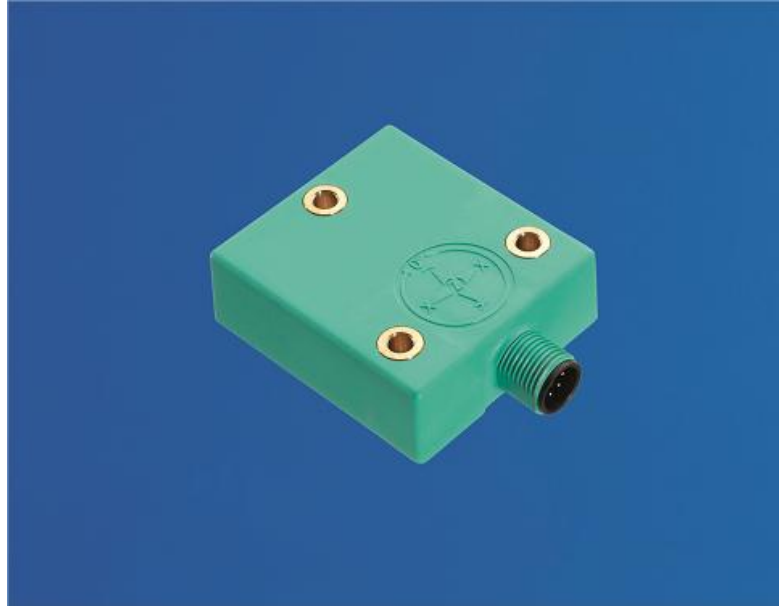


INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE



The industrial inclinometers are compact solutions for determining the inclination in both single and dual axes with remarkable precision and at a lower expense. The molded housing provides the mechanical stability and the fully encapsulated sensor has a high environmental protection making it ideal for measuring tilt / slope in industrial environments.

Main Features

- Dual Axis Measurement Range $\pm 80^\circ$
- Single Axis Measurement Range 360°
- High Resolution: 0.01°
- High Accuracy: 0.1°
- Rugged Glass Fiber Reinforced PBT Housing
- Active Linearization
- Temperature Compensation
- Digital Interface: RS232, Code ASCII
- Analog Interface: Voltage, Current
- Highest Protection Class: IP69K, IP68, IP67

Electrical Features

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

Programmable Parameters

- Preset
- Baud Rate
- Software Filters
- Resolution
- Analog Teach-In

Applications

- Measurement of Inclinations and Rotational Movements
- Cranes and Construction Machines
- Robotic Arms & Positioning Systems
- Mobile Platforms
- Marine & Offshore Machinery

INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Technical Data

Electrical Data

Model		INC -080	INC -360
Measurement Range		± 80°	360°
Number of Axes		2	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 ¹	4 mA to 20 mA, 0° = 4 mA Load ≤ 270 Ω ¹
Digital Interface		RS232 (ASCII Format)	
Baud Rate		Max. 115200 Baud (Programmable)	
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)	
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 Data

Housing Material	Glass Fiber Reinforced PBT (Polybutylene Terephthalate)
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 R_L < 500Ω with 15 V DC

² Further data available on request

³ Inclinerometers should be connected only to subsequent electronics whose power supplies comply with EN 50178 (Protective Low Voltage)

INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Environmental Conditions

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 Counter Connector), IP68, IP67

MTBF Data

Failure Rate [FIT]	759
MTBF [Hours]	1,317,822
MTBF [Years]	150

The data mentioned above were calculated for inclinometer electronics under the following conditions:

- SNA: Non-mobile operation
- Tu: 40°C - Mean component of ambient temperature
- Zf: Continuous operation for 8760 h per year

Default Factory Settings

Operational Mode	Continuous Mode
Resolution	0.01°
Output Transmission Rate	100 ms
Baud Rate	9600 Baud
Moving Average Filter	64
Angle Offset	0

INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

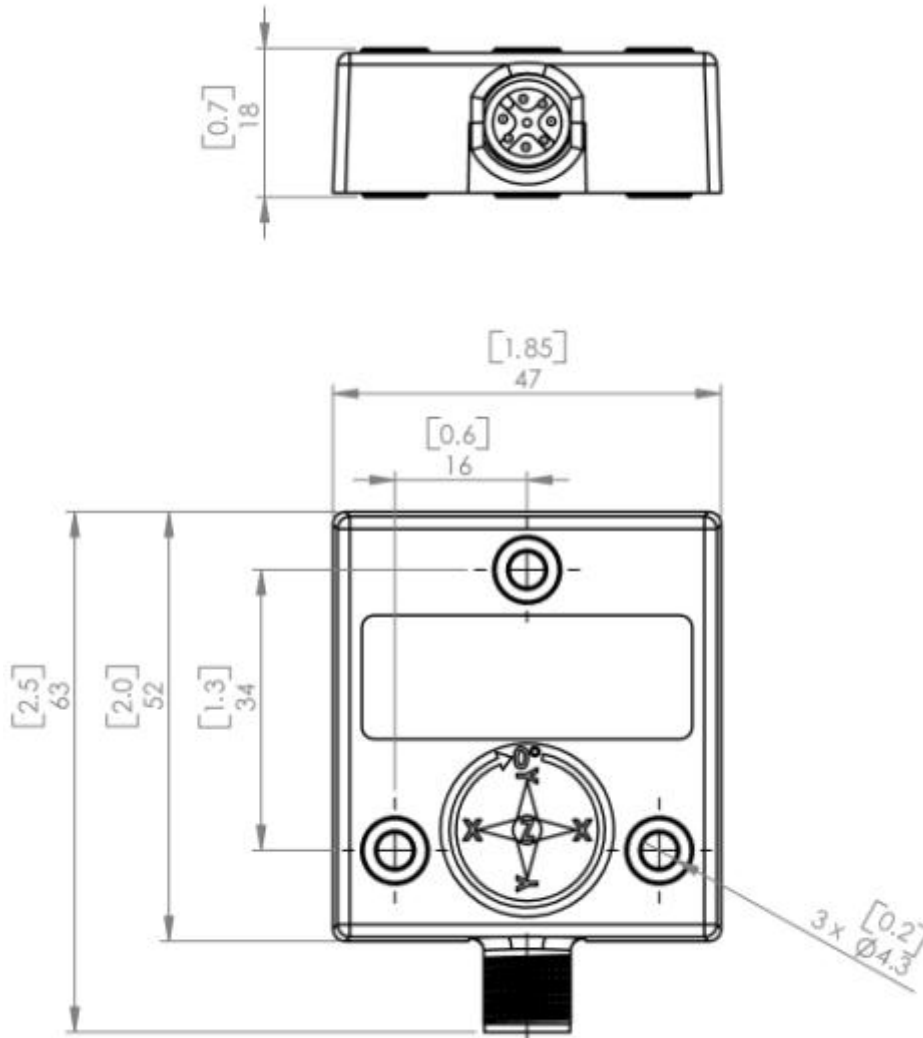
Programmable Parameters

The parameters of inclinometer can be re-configured using the RS232 interface . Additionally Preset can also be done through a (soon to be available) Analog Teach-in. (Refer to User Manual for additional information.)

Modes of Operation	Inclinometer can be switched between Polled Mode or Continuous mode.
Baud rate	The Baud rate can be programmed to lie between ranges of 2400 Baud and 115200 Baud.
Output Transmission Rate	The transmission rate of angular values can be adjusted to lie between 62.5ms and 10 seconds per value.
Moving Average Filter	Used to calculate the output position value as an average over last N values where N varies from 2 to 256 measurements in steps of $N = n^2$, $n = 1, 2, 3 \dots$
Preset Value	The current position value is set to the mid angle position by the parameter preset.

INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Mechanical Drawing -Industrial Housing

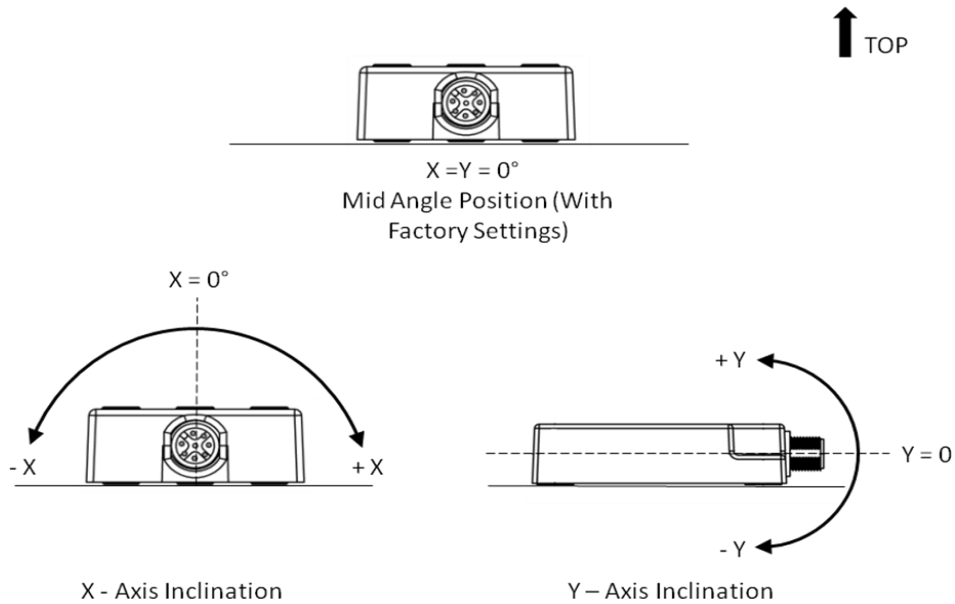


Dimensions in mm and [inches]

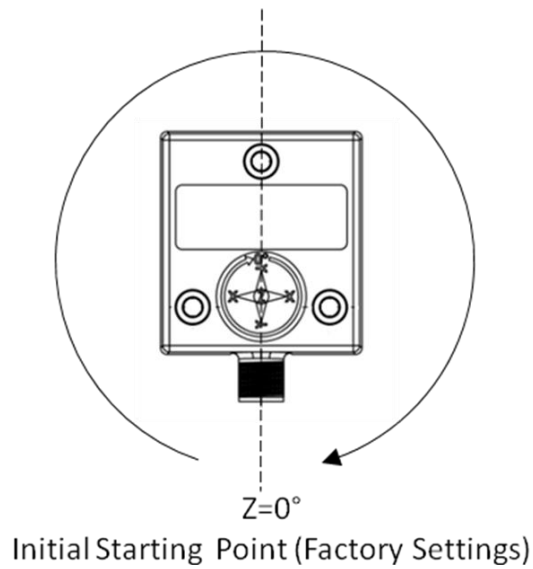
INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Measurement Axes

INC -080 – Dual Axis Inclinometer



INC-360 – Single Axis Inclinometer



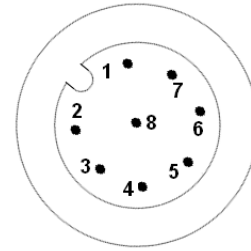
INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Pin Assignment

The inclinometer is connected via an 8 pin M12 A-coded round connector.

(Standard M12, Male side at sensor, Female at connector counterpart or connection cable).

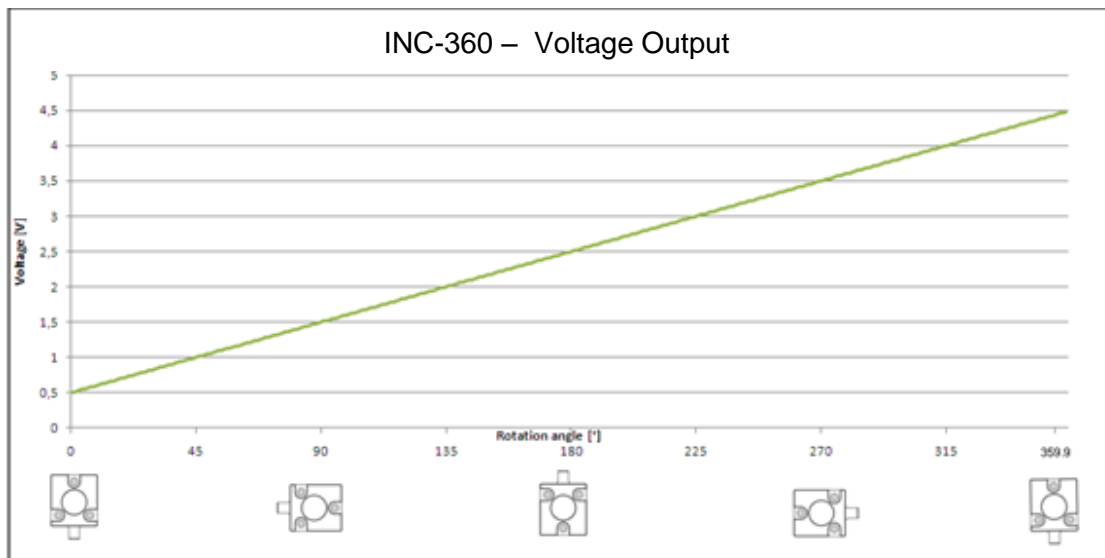
Pin	Description of INC-080	Description of INC-360
1	V _s Supply Voltage	V _s Supply Voltage
2	RxD (RS232 Receive)	RxD (RS232 Receive)
3	TxD (RS232 Transmit)	TxD (RS232 Transmit)
4	Ground	Ground
5	X-axis Analog Output	Z -Axis Analog Output
6	Preset/Set1 (Teach-In)	Preset/Set1 (Teach-In)
7	Y-axis Output Analog	Unused, Do Not Connect
8	DIR/Set 2 (Teach-In)	DIR/Set 2 (Teach-In)



For more detailed information about setup, measurement axes and programming, refer INC-RS232_Analog Manual.

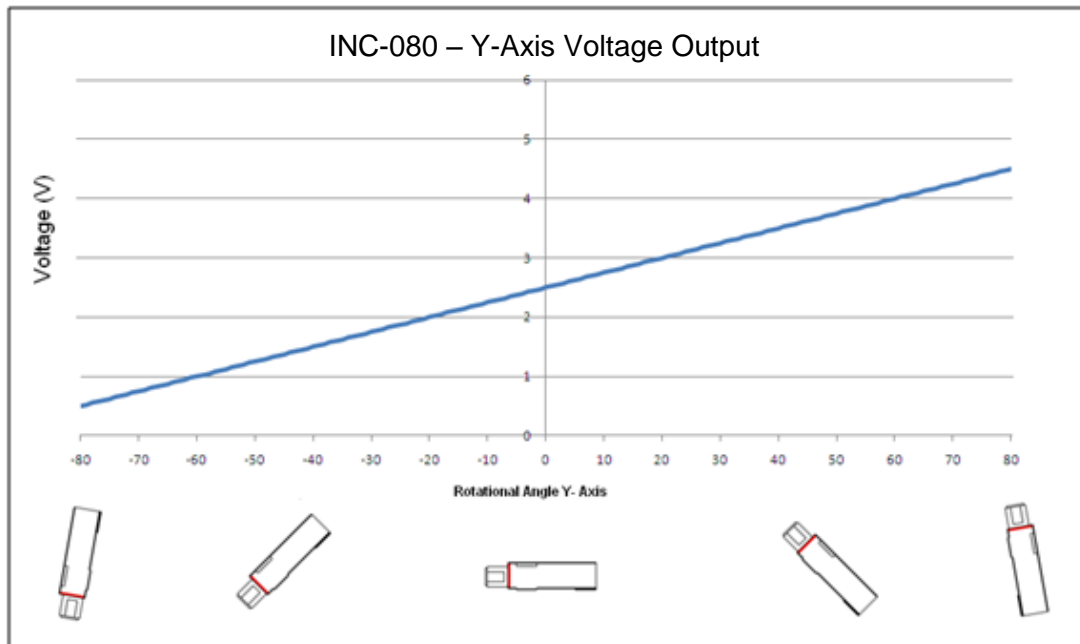
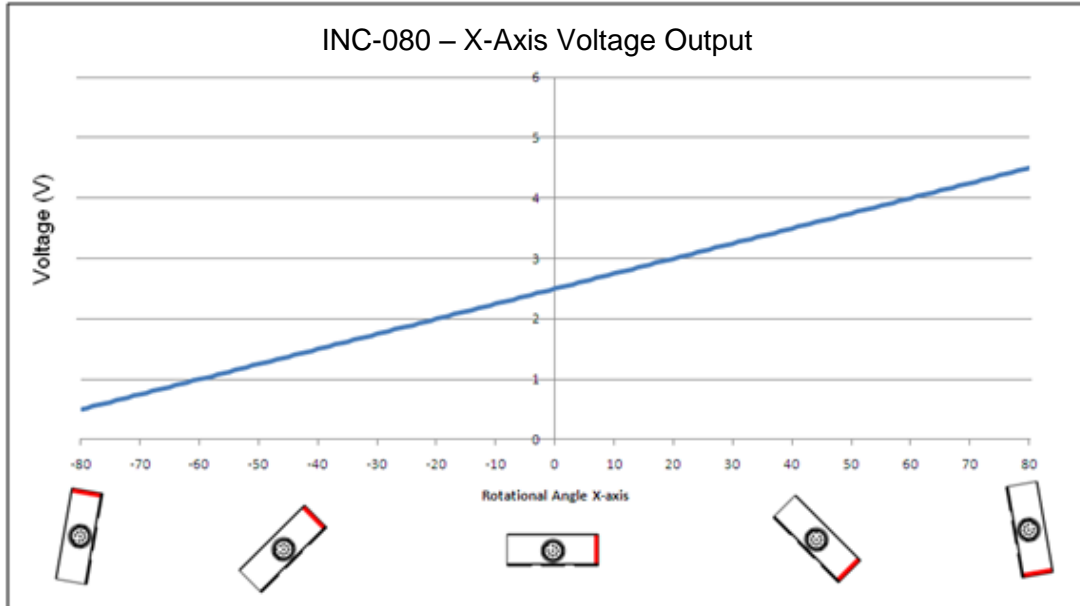
Please read the instruction leaflet carefully prior to installation.

Voltage Output



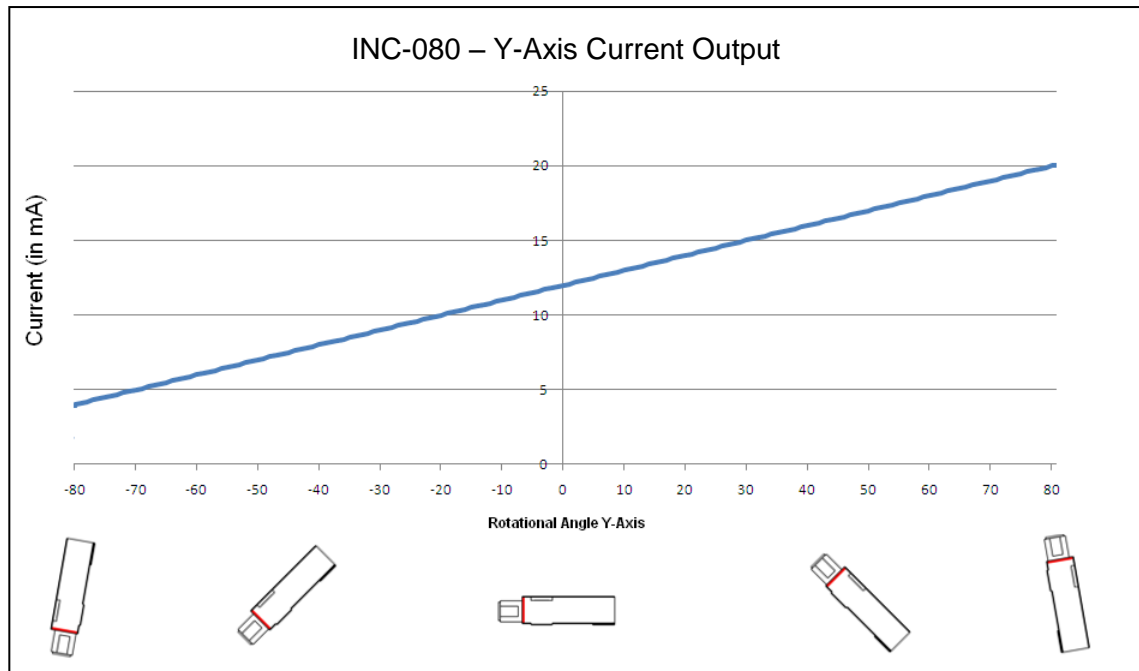
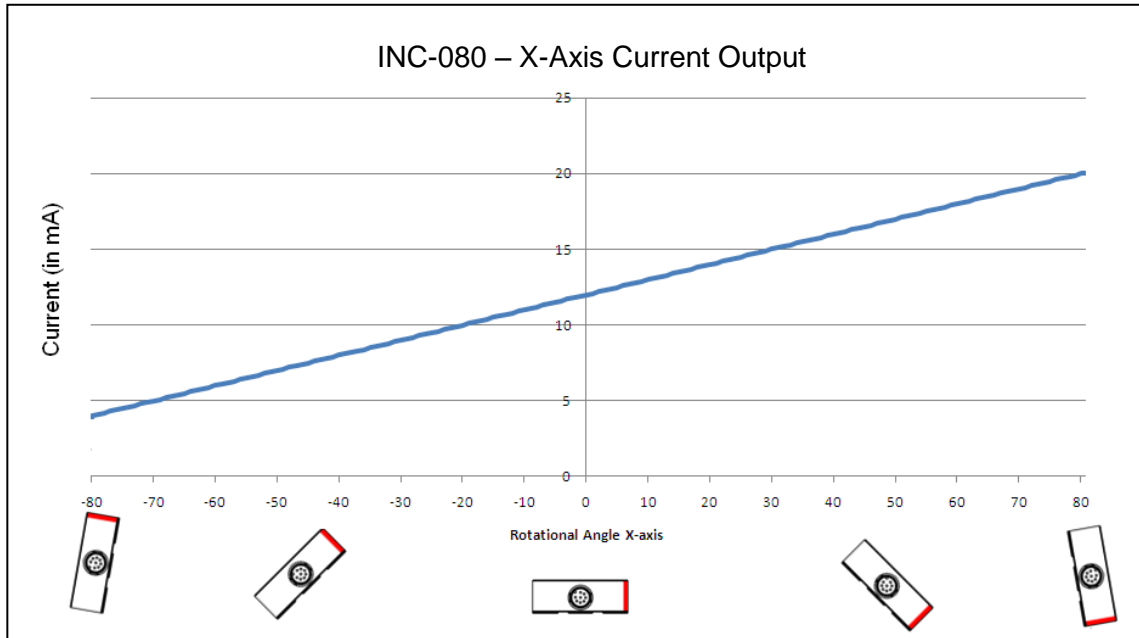
¹ Should not be connected

INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

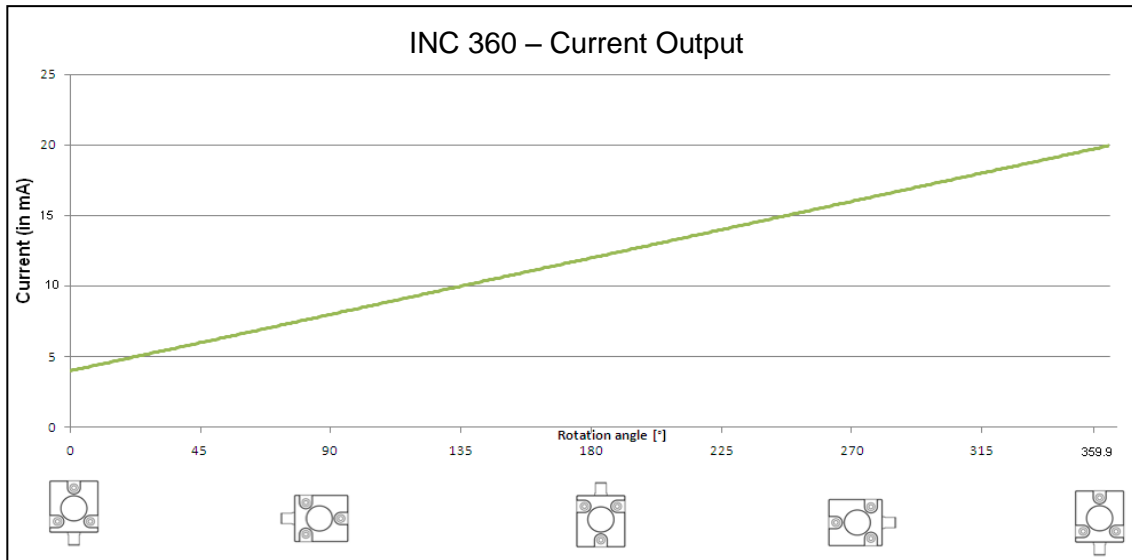


INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE

Current Output



INDUSTRIAL INCLINOMETER ANALOG & RS232 INTERFACE



Models/Ordering Description

Description	Type key	INC-	XXX-	X-	XXX-	X-	X	X	X-	XX
Range	360° (1 axis) ± 80° (2 axis)		360 080							
Number of axis	One for 360° Version Two for ± 80° Version			1 2						
Interface	RS232 + Voltage 0.5 to 4.5 V RS232 + Voltage 0 to 10 V RS232 + Current 4 to 20 mA				SVO SV2 SC0					
Version	Software Version					0				
Mounting	Vertical for 360° Version Horizontal for ± 80° Version						V H			
Housing Material	Industrial (PBT)							E		
Inclinometer Series	INC II									2
Connection	Connector									PM

Typical Type-Keys

INC-360-1-SV00-VE2-PM
 INC-080-2-SV00-HE2-PM
 INC-360-1-SC00-VE2-PM
 INC-080-2-SC00-HE2-PM