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.

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

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)

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)			

Enviromental

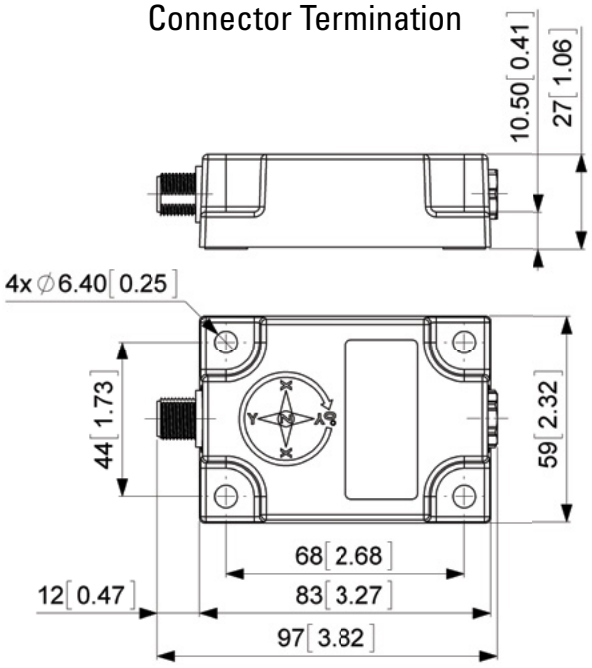
Operating Temperature	-40 °C to +85 °C / -40 °F to 185 °F
Humidity	98 % Relative Humidity, Non-Condensing
Protection Class (EN 60529)	IP 69K (With Appropriate Mating Connector and mounting), IP68

DIMENSIONS

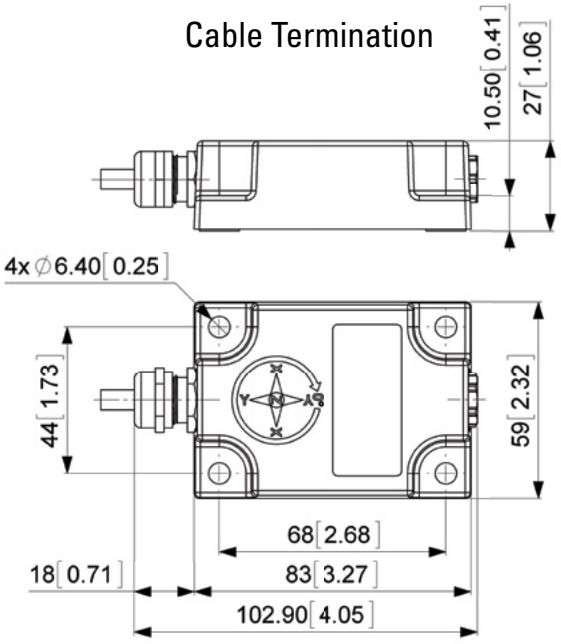
Tolerance, unless otherwise noted:
All dimensions are in millimeters [inches]

Metal Housing Option

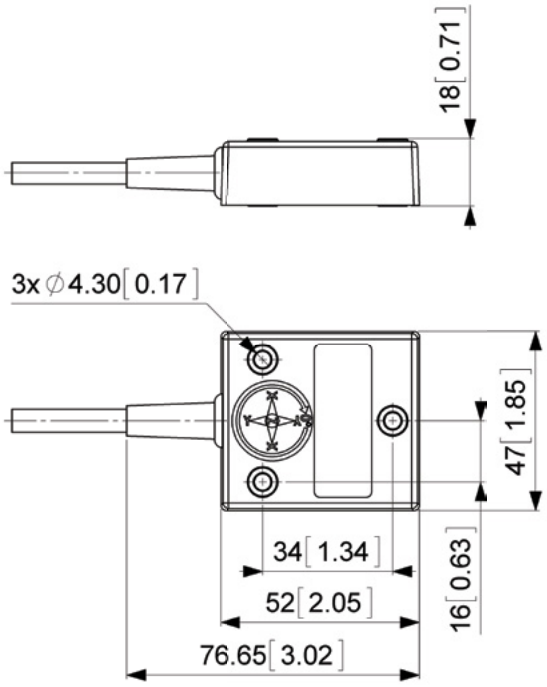
Connector Termination



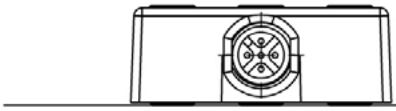
Cable Termination



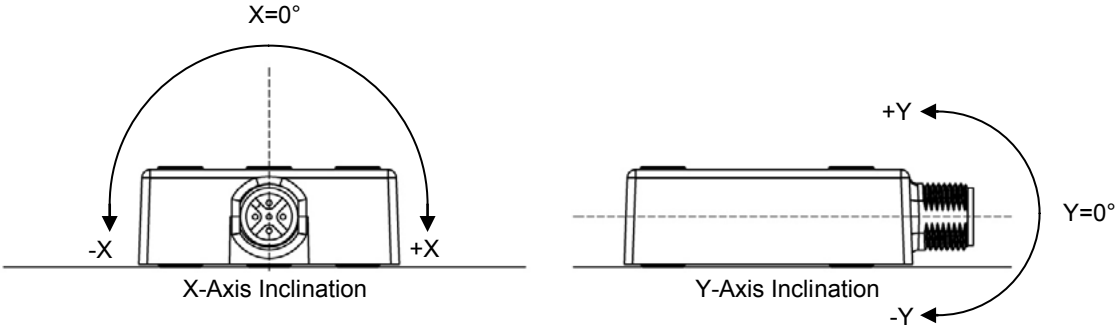
Plastic Housing Option



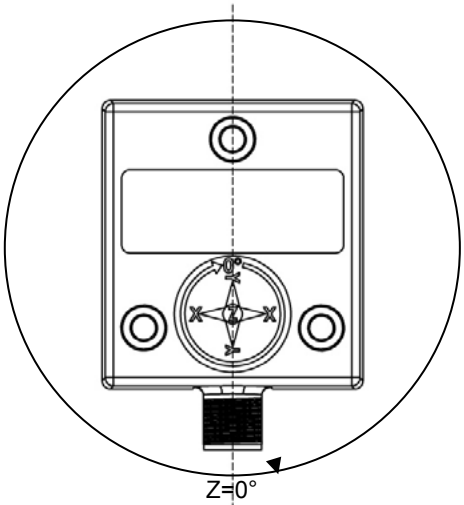
Measurement Axes (Two Axis Units)



X=Y=0°
Mid Angle Position
(With Factory Settings)



Measurement Axis- 360 (Single Axis Inclinometer)

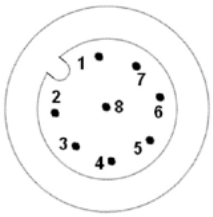


Initial Starting Point (Factory Settings)

SECTION TITLE

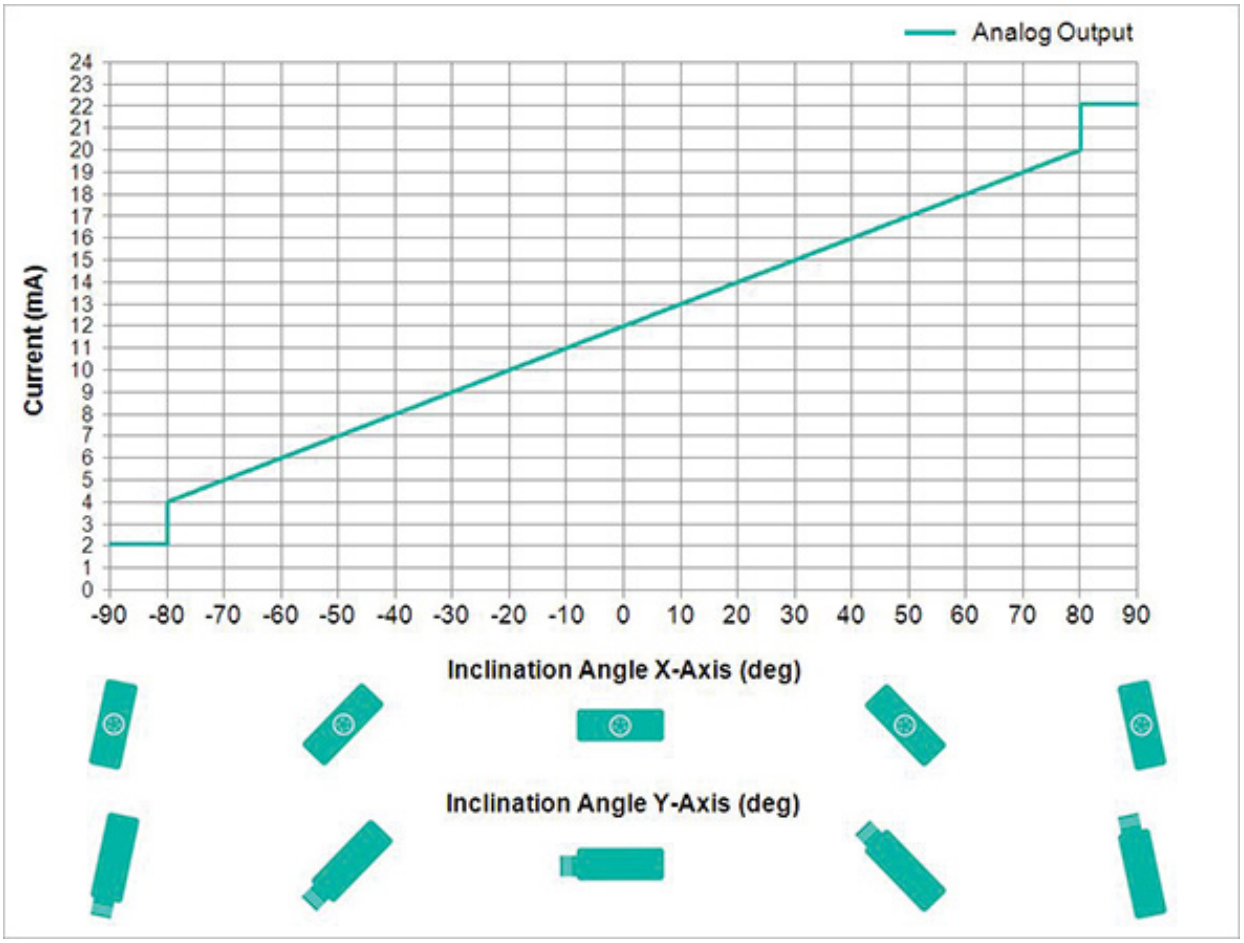
The inclinometer is connected via an 8 pin M12 A-coded round connector. (Standard M12, Male side at sensor, Female at mating connector).

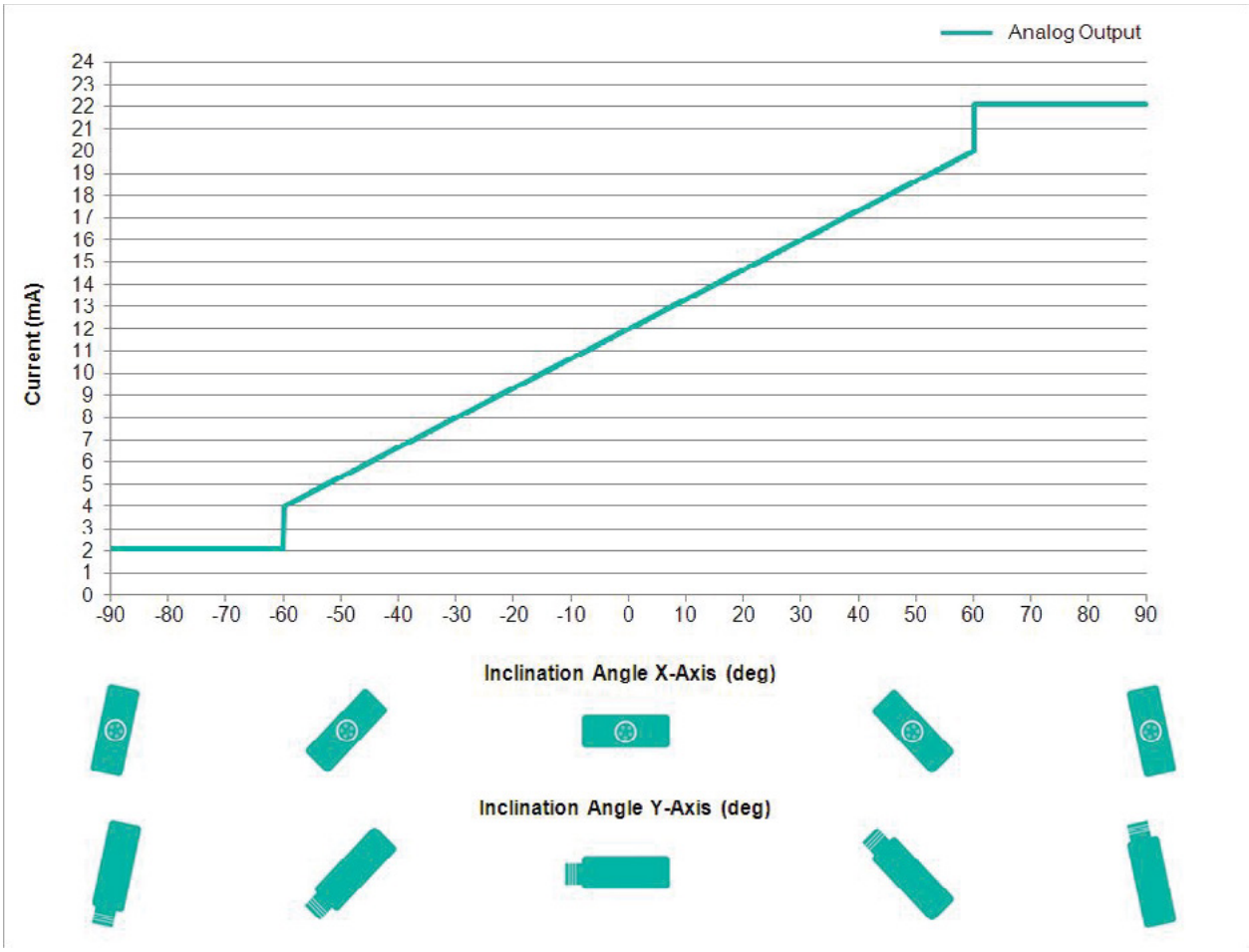
Pin	Cable Color	Dual-Axis Units	Single Axis, 360° Units
1	Red	VS Supply Voltage	VS Supply Voltage
2	Gray	Spare (N/C) [1]	Spare (N/C)
3	Pink	Spare (N/C)	Spare (N/C)
4	Yellow	Ground (Signal Common)	Ground (Signal Common)
5	Green	X-axis Analog Output[2]	Z -Axis Analog Output[2]
6	Brown	Spare (N/C)	Spare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

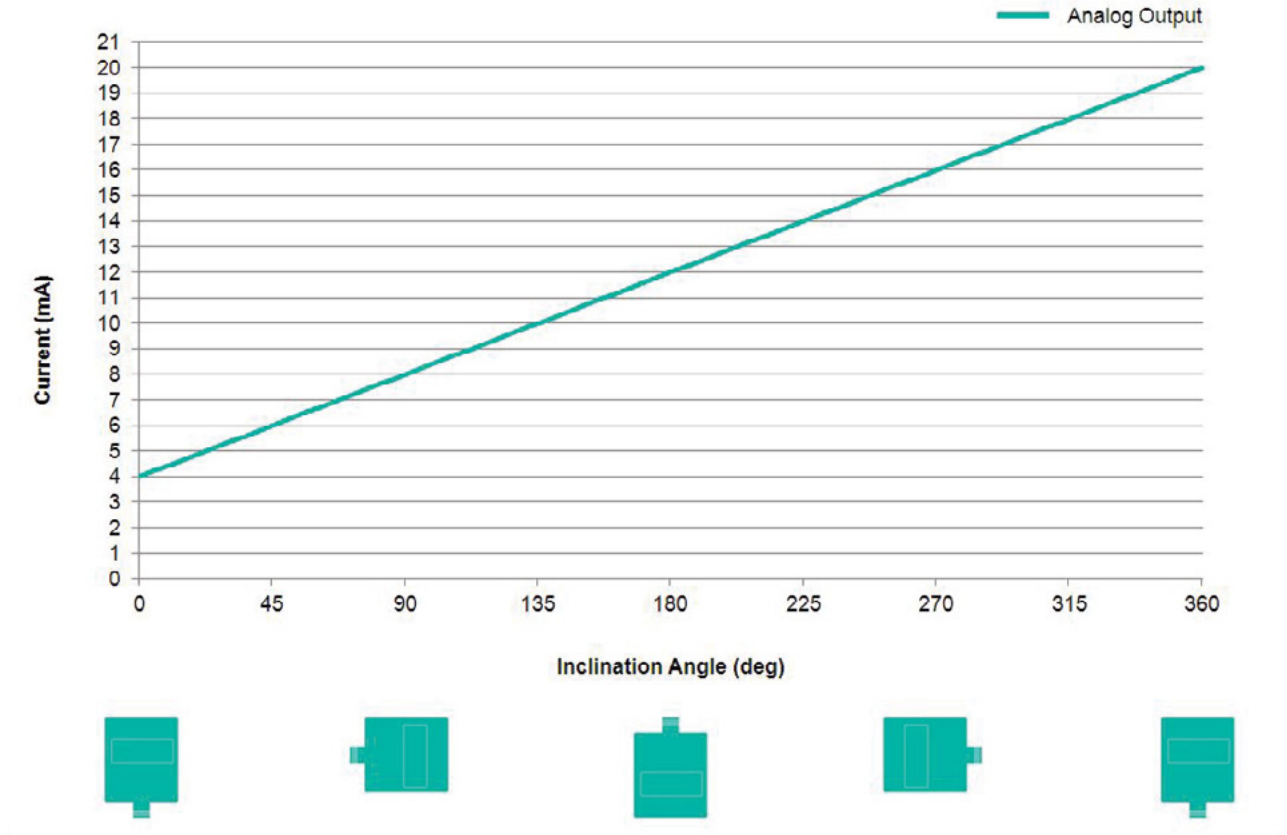


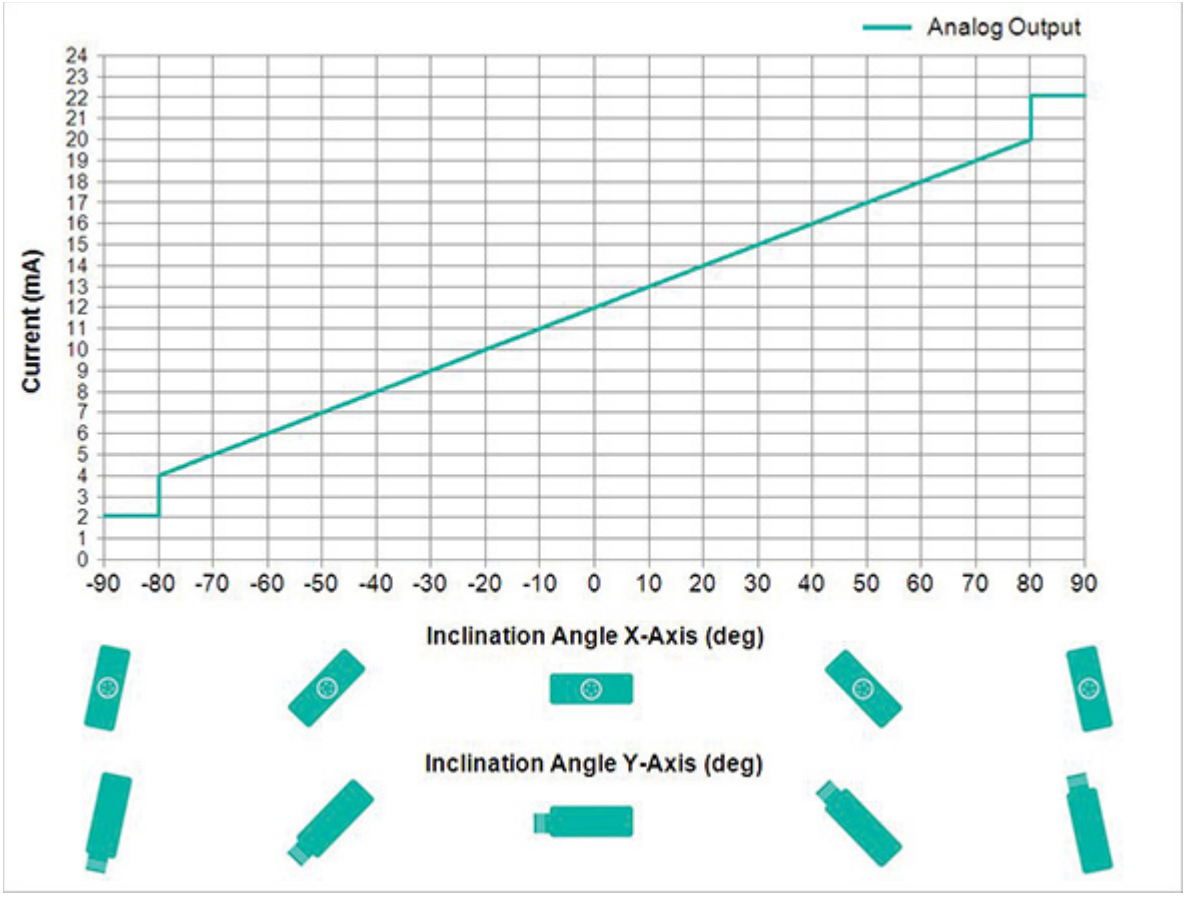
[1] Items marked Spare (N/C) should not be connected
[2] For single axis units, either the X-axis or the Y-axis is active as specified in the model. If not active, treat the axis as a Spare (N/C)

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

WARNINGS

RISK OF MATERIAL DAMAGE AND HOT ENCLOSURE
- The product's side panels may be hot, allow the product to cool before touching
- Follow proper mounting instructions including torque values
- Do not allow liquids or foreign objects to enter this product

Failure to follow these instructions can result in serious injury, or equipment damage.

HAZARD OF ELECTRIC SHOCK, EXPLOSION OR ARC FLASH
- Disconnect all power before installing or working with this equipment
- Verify all connections and replace all covers before turning on power

Failure to follow these instructions will result in death or serious injury.

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