PST Know Before It Goes

Wireless 4-20 mA Sensor
PST-MA1

Description

The *PST 4-20mA Sensor is a* cost-effective way to accurately measure the 4-20 mA output signal of an analog instrument. The 4 to 20 mA signal data can then be transmitted wirelessly, stored in a database, and viewed with *iStatus Reporting* software. The sensor data can easily be scaled to output in whatever engineering units are needed.

Transmitter

The Wireless 4-20 mA Sensor Transmitter uses two AA batteries with an approximate two-year battery life. These 900 MHz transmitter radios use the license-free 902-928 MHz ISM band. Before each transmission, the radio checks for a clear channel before it sends the sensor data. If the channel is busy, it waits until it finds an opening; then transmits the data. This clear channel assessment approach allows the system to function efficiently in noisy areas or heavy RF traffic areas without disrupting other communications. Data is typically transmitted once every 12 seconds to optimize battery life and minimize RF traffic. This data rate is more than sufficient for condition monitoring applications, but custom update rates are available from the factory if the 12-second rate does not meet the needs of your application. The transmitter range will vary depending on the location. Typical industrial environments are not ideal for RF reception; it is best to evaluate the site with a transmitter and software to find the ideal locations for transmitters and receivers.

Sensor

Temperature Range	-40°C to 80°C	(-40°F to 176°F)
Nominal Current Range	4-20mA	
Measurable Current Range	0 to 22mA	
Resolution	5.5uA	
Accuracy	+/-.2%	
FCC ID-X58-PST-TX01		
Batteries	2 “AA “ 1.5 volt cells	
Radio Frequency	902 to 928 digitally modulated spread spectrum radio	

Parts List

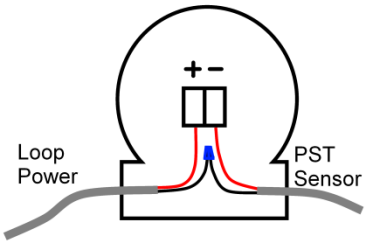
Quantity	Part
1	PST-MA1 4-20 mA Transmitter

Wiring

The *4-20mA Sensor* comes with two stripped 22 AWG wire leads. Connect the sensor in series with other loop devices.

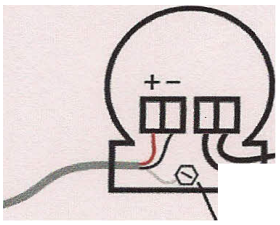
Case 1. Loop-Powered Device

- Remove power from the loop.
- Connect the sensor's red (positive) lead to the negative terminal of the current output device.
- Connect the negative loop wire to the sensor's black (negative) lead wire.
- Connect the positive loop wire to the current output device's positive terminal.



Case 2. 4-Wire or Externally Powered Device

- Remove power from the device.
- Connect the sensor's red (positive) lead to the current output device's positive terminal.
- Connect the sensor's black (negative) lead to the current output device's negative terminal.



Scaling in iStatus Software

Inputs from the PST-MA1 are easily scaled in software using the Sensor Setup tab.

The Math:

$$ScaledOutput = (RawInputFromSensor(mA) + ZeroValueinSensorSetup) * SpanValueinSensorSetup$$

Example 1:

Scale a 4-20 mA input for a 0 to 100% output.

Step 1: Calculate the Span value.

Span Value in Sensor Setup =

$$SpanVal = \left(\frac{MaxScaledVal - MinScaledVal}{MaxRawVal - MinRawVal}\right) \qquad SpanVal = \left(\frac{100\% - 0\%}{20mA - 4mA}\right) = 6.25$$

Step 2 : Calculate the zero value.

Zero Value in Sensor Setup =

$$Zero = \left(\frac{MinScaledVal}{Span}\right) - MinRawVal \qquad Zero = \left(\frac{0\%}{6.25}\right) - 4.0mA = -4.0$$

Step 3: Enter the calculated values into Sensor Setup table under the Zero and Span columns for that sensor.

Alias	Units1	LowCritical1	LOW1	HI1	HiCritical1	Zero1	Span1
Dewpoint	%	10	25	70	75	-4.0	6.25

Step 4: Select the Save Changes button. It can take up to 1 minute for scaling changes to take effect.

Example 2:

Scale a 4-20 mA input for a 20° to 100° output.

Step 1: Calculate the Span value.

$$SpanVal = \left(\frac{MaxScaledVal - MinScaledVal}{MaxRawVal - MinRawVal} \right) \qquad SpanVal = \left(\frac{100°F - 20°F}{20mA - 4mA} \right) = 5.0$$

Step2 : Calculate the zero value.

$$Zero = \left(\frac{MinScaledVal}{Span} \right) - MinRawVal \qquad Zero = \left(\frac{20°F}{5.0} \right) - 4.0mA = 0.0$$

Step 3: Enter the calculated values into Sensor Setup table under the Zero and Span columns for that sensor.

Step 4: Select the Save Changes button. It can take up to 1 minute for scaling changes to take effect.

Alias	Units1	LowCritical1	LOW1	HI1	HiCritical1	Zero1	Span1
Dewpoint	°F	-2	-1	50	60	0	5.0

Note: The low alarm limits have been set below the range of the sensor so that they are essentially out of the way because there isn't a LOW condition that would be cause for alarm in this example.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

1) This device may not cause harmful interference, and
2) This device must accept any interference received, including interference that may cause undesired operation.

Changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

The Multi-Point Transmitter (MPT) is a low powered low bandwidth device that i designed for the monitoring of equipment and process parameters that change slowly over time. The factory default data update rate is 5 times per minute. This slow update rate allows this transmitter to enjoy a long battery life while maintaining a continuous watch on your equipment's health. The data rate is not suitable for control purposes and Predictive Sensor Technology does not recommend that it be used to control equipment.