

Dual Axis SPI Inclinometer

Part Number: **0729-1751-99**



Operating Specifications

Interface	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	±60°
Linear Range	±25°
Axes of Measurement	2
Repeatability	±0.1°
Resolution	≤0.003°
Null Offset	±5°
Long Term Stability/Drift	≤0.1°
Null Temperature Coefficient	≤0.006° per °C
Scale Temperature Coefficient	0.1% per °C
Operating Temperature	-40 °C to 85 °C
Storage Temperature	-40 °C to 125 °C
Temperature Sensor Range	-40 °C to 125 °C
Time Constant (63.2% of output)	≤100 ms

Physical Characteristics

Housing	None (PCBA)
Electrical Connections	7 Pin, 2.54 mm (0.1") spacing
Weight	5.5 g
Length	31.8 mm (1.25")
Width	31.8 mm (1.25")
Height	16 mm (0.63")
Hole Center	26.7 mm (1.05")

SPI Commands, ASCII and Hexadecimal Values

'1', 0x31	X axis high byte of 16-bit output
'2', 0x32	X axis low byte of 16-bit output
'3', 0x33	Y axis high byte of 16-bit output
'4', 0x34	Y axis low byte of 16-bit output
'5', 0x35	Board temperature high byte of 10-bit output
'6', 0x36	Board temperature low byte of 10-bit output
'9', 0x39	Update all data (software version 2.0.0 and higher)

Note: Use 1 ms delay between commands.

Electrical Connections

J1 Pin 1 (+5)	Power supply (+)
J1 Pin 2 (C)	Power supply (-)
J1 Pin 3 (C)	Ground
J1 Pin 4 (OUT)	SDO, SPI slave data output
J1 Pin 5 (IN)	SDI, SPI slave data input
J1 Pin 6 (CLK)	SCK, SPI slave clock input
J1 Pin 7 (/SS)	SPI slave select
L1	Dual axis sensor connection
J3	Single axis sensor x axis connection
J4	Single axis sensor y axis connection

Certifications and Ratings

- RoHS

Description

The 0729-1751-99 dual axis SPI inclinometer is part of Fredericks' inclinometer family of products designed and manufactured in the USA for use in industrial, commercial, and military applications. It includes the [0717-4318-99](#) Fredericks TrueTilt™ wide-range, dual-axis electrolytic tilt sensors and [1-6200-005](#) signal conditioning electronics. Its wide operating angle range and SPI communications combined with its small footprint make it simple to integrate into new or existing systems and designs. Our comprehensive portfolio of tilt measurement products is engineered to outperform competing technology in the most demanding environments and serve industries ranging from RV leveling to aerospace applications and everything in between. Visit www.frederickscompany.com for more information.

Benefits

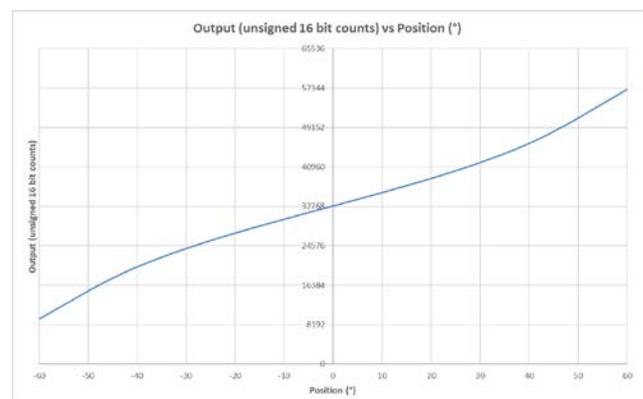
- Exceptionally high resolution, repeatability, and accuracy
- Very low power consumption
- Extremely long service life with less drift than MEMS tilt sensors
- Superior performance in extreme temperatures/environments
- Excellent customer support
- Designed and manufactured in the United States of America

Applications

- Construction, agricultural, and forestry vehicles and machinery
- Aerial work platforms (AWP), elevating work platforms (EWP)
- Mobile elevating work platforms (MEWPS)
- Scissor lifts (height sensor)
- Telescopic and articulating boom lifts (boom angle sensor)
- Solar tracking

View a full list of applications on The Fredericks Company website at www.frederickscompany.com.

Operating Range Output Behavior



Operating Range

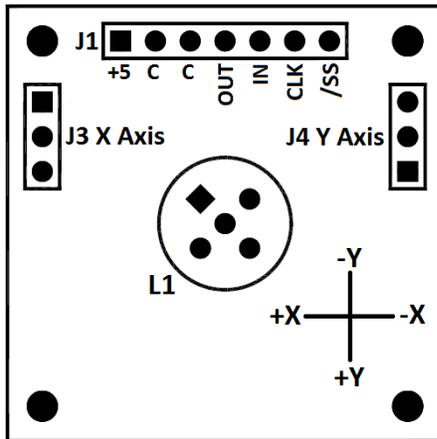


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SPI Slave Information

Clock	From master, idle high, 500 kHz to 20 MHz
Data Transfer Edge	Clock high to low
Data Bits	8, MSB first
Start Bits	1
Stop Bits	1
Slave Select Polarity	Idle high, low when transferring data

Direction of Measurement



Related Products

Dual Axis Electrolytic Inclinometers (PCBA)

- 0729-1752-99 ±60° range, RS-232 communications
- 0729-1753-99 ±60° range, analog and PWM output
- 0729-1754-99 ±60° range, RS-485 communications

Dual Axis Electrolytic Inclinometers (Enclosed, IP67)

- 0729-1755-99 ±60° range, analog 0 to 5 V DC output
- 0729-1759-99 ±60° range, RS-232 communications
- 0729-1760-99 ±60° range, RS-485 communications
- 0729-1760-04 ±10° range, RS-485 communications

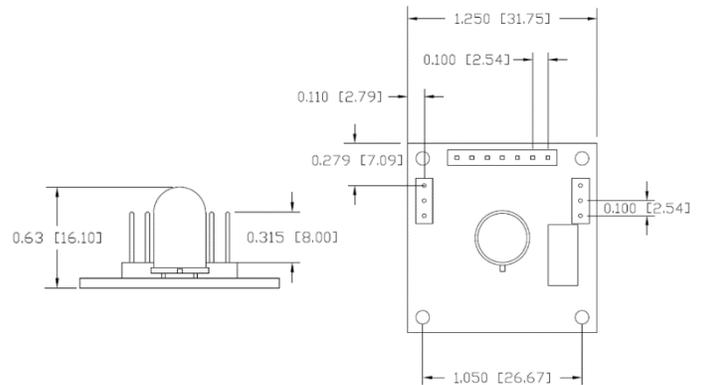
Dual Axis MEMS Inclinometers (Enclosed, IP67)

- 0750-9002-99 ±90° range, RS-485 communications
- 0750-3002-99 ±30° range, RS-485 communications
- 0751-9002-99 ±90° range, analog 0.5 to 4.5 V DC output
- 0751-3002-99 ±30° range, analog 0.5 to 4.5 V DC output

Mounting Notes

The 0729-1765-99 and all inclinometers in this series must be mounted horizontally (parallel to the surface of the earth and perpendicular to the force of gravity). For best performance, isolate the unit from vibrations when mounting it.

Dimensional Drawings



Example SPI Command Sequence

Update data and retrieve X and Y axis tilt values which both return 32768 (0° tilt), transmit and receive values are listed in hexadecimal:

```
[Master TX] 0x39 //update all values
[Master RX] ignore //no valid data in buffer yet
Delay 1 ms
[Master TX] 0x31 //request x axis high byte
[Master RX] 0x2A //'*' response to 0x39 command, data updated
Delay 1 ms
[Master TX] 0x32 //request x axis low byte
[Master RX] 0x80 //x axis high byte, response to 0x31 command
Delay 1 ms
[Master TX] 0x33 //request y axis high byte
[Master RX] 0x00 //x axis low byte, response to 0x32 command
Delay 1 ms
[Master TX] 0x34 //request y axis low byte
[Master RX] 0x80 //y axis high byte, response to 0x31 command
Delay 1 ms
[Master TX] 0x39 //update all values
[Master RX] 0x00 //y axis low byte, response to 0x32 command
```

X axis value = 0x8000 = 32768 = 0° tilt
Y axis value = 0x8000 = 32768 = 0° tilt

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