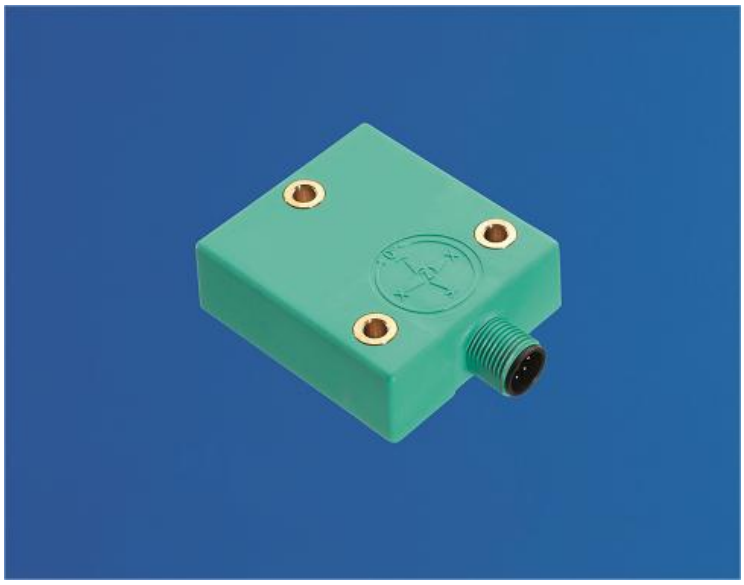
INDUSTRIAL INCLINOMETER
CANOPEN INTERFACE



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 Inclinometer ± 80°
- Single Axis Inclinometer 360°
- High Resolution: 0.01°
- High Accuracy: 0.1°
- Rugged Glass Fiber Reinforced PBT Housing
- High Mechanical Stability
- Active Linearization
- Temperature Compensation
- Interface: CANopen
- Housing Protection Class: IP69K, IP68, IP67

Programmable Parameters

- Resolution
- Preset
- Baud Rate
- Software Filters

Electrical Features

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

Applications

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

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Technical Data

Electrical Data

Model	INC-080	INC-360
Measurement Range	± 80°	360°
Number of Axes	2	1
Resolution	0.01°	
Accuracy (T = -10 °C to +40 °C)*	0.1°	
Sensor Response Time	10 ms (without filter)	
Recommended Measurement Rate	Up to 10 Hz	
Interface	CANopen (In Conformance to DS410) Transceiver According ISO 11898, Galvanically Isolated by Opto-Couplers	
Transmission Rate	Adjustable: Max. 1 MBaud (Factory Setting : 125 kBaud)	
Addressing	Programmable Node-id from 1 to 127 (Factory Setting: 1)	
Supply Voltage	10 to 30 VDC (Absolute Maximum Ratings)	
Current Consumption	Max. 57 mA at 10 V DC; Max. 53 mA at 24 V DC	
EMC	Emitted Interference: EN 61000-6-4	
	Noise Immunity: EN 61000-6-2	
Connection	Connector Output, 5 Pin M12 male (A-coded)	

Mechanical Data

Housing Material	Glass Fiber Reinforced PBT (Polybutylene Terephthalate)
Potting Material	Polyurethane
Shock (EN 60068-2-27)*	≤ 100 g (half sine, 6 ms)
Vibration (EN 60068-2-6)*	1.5 mm (10Hz to 58Hz) & ≤ 20 g (58 Hz to 2000 Hz)
Weight	75 gm / 3 oz

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

*further data available on request

MTBF Data

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

The above mentioned data were calculated for 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

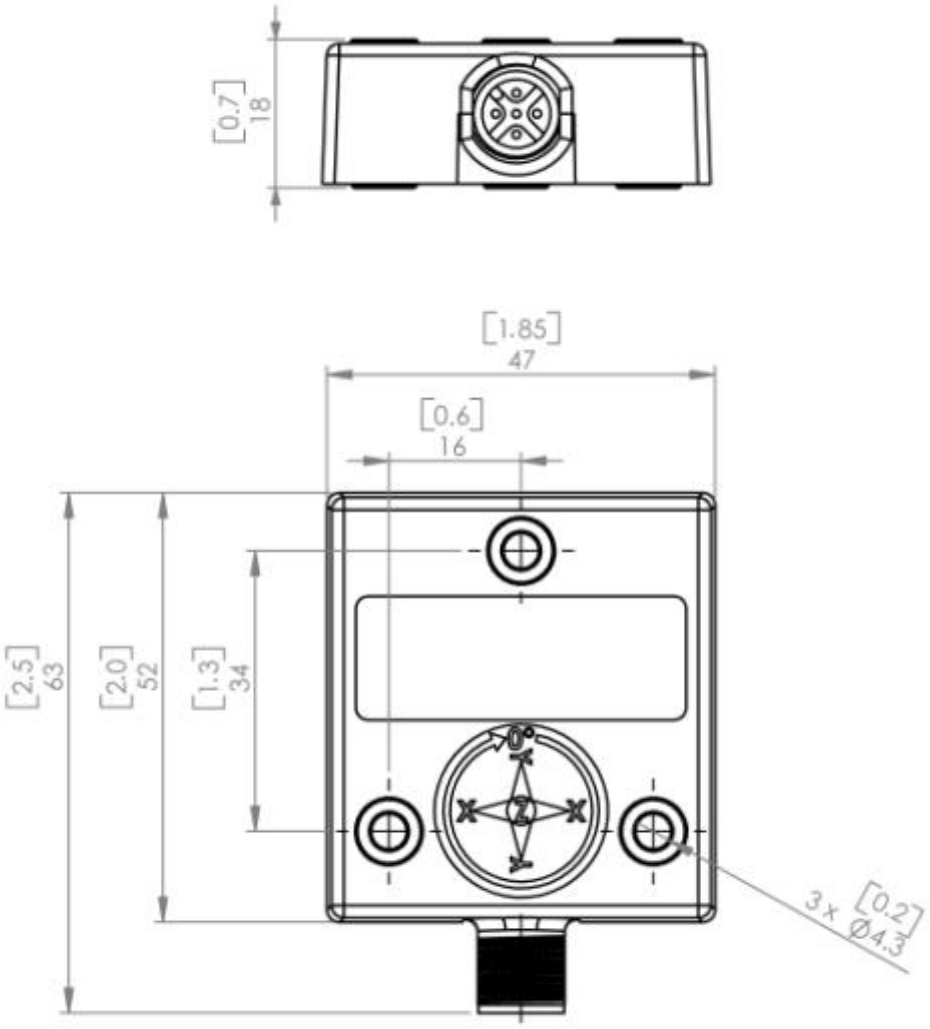
Programmable Parameters

Resolution per 1°	The resolution parameter per 1° is used to program the desired number (1°, 0.1° and 0.01°) of steps per 1°.
Preset Value	The Preset value is the desired position value, which should be reached at a certain physical position of the axis. The position value is set to the desired process value by the preset parameter.
Moving Avarage-Filter	This filter can be used to adjust the bandwidth of measuring values to minimize the influence of vibration. Factory Setting: Moving average filter activated for 20 subsequent readouts.
Digital Recursive Filter	This filter can be used for weighting the last measured value with the last previous value. This is useful to suppress sudden peaks in the angle measurement.
Transmission Rate	Adjustable - Min. 20 kBaud; Max. 1 MBaud Factory Setting : 125 kBaud
Address (Node ID)	Adjustable from 1 to 127 Factory setting: Node ID=1

Programmable CAN Transmission Modes

Polled Mode	By a remote-transmission-request telegram, the connected host calls for the current process value. The inclinometer reads the current position value, calculates eventually set-parameters and sends back the obtained process value by the same identifier.
Cyclic Mode	The inclinometer transmits cyclically the current process value, without being called by the host. The cycle time can be programmed in milliseconds for values between 1 ms and 65536 ms.
Sync Mode	The inclinometer answers with current process value after receiving a sync telegram. The parameter sync counter can be programmed to skip a certain number of sync telegrams before answering again.
Heartbeat Function	A node signals its communication status by cyclically transmitting a heartbeat message. This message is received by one or any number of members (Heartbeat Consumers) in the bus and so they can control the dedicated node (Heartbeat Producer).

Mechanical Drawing – Industrial Housing

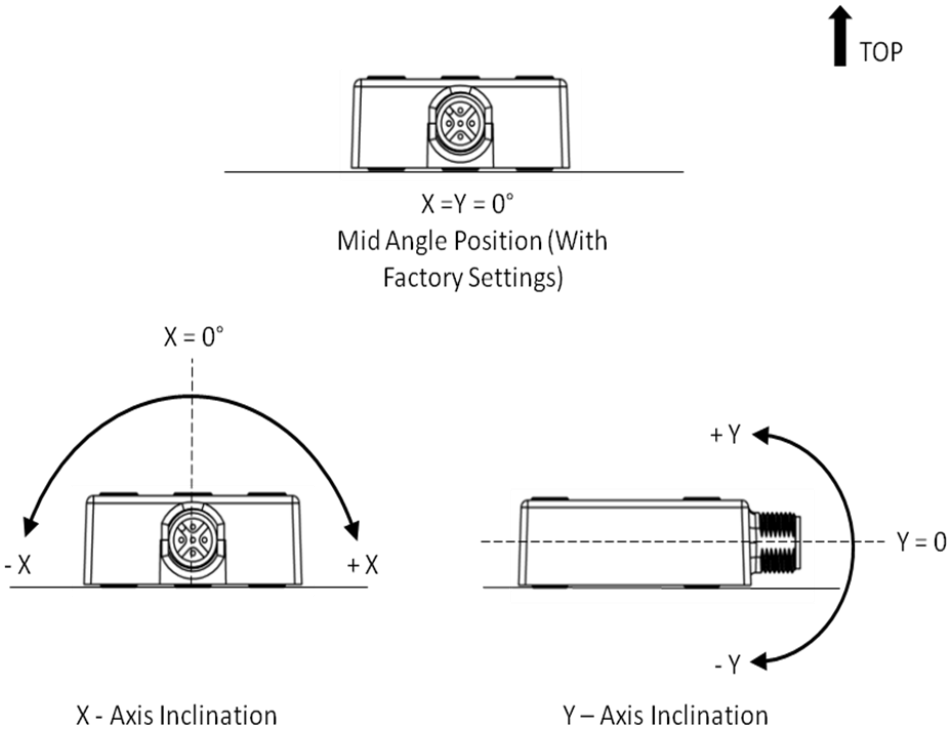


Dimensions in mm and [inches]

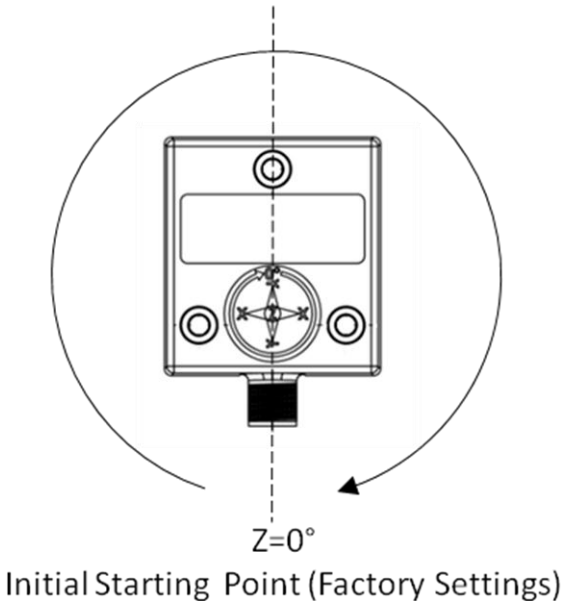
For more detailed drawings please refer website.

Measurement Axes

INC-080 – Dual Axis Inclinometer



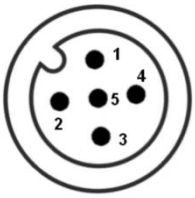
INC-360 – Single Axis Inclinometer



Pin Assignement

The inclinometer is connected via a 5 pin M12 A-coded round connector.
(Standard M12, Male side at sensor, Female at connector counterpart or connection cable)

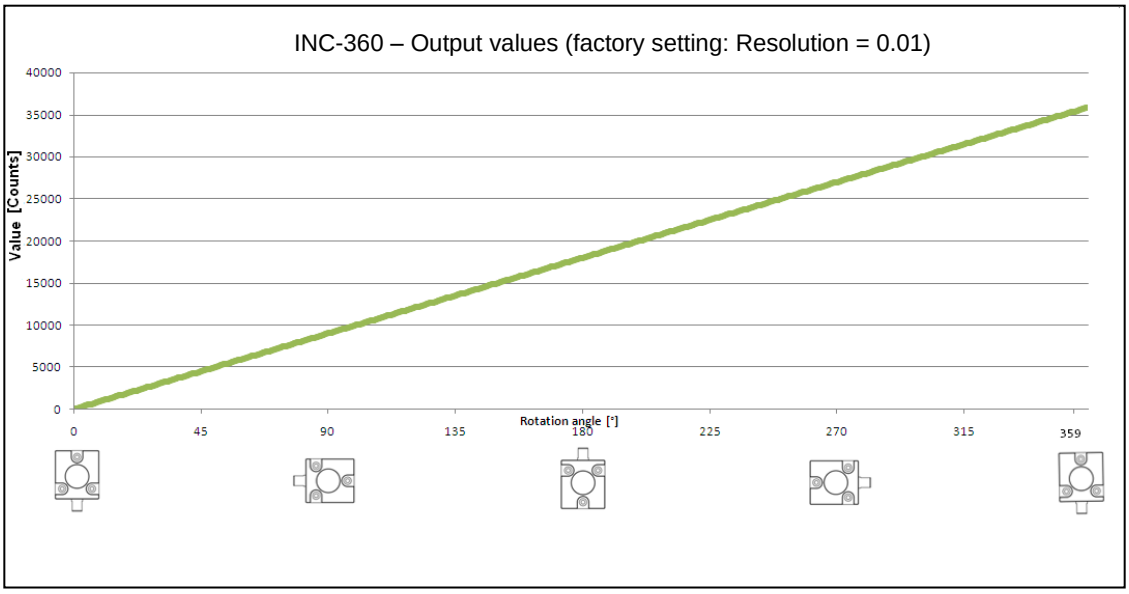
Signal	5 pin round connector pin number
CAN Ground	1
+Vs: Supply Voltage	2
0 V Supply voltage	3
CAN High	4
CAN Low	5



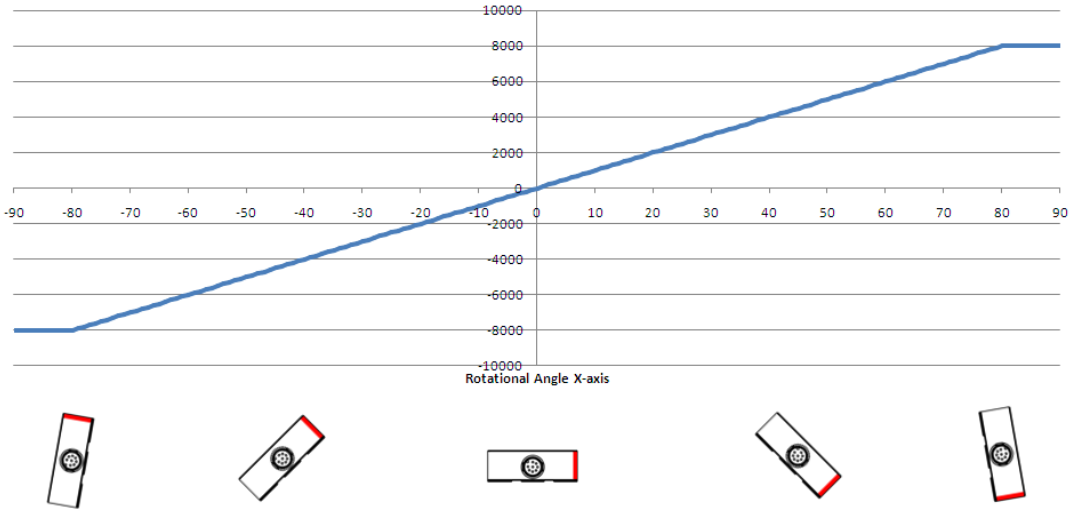
For more detailed information about setup, measurement axes and programming, refer CANopen Manual.

Please read the instruction leaflet carefully prior to installation.

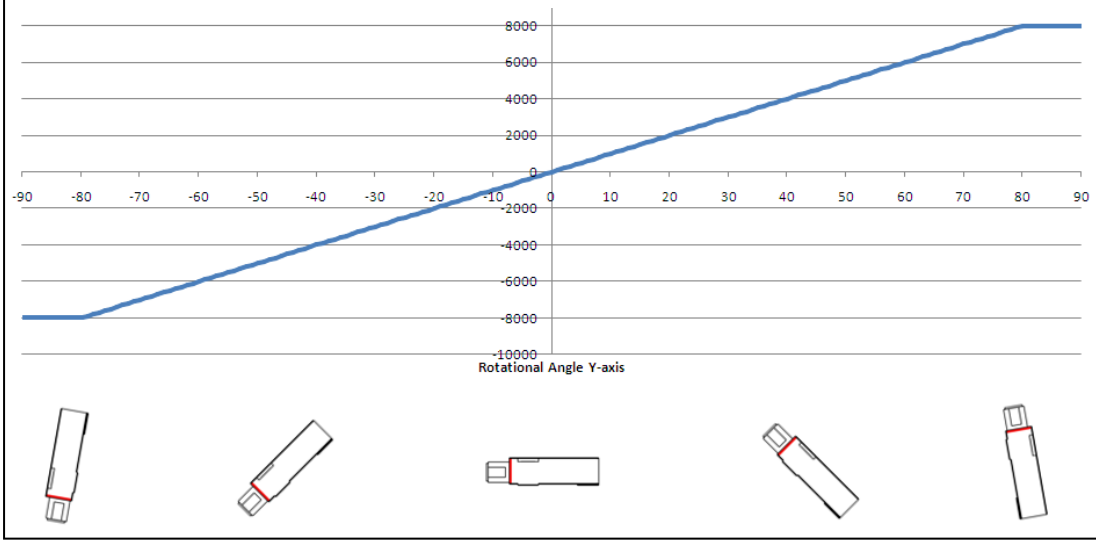
CANopen Output



INC-080 – X axis Output values (factory setting: Resolution = 0.01)



INC-080 – Y axis Output values (factory setting: Resolution = 0.01)



Models/Ordering Description

Description	Type key								
	INC-	XXX-	X-	XX	XX-	X	X	X-	XX
Range	360° (1 axis)	360							
	± 80° (2 axis)	080							
Number of axis	One for 360° Version		1						
	Two for ± 80° Version		2						
Interface	CANopen			CA					
Version	Software Version				01				
Mounting	Vertical for 360° Version					V			
	Horizontal for ± 80° Version					H			
Housing Material	Industrial (PBT)						E		
Inclinometer Series	INC II							2	
Connection	Connector								PM

Typical Type-Keys

INC-360-1-CA01-VE2-PM
INC-080-2-CA01-HE2-PM