OIAC10

Rugged analog inclinometer

General Description

OIAC10 inclinometers are available in two-axes or single-axis version. Two-axes versions can measure tilt angles up to ±60 degrees in the pitch and roll axis. Single-axis versions can measure tilt angles up to 360 degrees. Output signal is 0.5-9.5 Volt and can be extended up to 0-10 Volt on request.

The compact sturdy anodized metal enclosure can withstand shocks and vibrations, while the filling resin makes OIAC10 inclinometers waterproof and dustproof.

The MEMS transducer raw signals are filtered, conditioned, and elaborated with algorithms aimed for good noise rejection and measure stability. On request, the digital filter can be factory-adjusted for adapting the sensor's response time to customer needs.

The internal protection circuits make these inclinometers electrically robust to withstand overvoltage, outputs lines overload and cable inversions conditions.

OIAC10 inclinometers can be requested with different options in connectors, cable length, redundancy, or customer-specific device configurations.

The redundant variants combine the advantage of using two inclinometers in the same size of one.

For very high accuracy demanding applications, temperature-compensated variants can be requested.

Applications

Mobile and fixed cranes

Aerial platforms

Telehandlers

Drilling rigs

Earth moving machines

Agricultural machines

Forestry machines

Mowers inclination control

Levelling control

Pin Functions

OIAC10 inclinometers are available with different cable and connector options. Redundant versions are available only with cable. For more details, see pinout information on page number 4.

Images are for illustration purpose only and may not represent exactly the product in all the details

Features

- **Rugged device: fully metal case filled with protective resin**
- **Medium accuracy (typ ±0.10 deg)**
- **Very High MTTF @ 12V and 24V**
- **Single axis or dual axes version**
- **Different angle ranges**
- **Flat or vertical mounting version**
- **Operating temperature -40°C to +85°C**
- **IP67 protection grade**
- **Customizable on customer request**
- **Fully redundant version available**

Ordering information

OIAC10 - □□□□ - □ □ □ - □□□

AXES NUMBER
- **1** = 1 axis
- **2** = 2 axis
- **F** = 1 axis flat mount
- **V** = 2 axis vertical mount

customer req.cfg.

CABLE LENGTH
e.g.: ▪ 001 = 0.1m
▪ 005 = 0.5m
▪ 015 = 1.5m (STD)
▪ 155 = 15.5m

R = redundant version
S = stainless steel

T = temperature compensated

MEASURING RANGE
e.g.: ▪ 005 = ±5°
▪ 015 = ±15°
▪ 030 = ±30°
▪ 045 = ±45°
▪ 060 = ±60°
▪ 180 = 0...180°/±90° only in 1 axis mode
▪ 360 = 0...360°/±180° only in 1 axis mode

OUTPUT CONNECTION
- **C** = open lead cable
- **M** = M12-5 poles plug; male contacts
- **A** = AT04-4P connector
- **B** = M12-8 poles plug; male contacts

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Min	Max	Unit
T_S	Storage Temperature	-40	85	°C
T_A	Operating Temperature Range	-40	85	°C
V_{CC}	Supply Voltage Range (DC voltage)	12	30	V

Stresses beyond those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated in the operational sections of the specifications is not implied. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

ELECTRICAL CHARACTERISTICS

T_A = 25°C unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V_{CC}	Supply Voltage Range	-40 < T_A < +80	12	24	30	V
I_{CC}	Current consumption	average value non-redundant version		7.5	10	mA
Rg_1	Range of measurement	Single-Axis Versions	±10	±180	±180	deg
Rg_2	Range of measurement	Dual-Axes Versions	±5	±30	±60	deg
Reso	Output voltage resolution			1.3		mV
Resa	Angle Resolution				0.05	deg
S	Sensitivity	Range +/-30 deg		0.15		V/deg
A	Accuracy	Rg_1=±180°; Rg_2 <+/-30°		±0.1	±0.25	deg
X_A	Cross Axis Error			±1.0		% FS
D_T	Temperature drift			± 0.01		deg/°C
R_L	Load resistor		33	100		kΩ

RELIABILITY PARAMETERS

All MTTF calculations are made according to Siemens SN 29500.

Symbol	Parameter	Conditions	Value	Unit
MTTF	Mean time to failure 2 axes	Environment GM; T_A = 40°C; V_{CC} = 12V	336	years
		Environment GM; T_A = 40°C; V_{CC} = 24V	298	
	Mean time to failure 1 axis	Environment GM; T_A = 40°C; V_{CC} = 12V	410	
		Environment GM; T_A = 40°C; V_{CC} = 24V	360	
DC	Diagnostic coverage		None	-
S	Structure		Not redundant	-

For redundant versions, the reliability parameters will be calculated, according to the desired configuration.

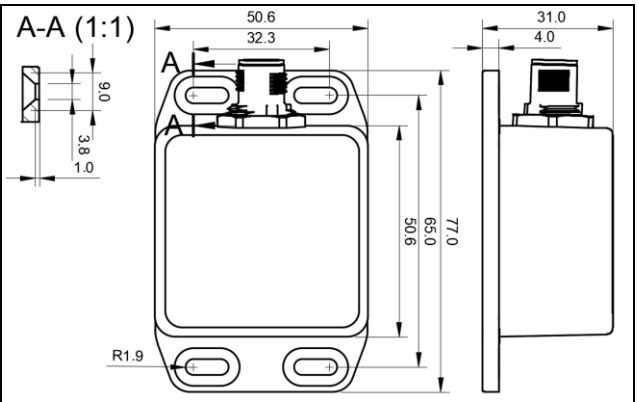
MECHANICAL CHARACTERISTICS AND DIMENSIONS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
W	Width			50.6		mm
L	Length			77.0		mm
H	Height			31.0		mm
Wt	Weight	non-redundant; M12 connector	150	180	220	g
		additional cable		75		g/m
C_L	Cable standard length			1.5		m
$C_Ø$	Cable outer diameter			6.7		mm
C_S	Cable connection styles	non redundant (6 conductors cable)	used 3 (1 axis) or 4 (2 axes)			
		redundant (12 conductors cable)	used 6 (1 axis) or 8 (2 axes)			

Standard Version

2 AXES

1 AXIS

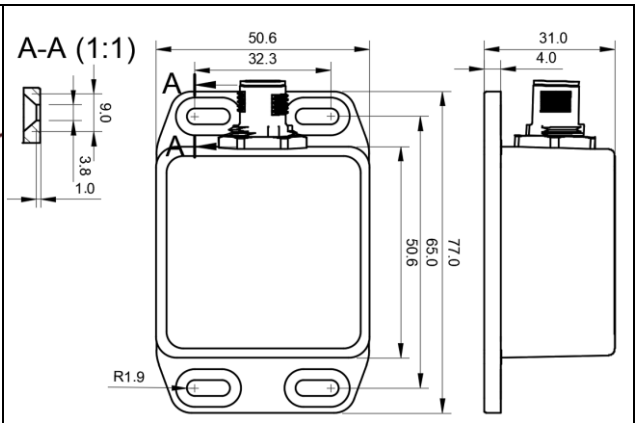


TOP VIEW SIDE VIEW

Flat and Vertical Mounting Version

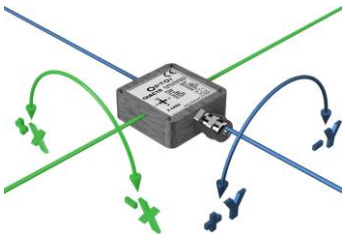
2 AXES
OIAC10-V

1 AXIS
OIAC10-F



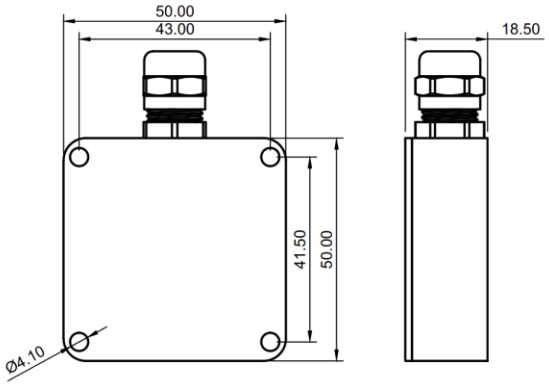
TOP VIEW SIDE VIEW

Stainless Steel Version



2 AXES
OIAC10-…-S

1 AXIS
OIAC10-…-S



TOP VIEW SIDE VIEW

Mounting

- The highest accuracy is achieved using 4 flat head countersunk screws with a maximum thread diameter of 4mm externally centered in the 4 slot-holes.
- For 1-axis models, the sensor's mounting surface must be vertical. The measured angle value increases with clockwise rotation. Zero position with left-oriented connector (top view).

1 AXIS ZERO POSITION AND DIRECTION

- For 2-axes models, the sensor's mounting surface must be flat and perfectly level.

2 AXIS DIRECTIONS

- For heavy vibrating applications, inclinometers isolation from vibration is required; if not the measured angles may be inexact.
- Strong accelerations applied to the inclinometers leads to inexact measure values.

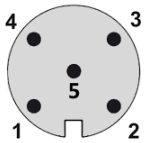
Pin Functions

CABLE VERSION OIAC10-XYYY-C

No	Color	Name	Function
1	BLACK	IU	Internal use only (leave it open if present)
2	BLACK	VCC	Positive Power Supply
3	BLACK	GND	Ground / 0V / V-
4	BLACK	OUTX	X-axis output for 2 and 1-axis devices
5	BLACK	OUTY	Y-axis output for 2 axes devices
6	YELLOW - GREEN	IU	Internal use only (leave it open if present)

M12-5 POLES MALE PLUG CONNECTOR VERSION: OIAC10-XYYY-M *

No	Color	Name	Function
1		VCC	Positive Power Supply
2		GND	Ground / 0V / V-
3		OUTX	X-axis output for 2 and 1-axis devices
4		OUTY	Y-axis output for 2 axes devices
5		IU_A	Internal use only (do not connect)

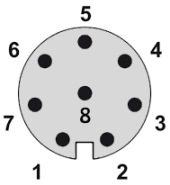


FRONT VIEW

** Different pinout or cable plus M12 connector variants are available on request.*

M12-8 POLES MALE PLUG CONNECTOR VERSION: OIAC10-XYYY-B

No	Color	Name	Function
1		VCC	Positive Power Supply
2		NC	Not connected
3		NC	Not connected
4		IU_B	Internal use only (do not connect)
5		GND	Ground / 0V / V-
6		OUTX	X-axis output for 2 and 1-axis devices
7		OUTY	Y-axis output for 2 axes devices
8		IU_A	Internal use only (do not connect)



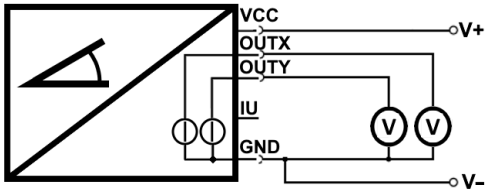
FRONT VIEW

REDUNDANT VERSION OIAC10-XYYY-CR

No	Color	Name	Function
1	GREY	$IU1_A$	CH1 Internal use only (leave it open if present)
2	RED	VCC1	CH1 Positive Power Supply
3	BLACK	GND1	CH1 Ground / 0V / V-
4	PINK	OUTX1	CH1 X-axis output for 2 and 1-axis devices
5	PURPLE	OUTY1	CH1 Y-axis output for 2 axes devices
6	PINK/GREY	$IU1_B$	CH1 Internal use only (leave it open if present)
6	YELLOW	$IU2_A$	CH2 Internal use only (leave it open if present)
7	WHITE	VCC2	CH2 Positive Power Supply
8	BLUE	GND2	CH2 Ground / 0V / V-
9	BROWN	OUTX2	CH2 X-axis output for 2 and 1-axis devices
10	GREEN	OUTY2	CH2 Y-axis output for 2 axes devices
	RED/BLUE	$IU2_B$	CH2 Internal use only (leave it open if present)

Electrical Connections

CONNECTIONS



OUTPUT CHARACTERISTICS

Fully redundant devices have two output signals available for each axis. These signals match themselves (no cross-signal).