



## T-SERIES INDUSTRIAL INCLINOMETER

Analog Interface



### Introduction

T-Series industrial inclinometers are compact high performance sensors used to determine inclination in roll and pitch axes with excellent precision and at a high value. Whether using a molded plastic housing or an AW6082-T6 aluminum alloy housing, both versions offer mechanical stability and an encapsulated sensor. Both have a high environmental protection rating making them ideal for measuring tilt in harsh industrial environments.

### Main Features

- Dual Axis Measurement Range up to  $\pm 60^\circ$
- Option for a Single Axis Measurement Range of  $360^\circ$
- High Resolution:  $0.01^\circ$
- High Accuracy:  $0.1^\circ$
- Glass Fiber Reinforced Plastic Housing available
- Factory Calibrated Linearity
- Temperature Compensated for Bias and Sensitivity
- Analog Interface: Voltage, Current
- Highest Protection Class: IP69K, IP68

### Electrical Features

- Highly Integrated Circuit in SMD-Technology
- Reverse Polarity Protection
- Over Voltage Peak Protection

### Applications

- Measurement of Inclination (pitch and roll) and Rotational Movements
- Cranes and Construction Machines
- Robotic Arms & Positioning Systems
- Mobile Platform stabilization
- Marine & Offshore Machinery



Electrical

Model		T- M2 (or P2)- (Range)			T-M1 (or P1) - 360
		15	30	60	
Measurement Range		± 15°	± 30°	± 60	360°
Number of Axes		2 (Standard), 1 optional			1
Analog Interface	Voltage	0.5 to 4.5 V, 0° = 2.5 V Load ≥ 10 KΩ with 12 V DC			0.5 to 4.5 V, 0° = 0.5 V Load ≥ 10 KΩ with 12 V DC
	Current	4 mA to 20 mA, 0° = 12 mA Load ≤ 270 Ω <sup>1</sup>			4 mA to 20 mA, 0° = 4 mA Load ≤ 270 Ω <sup>1</sup>
Resolution		0.01°			
Accuracy (T = -10 °C to +40 °C) <sup>2</sup>		0.1°			
Sensor Response Time		10 ms (Without Filter)			
Recommended Measurement Rate		Up to 10 Hz			
Supply Voltage <sup>3</sup>		10 to 30 V DC (Absolute Maximum Ratings) for Voltage Analog Interface 15 to 30 V DC (Absolute Maximum Ratings) for Current Analog Interface			
Power Consumption		≤ 0.7 W			
EMC		Emitted Interference: EN 61000-6-4			
		Noise Immunity: EN 61000-6-2			
Connection		Connector Output, 8 Pin M12 male (A-coded)			

Mechanical

Housing Material (Plastic)	Glass Fiber Reinforced PBT (Polybutylene Terephthalate)
Housing Material (Metal)	AW6082 Corrosion resistant Aluminum alloy, passivated
Potting Material	PUR (Polyurethane)
Shock (EN 60068-2-27) <sup>2</sup>	≤ 100 g (half sine, 6 ms)
Vibration (EN 60068-2-6) <sup>2</sup>	1.5mm (10 to 58 Hz) & ≤ 20 g (58 to 2000 Hz)
Weight	75 gm / 3 oz

<sup>1</sup> RL < 500Ω with 15 V DC

<sup>2</sup> Further data available on request

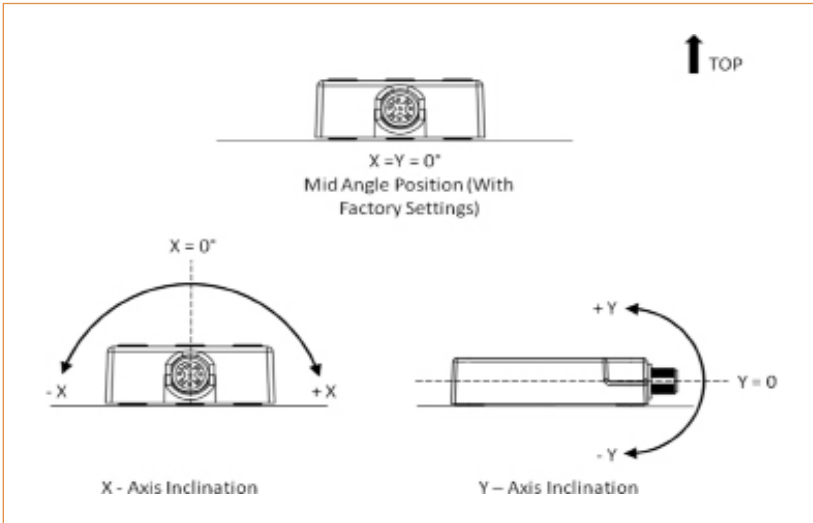
<sup>3</sup> Inclinometers should be connected only to subsequent electronics whose power supplies comply with EN 50178 (Protective Low Voltage)

Environmental

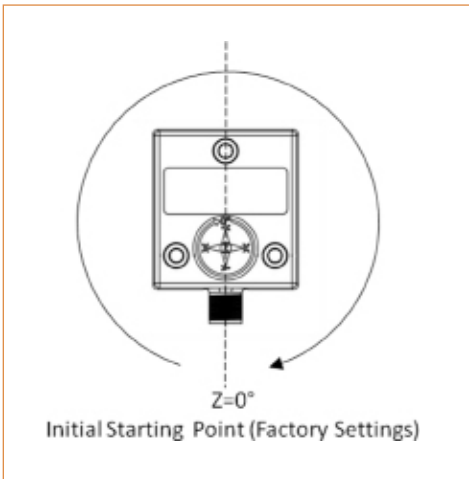
Operating Temperature	-40 °C to +85 °C / -40 °F to 185 °F
Humidity	98 % Relative Humidity, Non-Condensing
Protection Class (EN 60529)	IP 69K (With Appropriate Mating Connector and mounting), IP68



## MEASUREMENT AXES (TWO AXIS UNITS)



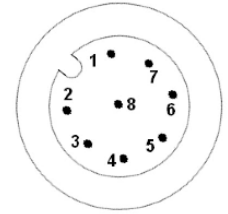
## MEASUREMENT AXIS - 360 (SINGLE AXIS INCLINOMETER)



# PIN ASSIGNMENT

The inclinometer is connected via an 8 pin M12 A-coded round connector. (Standard M12, Male side at sensor, Female at mating connector).

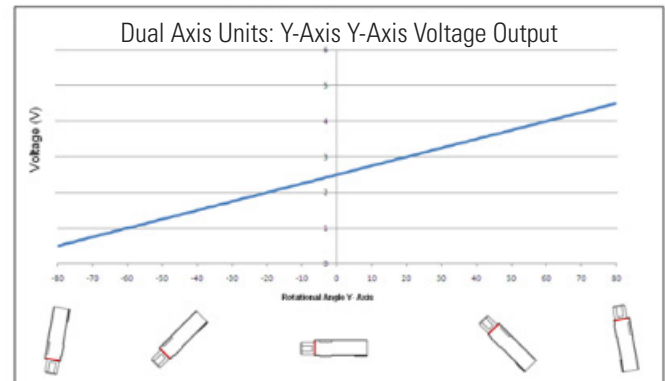
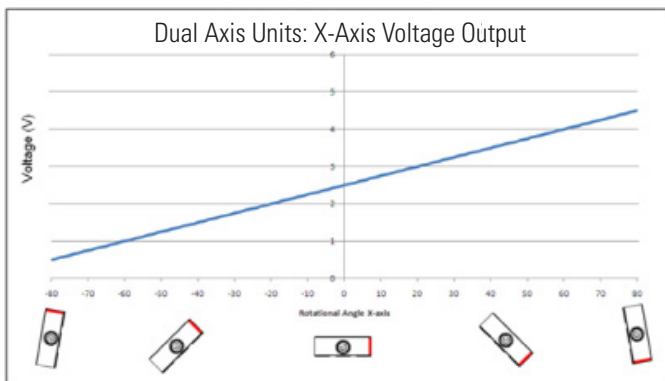
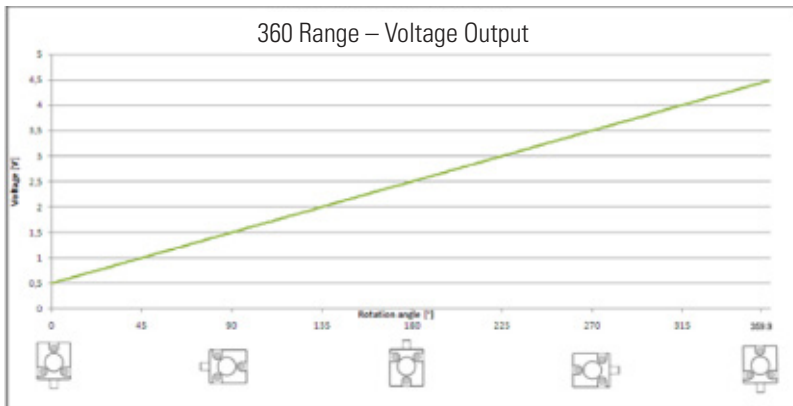
Pin	Cable Color	Dual-Axis Units	Single Axis, 360° Units
1	Red	VS Supply Voltage	VS Supply Voltage
2	Gray	Spare (N/C) <sup>1</sup>	Spare (N/C)
3	Pink	Spare (N/C)	Spare (N/C)
4	Yellow	Ground (Signal Common)	Ground (Signal Common)
5	Green	X-axis Analog Output <sup>2</sup>	Z -Axis Analog Output <sup>2</sup>
6	Brown	Spare (N/C)	Spare (N/C)
7	Blue	Y-axis Output Analog <sup>2</sup>	Spare (N/C)
8	White	Spare (N/C)	Spare (N/C)



<sup>1</sup> Items marked Spare (N/C) should not be connected

<sup>2</sup> For single axis units, either the X-axis or the Y-axis is active as specified in the model. If not active, treat the axis as a Spare (N/C)

# VOLTAGE OUTPUT





**T** — **M1X** — **15** — **A1** — **CS2**

**Series**

**T = Tilt Measurement**

**Housing/Axes**

**M1X** = Metal, 1 Axis, X direction (Roll)  
**M1Y** = Metal, 1 Axis, Y direction (Pitch)  
**M2** = Metal, 2 Axes  
**P1X** = Plastic, 1 Axis, X direction (Roll)  
**P1Y** = Plastic, 1 Axis, Y direction (Pitch)  
**P2** = Plastic, 2 Axes  
 Note: With a 360° range, use the 1 axis designation (i.e. M1)

**Measurement Range**

**15** = ± 15°  
**30** = ± 30°  
**60** = ± 60°  
**360** = ± 360°

**Output Type**

**A1** = 4-20 mA  
**A4** = 0 – 5V (Nominal)  
 Actual range is 0.5 to 4.5 VDC

**Termination Options**

**M12/8** = 8 Pin Connector  
**CS1** = Cable, 1 M  
**CS2** = Cable, 2 M  
**CS5** = Cable, 5 M  
**CS10** = Cable 10 M

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