

## RS-485 Signal Conditioner for Electrolytic Tilt Sensors

Part Numbers: 1-6200-008, 1-6200-008-MV7

### Operating Specifications

<b>Communications</b>	RS-485
<b>Analog Input Resolution</b>	16 bits (10 bits oversampled)
<b>Operating Range</b>	0% to 100% of sensor range
<b>Supply Voltage</b>	3.3 V DC to 5 V DC
<b>Supply Current</b>	9 mA @ 5 V DC, 6 mA @ 3.3 V DC
<b>Operating Temperature</b>	-40 °C to 85 °C
<b>Storage Temperature</b>	-40 °C to 125 °C
<b>Sensors Controlled</b>	1 or 2
<b>Axes of Measurement</b>	1 or 2
<b>Temperature Sensor Range</b>	-40 °C to 125 °C

### Physical Characteristics

<b>Housing</b>	None
<b>Electrical Connections (1-6200-008)</b>	7 Pin, 2.54 mm (0.1") spacing
<b>Electrical Connections (1-6200-008-MV7)</b>	Molex 0705430006 (7 Pin)
<b>Weight</b>	4 g
<b>Length</b>	32 mm (1.25")
<b>Width</b>	32 mm (1.25")

### Ordering Information

Part Number	Description
1-6200-008	Signal Conditioner, 1 or 2 Axis, RS-485
1-6200-008-MV7	Signal Conditioner, 1 or 2 Axis, RS-485, Molex

### Compatible With

Part Number	Description
0717-4313-99	Tilt Sensor, ±50°, 2 Axis
0717-4315-99	Tilt Sensor, ±60°, 2 Axis
0717-4318-99	Tilt Sensor, ±60°, 2 Axis
0717-4319-99	Tilt Sensor, ±50°, 2 Axis
0717-4321-99	Tilt Sensor, ±40°, 2 Axis
0717-4322-99	Tilt Sensor, ±45°, 2 Axis
0717-4323-99	Tilt Sensor, ±50°, 2 Axis
0717-4326-99	Tilt Sensor, ±30°, 2 Axis
0703-1602-99	Tilt Sensor, ±25°, 1 Axis
0703-1603-99	Tilt Sensor, ±25°, 1 Axis, Tabless
0703-0711-99	Tilt Sensor, ±3°, 1 Axis

### Related Products

Part Number	Description
1-6200-005	Signal Conditioner, 1 or 2 Axis, SPI
1-6200-006	Signal Conditioner, 1 or 2 Axis, RS-232
1-6200-007	Signal Conditioner, 1 or 2 Axis, Analog/PWM
1-6200-012	Signal Conditioner, 1 or 2 Axis, Analog/RS-232

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### Description

The **1-6200-008** RS-485 signal conditioner can be used with any Fredericks electrolytic tilt sensor. This signal conditioner can be connected to a dual-axis tilt sensor or 1 or 2 single-axis tilt sensors to provide single or dual-axis position measurement over the sensor's range.

The **1-6200-008-MV7** replaces our standard connector with an easy-to-use Molex 0705430006 (7 Pin) connector that can be used to integrate into any new or existing design.

Fredericks **0717 series wide range tilt sensors** can be mounted directly to the PCB for a complete inclinometer solution. Single-axis sensors must be mounted externally to the PCB and connected with wires.

### Key Features and Benefits

- Very low power consumption
- Simple integration into a new or existing design
- Excellent resolution and repeatability of measurements
- -40 °C to 85 °C operating temperature for industrial applications
- Live text and video chat technical support

### Applications

- Recreational vehicle (RV) leveling systems
- Geotechnical and structural monitoring
- Construction tools, laser leveling
- Construction machinery and equipment

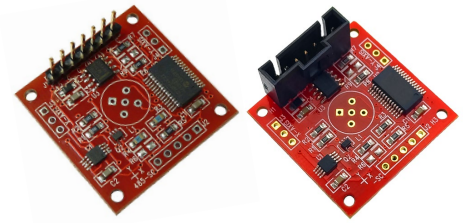
View the full list at [www.frederickscompany.com/markets](http://www.frederickscompany.com/markets).

### RS-485 Information

<b>Baud Rate (default 9600)</b>	1200 to 38400
<b>Data Bits</b>	8
<b>Parity</b>	None
<b>Stop Bits</b>	1
<b>Address (default 99)</b>	01 to 99
<b>Maximum Signal Conditioners on Bus</b>	32

### RS-485 Commands (assume default address 99)

<b>*9911#</b>	X axis output (0 to 65535)
<b>*9921#</b>	Y axis output (0 to 65535)
<b>*9941#</b>	Temperature output (0 to 1023)
<b>*9980#</b>	Read product information
<b>*9981Axx#</b>	Change address to xx (01 to 99)
<b>*9982D#</b>	Read user information
<b>*9984Z#</b>	Set current position as zero
<b>*9984R#</b>	Clear saved zero position
<b>*9988Rx#</b>	Change baud rate to x (1 to 6)
<b>*9989B#</b>	Reset to factory default settings



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**Electrical Connections**

<b>J1 Pin 1 (+5)</b>	Supply (+)
<b>J1 Pin 2 (C)</b>	Supply (-)
<b>J1 Pin 3 (C)</b>	Ground
<b>J1 Pin 4 (B)</b>	RS-485 B (-)
<b>J1 Pin 5 (A)</b>	RS-485 A (+)
<b>J1 Pin 6 (C)</b>	Ground
<b>J1 Pin 7 (C)</b>	Ground
<b>L1</b>	Dual axis sensor connection
<b>J3</b>	Single axis sensor x axis connection
<b>J4</b>	Single axis sensor y axis connection

**Converting Temperature Values**

The board temperature output is a 10-bit value (0 to 1023). To convert that value to a temperature in °C, use the following equation:

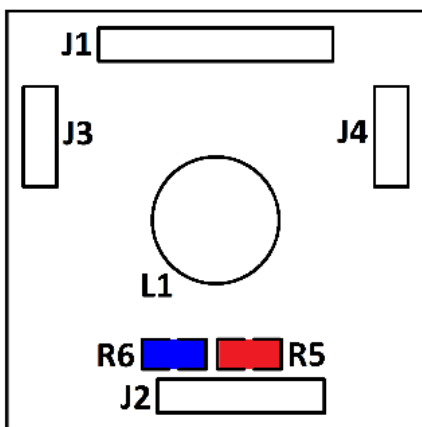
$$\text{Temperature in } ^\circ\text{C} = (((\text{output}/1023) * \text{supply voltage}) - 0.5) / 0.01$$

**Board Configuration**

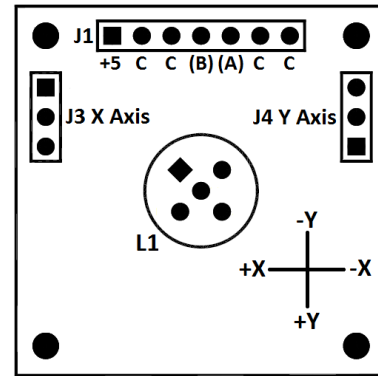
The 1-6200-008 signal conditioner can be configured to operate one dual-axis sensor or two single-axis sensors. Dual-axis sensors can be mounted directly to the board, whereas single-axis sensors must be mounted off the board and connected with wires.

The board must be configured for either dual-axis sensors or single-axis sensors. This configuration is determined by the resistor values of R5 and R6.

- For a dual-axis sensor: R5 (red) is 10 kΩ, R6 (blue) is not installed (open circuit). The sensor is connected to L1.
- For single-axis sensors: R5 (red) is not installed (open circuit), R6 (blue) is 1 kΩ. Sensors are connected to J3 and J4.

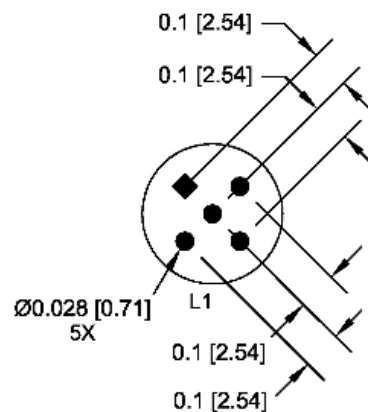
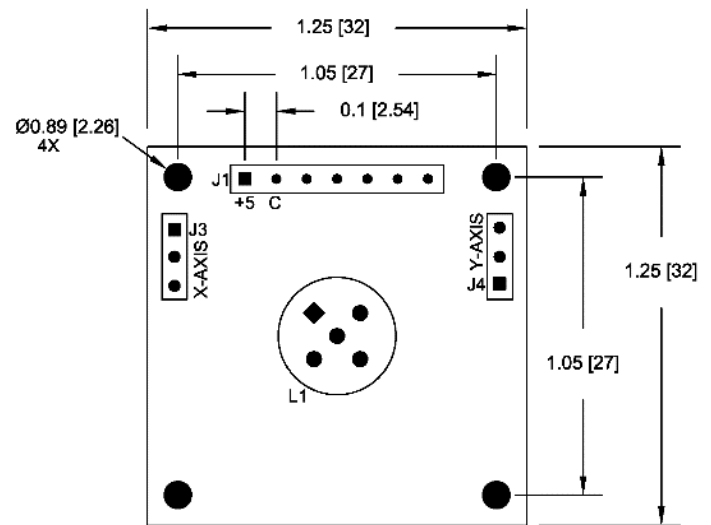


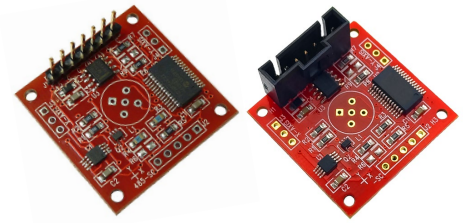
**Pin Diagram and Direction of Measurement**



Note that the direction of measurement only applies when a dual axis sensor is mounted on the PCB.

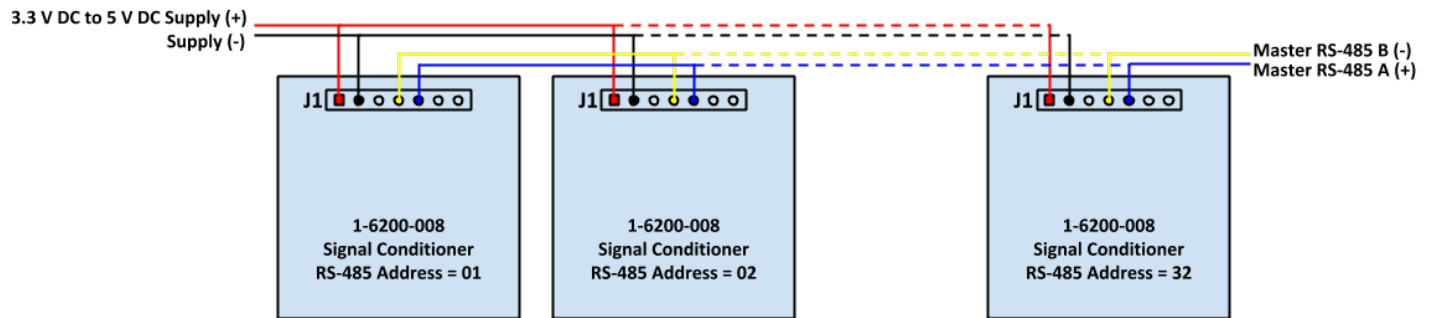
**Dimensional Drawings**





**RS-485 Signal Conditioner for Electrolytic Tilt Sensors**  
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**Example RS-485 Bus Configuration**



**Example RS-485 Command and Response Byte Values**

Retrieve X axis tilt value from a signal conditioner with address 99 which returns 32768 (0° tilt):

**Command**

Byte	0	1	2	3	4	5
ASCII	*	9	9	1	1	#
Hex	0x2A	0x39	0x39	0x31	0x31	0x23

**Response**

Byte	0	1	2	3	4	5	6
ASCII	3	2	7	6	8	<lf>	<cr>
Hex	0x33	0x32	0x37	0x36	0x38	0x0A	0x0D

**Additional Documentation**

- [AN1000 Electrolytic Tilt Sensor Excitation](#)
- [AN1001 Temperature Compensation of Electrolytic Tilt Sensors](#)
- [AN1003 Configuring Tera Term to Use with TFC Tilt Products](#)
- [AN1005 Converting Tilt Angle to Degrees](#)
- [AN1006 Obtaining Measurements from TFC Signal Conditioners](#)

**Certifications and Ratings**

- RoHS Compliant

**Company Information**

**Specialty Manufacturing Services That Promise Precision** - Since 1935, The Fredericks Company has been a global provider and U.S. designer and manufacturer of the highest performance tilt and vacuum measurement products on the market, with manufacturing processes that ensure the reliability of our products.

**Tilt Measurement Products and Sensors That Set Standards** - Fredericks' comprehensive tilt measurement product portfolio offers [electrolytic tilt sensors](#), [inclinometers](#), and [tilt switches](#). Engineered to outperform competing technology, our tilt sensors are accurate and repeatable with excellent resolution. Our tilt measurement products have no planned obsolescence and serve industries ranging from [construction](#) and [RV leveling](#) to aerospace applications and everything in between.

**A Partnership That Prioritizes Uptime, Lead Time, and Service** - Fredericks guarantees customer satisfaction and our "not too big, not too small" operation is what enables us to offer a true partnership experience. Our dedicated representatives and engineers offer exceptionally responsive service and the fastest lead times in the industry, knowing that uptime is the key to your success. With anytime access to our leadership team and solutions that enhance your products, you will feel the Fredericks difference.

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