*Q sensors)	
FTH-FIL-002	Stainless steel, sintered to 10 micrometer porosity (for high dust environments.)	

5-Pin Threaded M12/Euro-Style Cordsets—Single Ended					
Model	Length	Style	Dimensions	Pinout (Female)	
MQDC1-501.5	0.50 m (1.5 ft)	Straight		 1 = Brown 2 = White 3 = Blue 4 = Black 5 = Gray	
MQDC1-506	1.83 m (6 ft)				
MQDC1-515	4.57 m (15 ft)				
MQDC1-530	9.14 m (30 ft)				
MQDC1-506RA	1.83 m (6 ft)	Right-Angle			
MQDC1-515RA	4.57 m (15 ft)				
MQDC1-530RA	9.14 m (30 ft)				

² Humidity measurements are only available with model M12FTH3Q. Model M12FT3Q does not include the humidity sensor.

³ Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.

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