

# Tilt Measurement Product Catalog



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# Welcome to The Fredericks Company

## High Performance Products Designed and Manufactured in the USA

Fredericks is a global provider and U.S. manufacturer and designer of high-performance tilt and vacuum measurement products. Built to last, our products are made with state-of-the-art sensing technologies, proven processes and an intrinsic passion for the trade. Offering simple integration and quality and safety benchmarks, our customers benefit not just from standard-setting reliability, but from our commitment to competitive pricing and performance.

### Two Weeks or Less Lead Times

We're committed to maintaining the shortest possible lead times for our customers. We understand the importance of fast delivery for your business continuity; long lead times are not only frustrating, but can result in an immediate halt to your operations, decreasing productivity and causing revenue loss.

How do we get lead times this fast? We provide you with a dedicated customer service representative who handles your order from start to finish. Our team makes sure that you receive everything you need, so we get it right the first time, every time!

### 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 some of 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.

## Specialty Manufacturing Services That Promise Precision and Partnership

Since 1935, The Fredericks Company has specialized exclusively in tilt and vacuum measurement products. Today, our precise manufacturing processes produce the most accurate and advanced products on the market, ensuring perfection every time. A true specialty service provider, we are willing and eager to put our experience and capabilities to good use, helping OEMs achieve even the most complex designs.

Even though timely customer service and expert product support should be a standard for doing business, in recent times we've found it to be the exception instead of the rule. Getting the quick, ongoing support you need is critical when you have time sensitive engineering challenges to work through. At that point, you don't just need a part – you need a partner, and expert product support is something you can rely on from Fredericks with anytime access to our product specialists and leadership team.

### Women-Owned Small Business

Fredericks is proud to be a Women-Owned Small Business (WOSB). We are ISO 9001:2015 certified and registered with the U.S. State Department as ITAR compliant. All of our products are designed and manufactured at our facility in Huntingdon Valley, PA.

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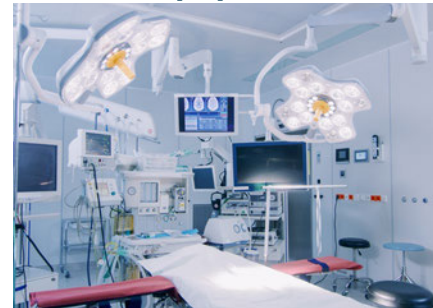
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# Markets We Serve

## Agricultural Vehicles



## Medical Equipment



## Construction Vehicles



## MEWPs



## Additional Markets

- Construction Tools
- Laser Leveling
- Geotechnical Monitoring
- Structural Monitoring
- RV Leveling Systems
- And More!



# Electrolytic Tilt Sensors

Electrolytic tilt sensors measure an angular position with reference to gravity and are used in a wide variety of applications from construction vehicles, seismic monitoring, and medical devices.

We offer several low-cost solutions with a range of measurement up to  $\pm 60^\circ$  with high accuracy from  $\pm 0.1$  to  $\pm 0.001^\circ$  in one or two axes that are designed and engineered to outperform MEMS-based technology.

Our electrolytic tilt sensors are designed for industrial applications, all-metal, hermetically sealed, and capable of handling the most extreme environments.

**0717-4313-99****Wide-Range Tilt Sensor**

Operating Range	±50°
Linear Range	±20°
Axes	2
Repeatability	±0.05°
Resolution	≤0.003°
Height	18.8 mm
Diameter	9.1 mm

**0717-4315-99****Wide-Range Tilt Sensor**

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.05°
Resolution	≤0.003°
Height	18.8 mm
Diameter	9.1 mm

**0717-4318-99****Wide-Range Tilt Sensor**

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Height	18.8 mm
Diameter	9.1 mm

**Most Popular****0717-4319-99****Wide-Range Tilt Sensor**

Operating Range	±50°
Linear Range	±20°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Height	18.8 mm
Diameter	9.1 mm

**0717-4321-99****Wide-Range Tilt Sensor**

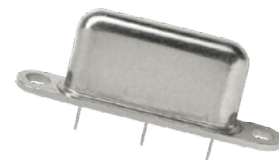
Operating Range	±40°
Linear Range	±40°
Axes	2
Repeatability	±0.1°
Resolution	≤0.005°
Height	14 mm
Diameter	9.1 mm

**0717-4323-99****Wide-Range Tilt Sensor**

Operating Range	±45°
Linear Range	±45°
Axes	2
Repeatability	±0.1°
Resolution	≤0.005°
Height	14 mm
Diameter	9.1 mm

**0717-4323-99****Wide-Range Tilt Sensor**

Operating Range	±50°
Linear Range	±50°
Axes	2
Repeatability	±0.1°
Resolution	≤0.005°
Height	14 mm
Diameter	9.1 mm

**0703-1602-99****Mid-Range Tilt Sensor**

Operating Range	±25°
Linear Range	±10°
Axes	1
Repeatability	±0.005°
Resolution	≤0.0003°
Height	14.2 mm
Length	40.6 mm

**0703-0711-99****Narrow Range Tilt Sensor**

Operating Range	±3°
Linear Range	±1°
Axes	1
Repeatability	±0.001°
Resolution	≤0.0003°
Height	8.5 mm
Length	40.6 mm

**Structural Monitoring Case Study: Resensys**



# Electrolytic Inclinometers

Inclinometers are an assembly of our signal conditioner and tilt sensor products. The assembly provides an easy-to-use end user output in two axes like analog 0 to 5 V DC, SPI, RS-232, RS-485, and UART/TTL.

Utilizing our electrolytic tilt sensing technology, these inclinometers have measurement ranges from  $\pm 25^\circ$  to  $\pm 60^\circ$  with repeatability from  $\pm 0.005^\circ$  to  $\pm 0.1^\circ$ .

Our inclinometers offer supply voltages up to 16 V DC, and housed units with potting provide an environmental protection rating up to IP67. The standard flying leads on any of our inclinometers with a cable can be replaced with a custom connector based on your specifications.

New Product!



## ApexTwo™

### Specifications

Operating Range	±60°
Linear Range	±50°
Axes	2
Accuracy	±0.5°
Resolution	≤0.01°
Supply Voltage	10 V DC to 30 V DC
Supply Current	5 mA @ 12 V DC

### ApexTwo™ Ordering Information

Communications	Connector	Part Number
Analog	Deutsch	F260-21A-018-00
Analog	Amphenol	F260-21A-018-01
RS-232	Deutsch	F260-212-018-00
RS-232	Amphenol	F260-212-018-01
RS-485	Deutsch	F260-214-018-00
RS-485	Amphenol	F260-214-018-01



0729-1751-99

### SPI Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	4 mA @ 3.3 V 6 mA @ 5 V



0729-1752-99

### RS-232 Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	11 mA @ 3.3 V 16 mA @ 5 V



0729-1753-99

### Analog/PWM Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	10 mA @ 3.3 V 15 mA @ 5 V



0729-1754-99

### RS-485 Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	6 mA @ 3.3 V 9 mA @ 5 V



0729-1765-99

### Analog/RS-232 Inclinometer

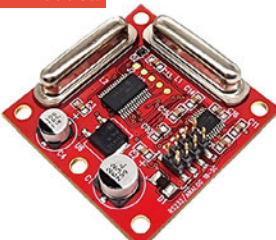
Operating Range	±25°
Linear Range	±10°
Axes	2
Repeatability	±0.005°
Resolution	≤0.0003°
Supply Voltage	7 V DC to 16 V DC
Supply Current	20 mA @ 12 V DC



F225-00T-003-01

### UART/TTL Inclinometer

Operating Range	±25°
Linear Range	±10°
Axes	2
Repeatability	±0.005°
Resolution	≤0.001°
Supply Voltage	5 V DC ±0.25 V DC
Supply Current	<10 mA @ 5 V DC



F203-00A-212-00

### Analog/RS-232 Inclinometer

Operating Range	±3°
Linear Range	±1°
Axes	2
Repeatability	±0.001°
Resolution	≤0.001°
Supply Voltage	7 V DC to 16 V DC
Supply Current	<10 mA



0729-1755-99

### Analog/PWM Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	7 V DC to 16 V DC
Supply Current	20 mA @ 7 V DC



0729-1759-99

### RS-232 Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	7 V DC to 16 V DC
Supply Current	20 mA @ 7 V DC



0729-1760-99

### RS-485 Inclinometer

Operating Range	±60°
Linear Range	±25°
Axes	2
Repeatability	±0.1°
Resolution	≤0.003°
Supply Voltage	7 V DC to 16 V DC
Supply Current	20 mA @ 7 V DC



# Electrolytic Tilt Switches

Our tilt switches are very similar to our inclinometers, but instead of a continuous output, tilt switches have a discrete on/off output from either a relay or an open collector.

The angle where the tilt switch output switches can be set to specific angle positions in one or two axes, up to  $\pm 45^\circ$  tilt. The trip angle can be set by us at the factory or set and reset by you in the field.

These tilt switches are housed and have optional potting to provide up to IP67 environmental protection. Cables with flying leads and connectors are available with customization based on your requirements.

Most Popular

**0729-1736-99****Dual-Axis Tilt Switch**

Maximum Trip Angle	±35°
Minimum Trip Angle	±1°
Output	1 Relay
Axes	2
Repeatability	±0.1°
Long Term Stability	≤0.1°

**0729-1757-99****Single-Axis Tilt Switch**

Maximum Trip Angle	±45°
Minimum Trip Angle	±1°
Output	2 Open Collectors
Axes	1
Repeatability	±0.1°
Long Term Stability	≤0.1°

**0729-1758-99****Single-Axis Tilt Switch**

Maximum Trip Angle	±45°
Minimum Trip Angle	±1°
Output	2 Open Collectors
Axes	1
Repeatability	±0.1°
Long Term Stability	≤0.1°

**0729-1763-XX****Dual-Axis Tilt Switch**

Maximum Trip Angle	±45°
Minimum Trip Angle	±1°
Output	4 Relays
Axes	2
Repeatability	±0.1°
Long Term Stability	≤0.1°

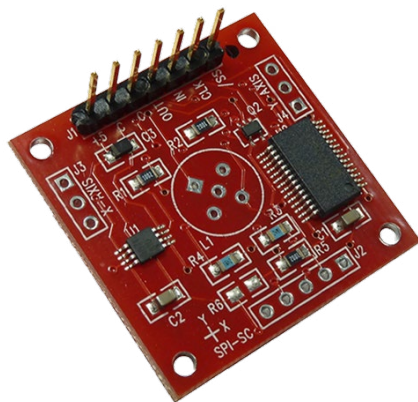


Our signal conditioners include convenient mounting holes and connectors allowing you to simply mount and integrate our circuits in your design. These products have 16-bit outputs to ensure the best accuracy in your application.

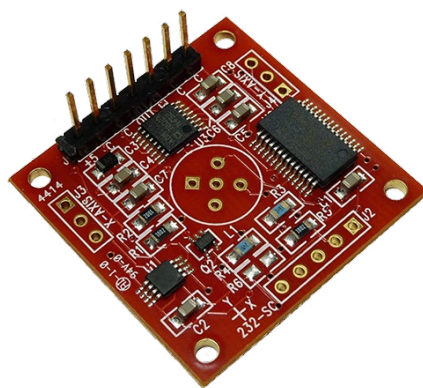


**FREDERICKS**  
COMPANY | **TELEVAG**

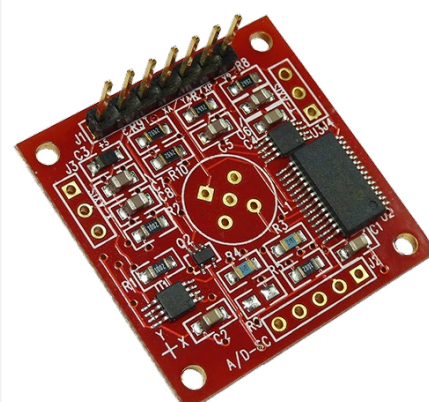
2400 Philmont Ave, Huntingdon Valley PA 19006, USA


**1-6200-005**
**SPI Signal Conditioner**

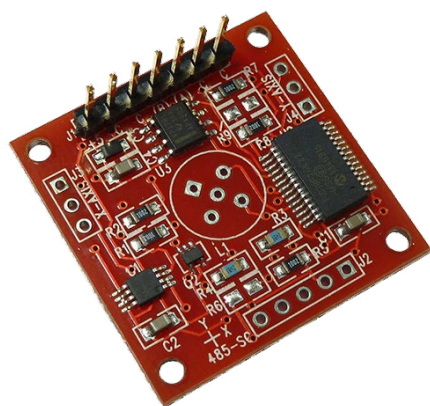
Communications	SPI
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	6 mA @ 5 V DC 4 mA @ 3.3 V DC
Operating Range	0% to 100% of connected sensor range
Output	16 bit


**1-6200-006**
**RS-232 Signal Conditioner**

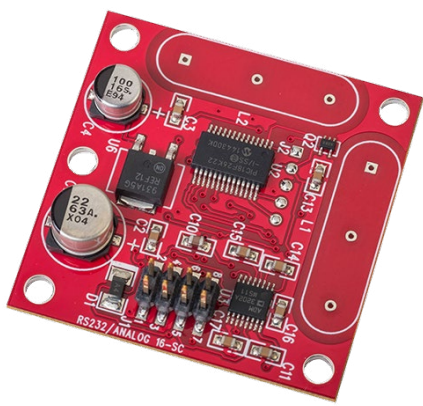
Communications	RS-232
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	16 mA @ 5 V DC 11 mA @ 3.3 V DC
Operating Range	0% to 100% of connected sensor range
Output	16 bit


**1-6200-007**
**Analog/PWM Signal Conditioner**

Communications	Analog 0 to $V_{dd}$ , PWM
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	15 mA @ 5 V DC 10 mA @ 3.3 V DC
Operating Range	0% to 100% of connected sensor range
Output	16 bit


**1-6200-008**
**RS-485 Signal Conditioner**

Communications	RS-485
Supply Voltage	3.3 V DC to 5 V DC
Supply Current	9 mA @ 5 V DC 6 mA @ 3.3 V DC
Operating Range	0% to 100% of connected sensor range
Output	16 bit


**1-6200-012**
**Analog/RS-232 Signal Conditioner**

Communications	RS-232, 0 V DC to 5 V DC
Supply Voltage	7 V DC to 16 V DC
Supply Current	20 mA @ 7 V DC
Operating Range	0% to 100% of connected sensor range
Output	16 bit



High Performance Sensing Solutions



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