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 a list of accessories, refer to Banner Engineering's website, *www.bannerengineering.com/wireless*.

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*.

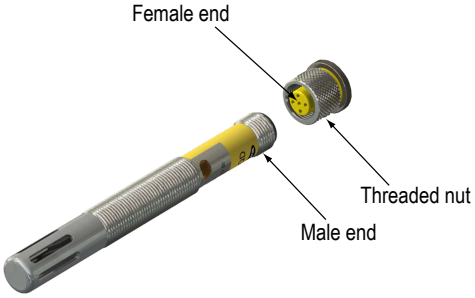
Models

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

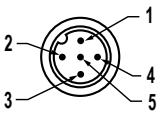
Connecting the Temperature/Humidity Sensor

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-pin M12/ Euro-style Male Connector	Pin	Wire Color	Sensor Connection
	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

		I/O Range		Holding Register Representation	
Sensor Address	**Description**	**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

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
Measuring Range: –40 °C to +85 °C (–40 °F to +185 °F) [2]
Resolution: 0.1 °C
Accuracy
–40 °C to 0 °C: ± 0.6 °C
0 °C to 60 °C: ± 0.4 °C
+60 °C to +85°C: ± 1.2 °C
Operating the Modbus temperature/humidity sensor at voltages greater than 12 V can increase the temperature accuracy error by up to 1 °C. The amount of error depends upon the application's device mounting and air flow characteristics.

Mounting Threads
M12 × 1

Indicators
Green flashing: Power ON
Red flicker: Serial Tx

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

Humidity[3]
Measuring Range: 0 to 100% relative humidity
Resolution: 0.1% relative humidity
Accuracy:
25 °C: ±2%
0 °C to 70°C and 10–90%: ±3%
0 °C to 70°C and 0–10 % or 90–100 %: ± 7%

[1] Only available on the M12FTH3Q model. Humidity sensor is not included with the M12FT3Q model.
[2] Operating the devices at the maximum operating conditions for extended periods can shorten the life of the device.
[3] Humidity measurements are only available with model M12FTH3Q. Model M12FT3Q does not include the humidity sensor.

Environmental Rating
IEC IP67; NEMA 6

Operating Temperature
–40 °C to +85 °C (–40 °F 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

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

Temperature-Humidity Filter Caps

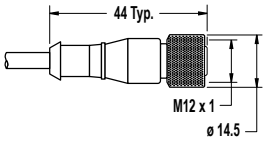
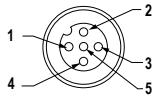
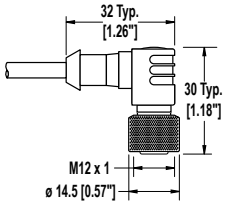
FTH-FIL-001
- Aluminum grill filter cap (factory default, ships with M12FT*Q sensors)



FTH-FIL-002
- Stainless steel, sintered to 10 micrometer porosity (for high dust environments.)



5-Pin Euro-Style Cordsets

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)			

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