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 ±60°
- Option for a Single Axis Measurement Range of 360°
- High Resolution: 0.01°
- High Accuracy: 0.1°
- 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

SPECIFICATIONS

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 Ω1			4 mA to 20 mA, 0° = 4 mA Load ≤ 270 Ω[1]
Resolution		0.01°			
Accuracy (T = -10 °C to +40 °C)[2]		0.1°			
Sensor Response Time		10 ms (Without Filter)			
Recommended Measurement Rate		Up to 10 Hz			
Supply Voltage[3]		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)[2]	≤ 100 g (half sine, 6 ms)
Vibration (EN 60068-2-6)[2]	1.5mm (10 to 58 Hz) & ≤ 20 g (58 to 2000 Hz)
Weight	75 gm / 3 oz

[1] RL < 500Ω with 15 V DC
[2] Further data available on request
[3] Inclinometers should be connected only to subsequent electronics whose power supplies comply with EN 50178 (Protective Low Voltage)

Environmental

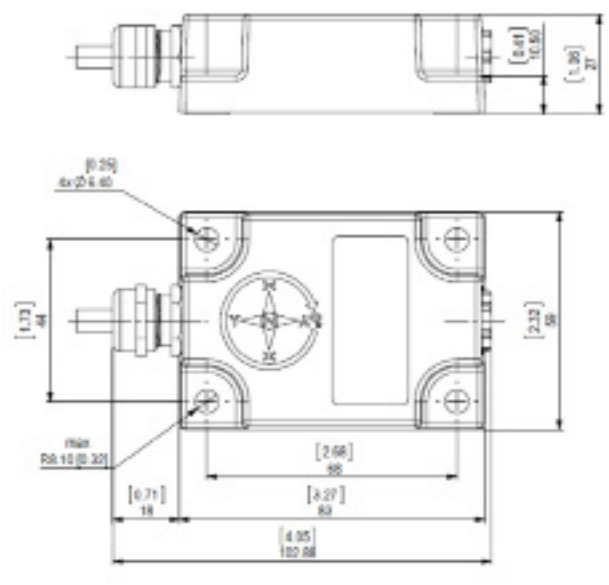
Operating Temperature	-40 °C to +85 °C / -40 °F to 185 °F
Humidity	98 % Relative Humidity, Non-Condensing
Protection Class (EN 60529)	IP 69K (With Appropriate Mating Connector and mounting), IP68

DIMENSIONS

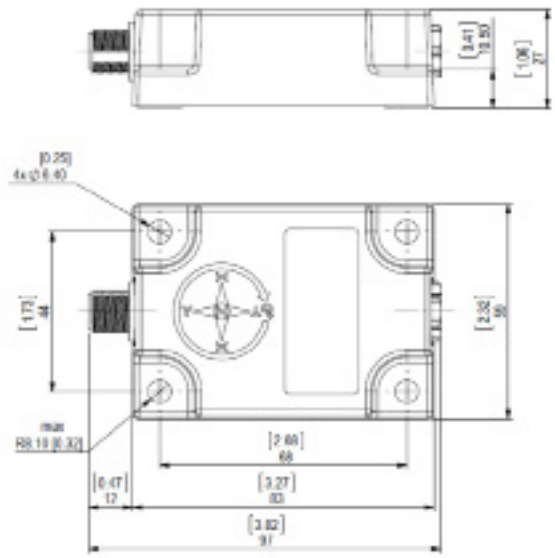
Dimensions in mm and [inches]

Metal Housing Option

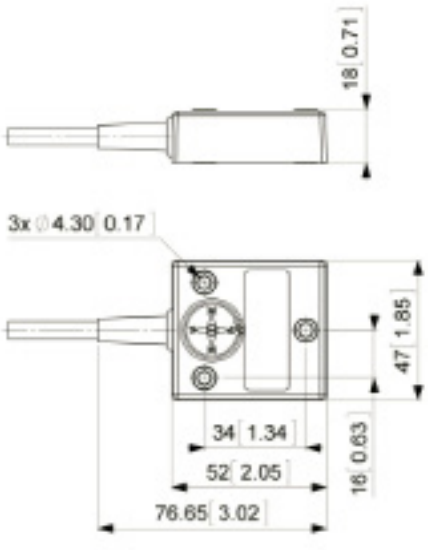
Cable Termination



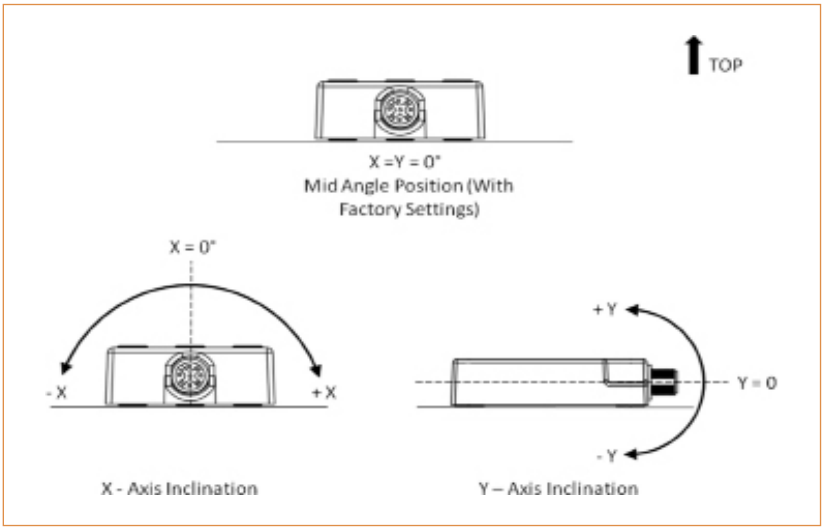
Connector Termination



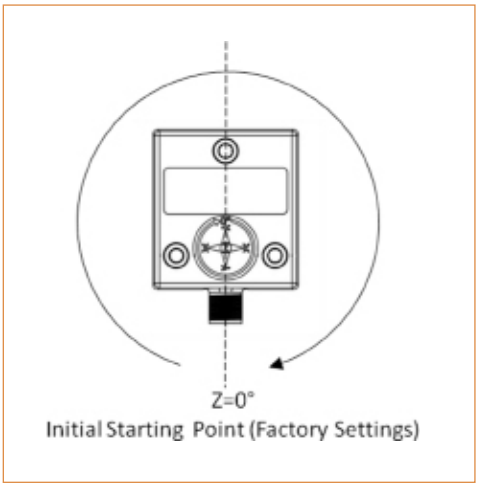
Plastic Housing Option



MEASUREMENT AXES (TWO AXIS UNITS)



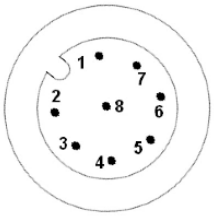
MEASUREMENT AXIS - 360 (SINGLE AXIS INCLINOMETER)



PIN ASSIGNMENT

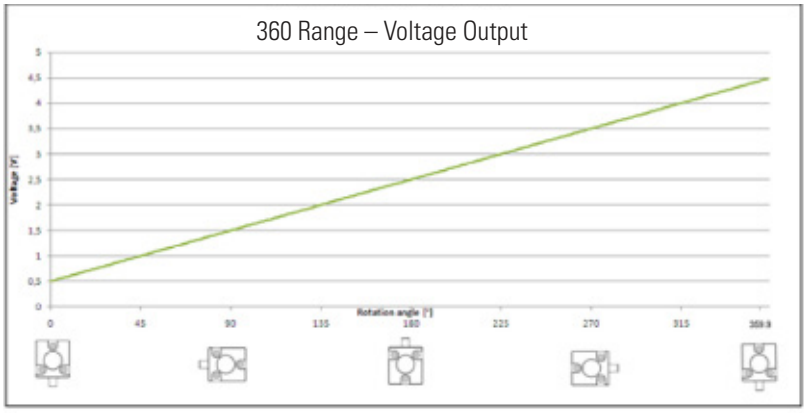
The inclinometer is connected via an 8 pin M12 A-coded round connector. (Standard M12, Male side at sensor, Female at mating connector).

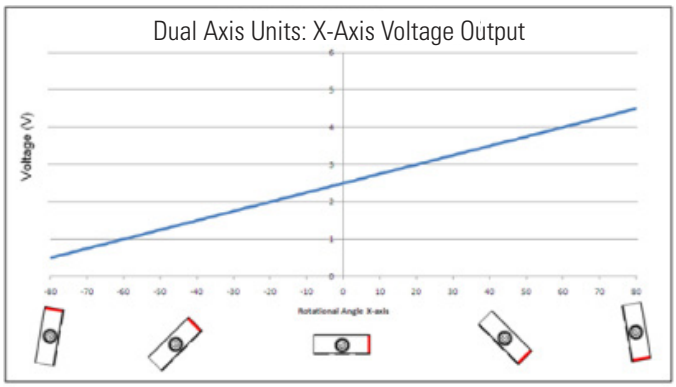
Pin	Cable Color	Dual-Axis Units	Single Axis, 360° Units
1	Red	VS Supply Voltage	VS Supply Voltage
2	Gray	Spare (N/C) [1]	Spare (N/C)
3	Pink	Spare (N/C)	Spare (N/C)
4	Yellow	Ground (Signal Common)	Ground (Signal Common)
5	Green	X-axis Analog Output[2]	Z -Axis Analog Output[2]
6	Brown	Spare (N/C)	Spare (N/C)
7	Blue	Y-axis Output Analog2	Spare (N/C)
8	White	Spare (N/C)	Spare (N/C)

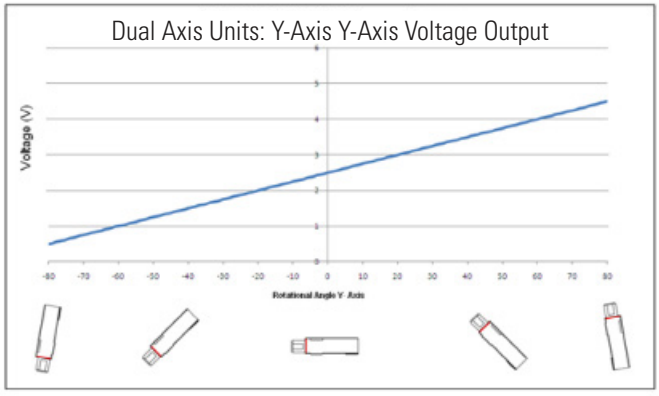


[1] Items marked Spare (N/C) should not be connected
[2] For single axis units, either the X-axis or the Y-axis is active as specified in the model. If not active, treat the axis as a Spare (N/C)

VOLTAGE OUTPUT







ORDERING OPTIONS

Example : T-M1X-15-A1-CS2

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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