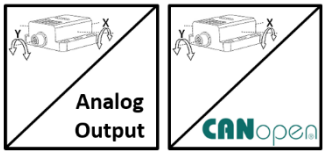
INCLINOMETER (TILT SENSOR)

"Analog or CANopen Output"

INC 110

GENERAL FEATURES

- ±90° dual axis measurement range or
  0-360° single axis measurement range option
- 4-20 mA, 0-5V, 0-10V or CANopen signal output option
- Compensated axis sensitivity
- High Sensitivity : ±0.2°
- Ability to specify 0° point
- Easy installation
- IP67 protection class
- Small and robust housing
- Compact structure



INC 110 series inclinometers are used for inclination measurement for single or dual axis. They have ±90° dual axis and 0-360° single axis measurement range. These sensors with 0-5VDC or 0-10VDC voltage output, 4-20mA current output or CANopen signal output option, can take measure ment with ±0.2° accuracy. Thanks to its compensated axis sensitivity, the effect of the axes on each other is minimized.

These sensors, especially used in machine and crane industries, can operate in outdoor environments with their high IP protection classes.

TECHNICAL SPECIFICATIONS

Supply Voltage	4-20 mA & CANopen: 12…24 VDC 0-10 VDC & 0-5 VDC: 15…24 VDC	**Protection Class**	IP67
***Measurement Range**	Single axis: 360° Dual axis: ±90°	**Operating Temperature**	- 30°C … +70°C
		Relative Humudity	%10 ile %90
***Measurement Axes**	X, XY	**Weight**	~140 gr
***Output Signals**	Analog 4-20 mA, 0-5VDC, 0-10 VDC CANopen	**Body Material**	Aluminium
Response Frequency	10Hz	***Electrical Connection**	Analog models: M12 5 pin (male) socket or cable output CANopen models: M12 5 pin (male) and M12 5 pin (female) socket
Resolution	For Analog models: 12 bit For CANopen models: 0.05°		
Accuracy	±0,2°		

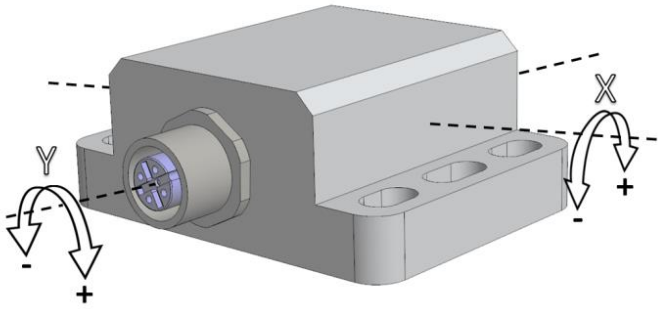
Note: The specifications specified by (*) vary depending on the model selected. The detailed code table for product selection is shown on page 5.

CANopen SPECIFICATIONS

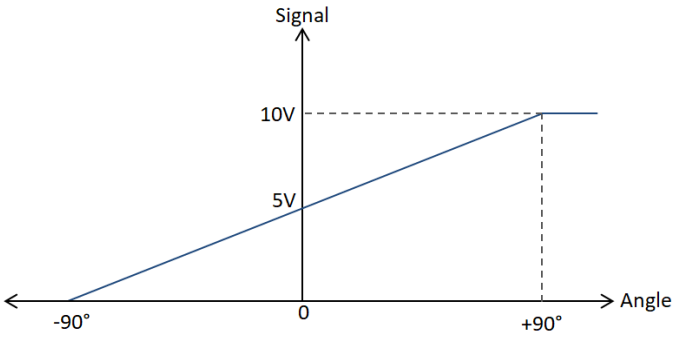
Communication profile	CiA 301
Response Rate Frequency	10 Hz.
Device Type	CANopen, CiA DS410
Node ID	Between 1 and 127, it can be adjusted with LSS or SDO
Baud Rate	10 kBit/s, 20 kBit/s, 50 kBit/s, 100 kBit/s, 125 kBit/s, 250 kBit/s, 500 kBit/s, 800 kBit/s, 1 Mbit/s
PDO Data Rate	100 ms
Error Control	Heartbeat, Emergency Message
PDO	1 Tx PDO
PDO Modes	Event/Time triggered, Synch/Asynch
SDO	1 server
Position Information	Object Dictionary 6004
Termination Resistance	Optional, specify at the order stage.

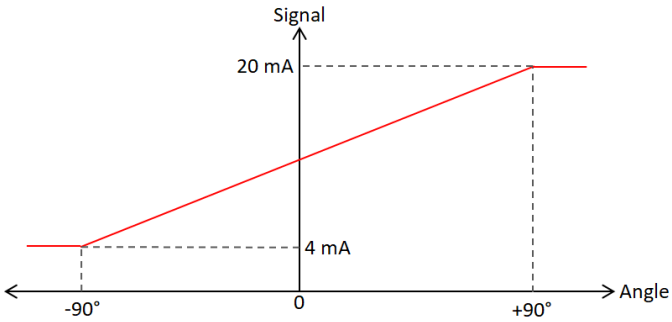
AXES AND SIGNAL OUTPUT DIAGRAM

Dual Axis (±90°)

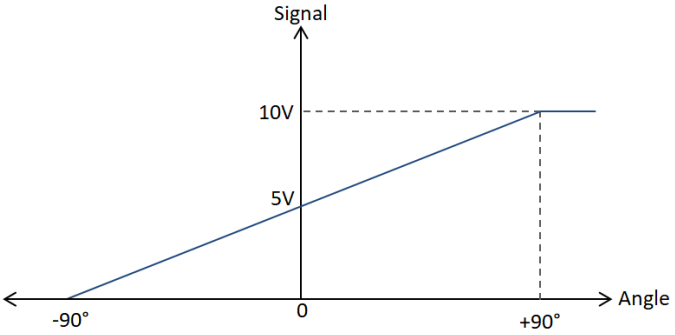


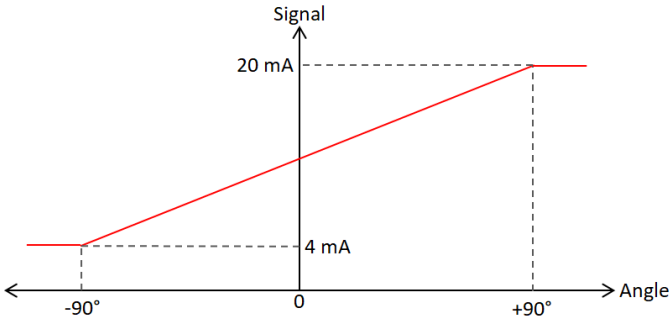
X Axis-Analog Signal Output



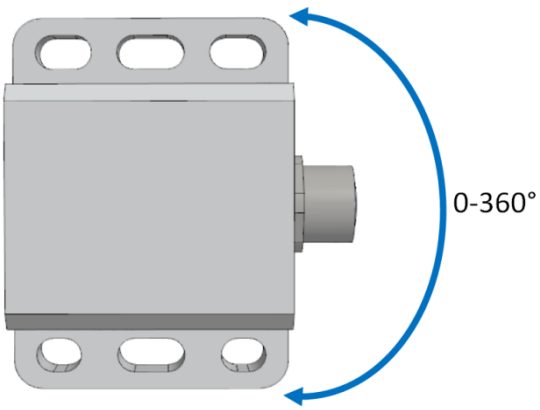


Y Axis-Analog Signal Output

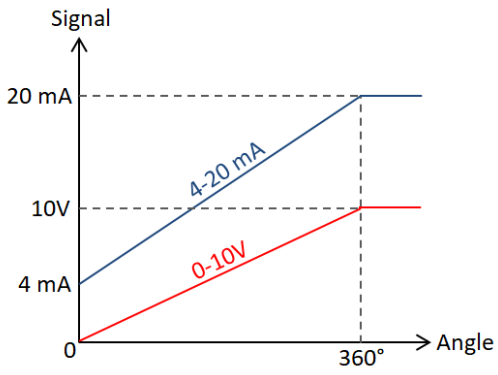




Single Axis (360°)



Analog Signal Output



ELECTRICAL CONNECTION

Analog

Signal	M12 Socket	Cable
V+	Pin 1	Red
Output1 (Analog current/voltage) (X axis)	Pin 2	Yellow
GND (0V)	Pin 3	Black
Output2 (Analog current/voltage) (Y axis)	Pin 4	Green
Reset	Pin 5	Pink

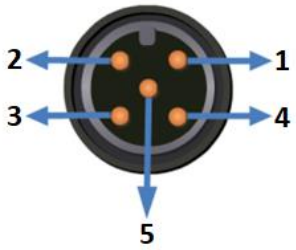
* Output 2 is only used on two-axis models. On single-axis models, Pin 4 (green cable) is empty.
* On analog output models, 1 pcs M12 5 pin male socket is used as standard.
* Different socket models can be requested optionally.

DETERMINING THE 0° POINT OF SENSOR

Pin 5 (pink cable) and pin 3 (black cable) are short-circuited once and then disconnected. Thus, the sensor recognizes that the position is 0 °. If the same operation is repeated a second time, the sensor is reset to the factory settings.

During the operations, the sensor position should be kept constant for approximately 4 seconds.

M12 5 Pin Male Socket

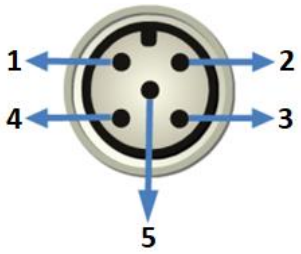


CANopen

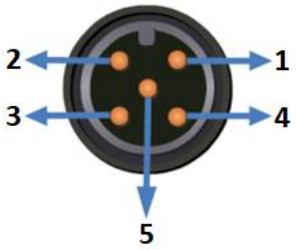
Signal	M12 Socket	Cable
CAN_SHIELD	Pin 1	Mesh
V+	Pin 2	Red
GND (0V)	Pin 3	Black
CAN_H	Pin 4	Yellow
CAN_L	Pin 5	Green

* CANopen models have 2 outputs. 1 pcs M12 5 pin male and 1 pcs M12 5 pin female sockets are used as standard.
* Different socket models can be requested optionally.

M12 5 Pin Female Socket



M12 5 Pin Male Socket

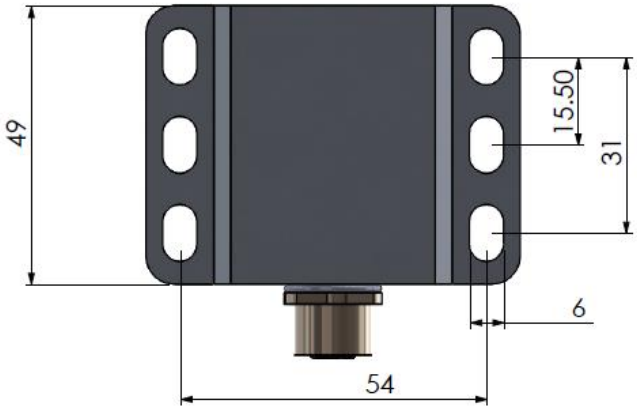


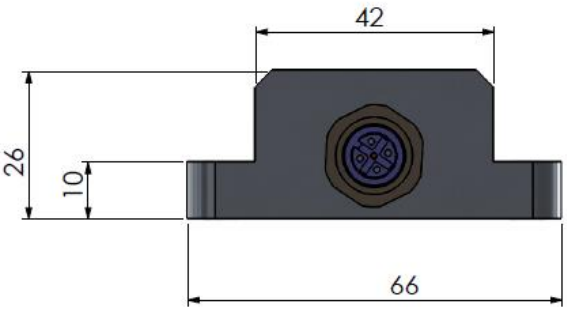
SAMPLE APPLICATION AREAS

- Agricultural and forestry machinery
- Construction machinery and special-purpose vehicles
- Solar thermal energy and photovoltaics
- Automated guided systems
- Crane and lifting technology
- Wind power plant

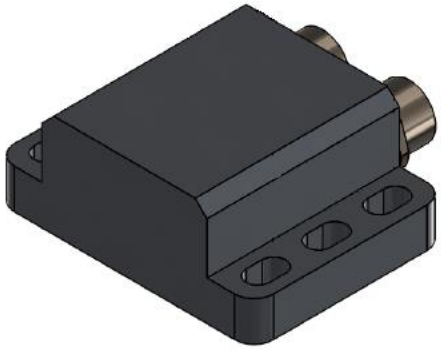
MECHANICAL DIMENSIONS (in mm)

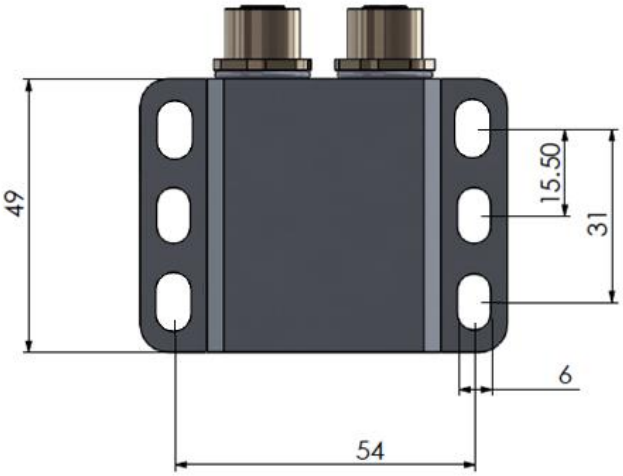
Analog

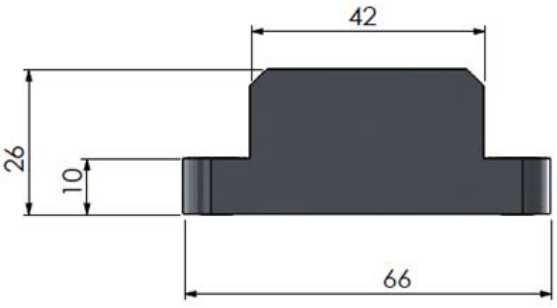




CANopen







ORDER CODE

Model
INC 110

Number of Axis
01: Single Axis
02: Dual Axis

Supply Voltage (3)
PP: 12…24VDC / 15…24VDC

Output Signal Direction
CW: Clockwise
CCW: Counter-Clockwise

Output Type
No code : Single Output

INC 110	–	XX	–	XX	–	XX	–	XX	–	X	–	XX	–	XX	–	XX

Sensor Type (1)
E: Inclination
A: Angle

Measurement Range (2)
-90…+90: -90°…+90°
-45…+45: -45°…+45°
360: 0…360°
180: 0…180°

Output Signals
V: 0-10 VDC
V1: 0-5 VDC
A: 4-20 mA
C: CANopen

Electrical Connection (4)
3M : 3m cable
5M : 5m cable
10M : 10m cable
S13F : M12 5 pin female socket
S13M : M12 5 pin male socket
S13FM: M12 5 pin female + M12 5 pin male socket (CANopen models)

(1) If sensor type is selected as inclination, the number of axis can be selected as single or dual, and the measurement range can be selected as ±90°.
If sensor type is selected as angle, the number of axis can be selected as single, and the measurement range can be selected as 0-360°.
(2) Optionally, different measurement values between ±90° for inclination sensors, and 0-360° for angle sensors can be requested. You should specify
your non-standard measurement value at the order stage.
(3) The supply voltage is 12…24VDC for CANopen and 4-20 mA output models, and 15…24VDC for 0-10 VDC and 0-5 VDC output models.
(4) The product can be requested with cable or socket.
As standard;
For analog output models, 1 pcs M12 5 pin male socket (S13M) is used.
For CANopen output models, 1 pcs M12 5 pin female + 1 pcs M12 5 pin male socket (S13FM) is used.
However, different socket combinations may be requested as in the examples below.
Please contact us for any other socket model other than M12.

Sample Code 1: INC110 E 01 -90…+90 PP A CW S13F
INC 110 series, inclination, single axis, -90°…+90° measurement, 12-24VDC supply, current output, clockwise, 1 pcs M12 5 pin female soket

Sample Code 2: INC110 E 02 -45…+45 PP C CCW S13FM
INC 110 series, inclination, dual axis, -45°…+45° measurement, 12-24VDC supply, CANopen output, counter-clockwise, 1 pcs M12 5 pin female + 1 pcs M12 5 pin male socket

Sample Code 3: INC110 A 01 180 PP C CCW S13M
INC 110 series, angle, single axis, 0…180° measurement, 12-24VDC supply, CANopen output, counter-clockwise, 2 pcs M12 5 pin male socket

OPTIONAL PRODUCTS

Product	Code	Description
	CB5 5M / S13F	5 meters 5x0,14 mm^2 extension cable + M12/5 pin female connector (IP67)

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