

General Description

OIAC3 inclinometers can measure tilt angles up to ± 60 degrees in the pitch and roll axis or 360 degrees in single-axis working mode.

The compact sturdy anodized metal enclosure can withstand shocks and vibrations, while the filling resin makes OIAC3 inclinometers waterproof and dustproof.

The MEMS transducer raw signals are filtered, conditioned and elaborated with algorithms aimed for good noise rejection and measure stability. With a typical accuracy of ± 0.05 deg OIAC3 are very precise and sensitive.

The CANopen interface is compliant to CiA standard DS-301 with device profile DSP-410, which let OIAC3 inclinometers be programmable directly using the CAN network master device.

OIAC3 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 within the dimension of a single one.

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

Applications

- Solar power plants
- Mobile and fixed cranes
- Aerial platforms
- Telehandlers
- Drilling rigs
- Earth moving machines
- Agricultural machines
- Forestry machines

Pin function

OIAC3 inclinometers are available with different connectors and cables. See pinout information at page number 3.

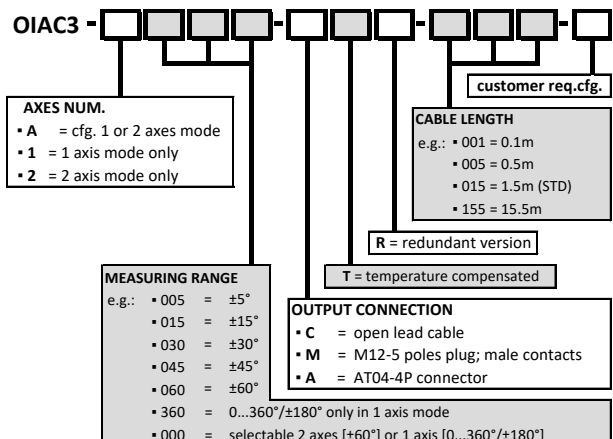


CANopen
certified
CiA201502-301V42/30-0190

Features

- Rugged device: fully metal case filled with protective resin
- High resolution (up to ± 0.001 deg)
- High accuracy (typ ± 0.05 deg)
- Very High MTTF @ 12V and 24V
- 1D or 2D inclination measurement
- CANopen certified (DS301 / DSP-410)
- Programmable filter on measured angles
- Configurable without additional tools
- Operating temperature -40°C to $+85^{\circ}\text{C}$
- IP67 protection grade
- Customizable on customer request

Ordering Information



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)	7	40	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.

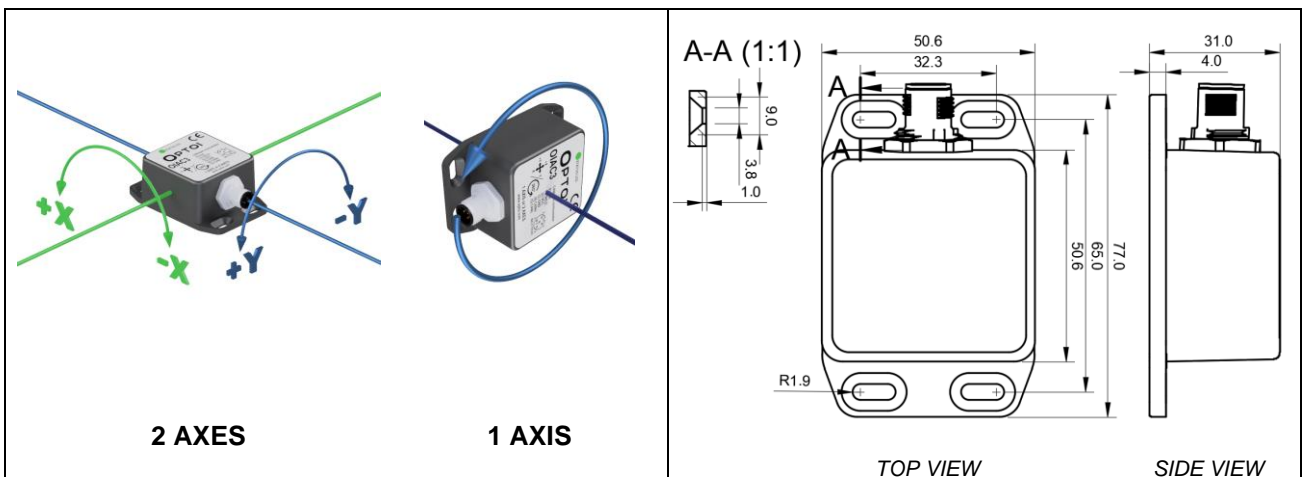
TECHNICAL CHARACTERISTICS*

T_A = 25°C, unless otherwise noted

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	Supply Voltage Range	-40 < T _A < +80	7	12/24	40	V
I _{CC}	Current consumption	average value		50		mA
R _G	Range of measurement	2 axes mode 1 axis 0-360° format 1 axis ±180° format	±5	±60 360 ±180	±60	deg
R	Resolution	user-programmable	1	0.01	0.001†	deg
A	Accuracy			±0.05	±0.2	deg
X	Cross Axis Error	2 axes mode		±0.1	±0.5	% FS
BR	Baud Rate	user-programmable	10	500	1000	Kbit/s
D	Temperature Drift			±0.008‡		deg/°C

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
W	Weight	non-redundant; M12 connector additional cable	150	180 75	220	g g/m



* [Reference manual](#) reports a complete description of the technical data

† Only if measuring range is set below ± 30 deg in two-axes mode

‡ Temperature drift can be decreased to typ ±0.002 deg/°C by thermal calibration: available as option

- 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. Measured angle value increases with clockwise rotation. Zero position with left-oriented connector (top view).



- For 2-axes models, the sensor's mounting surface must be flat and perfectly level. Sensors mounted on a non-flat surface can be compensated using the offset and preset register (see the Reference manual) for angle's offset compensation.



- 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 0.1M LENGTH, WITH AMPHENOL AT04-4P CONNECTOR: OIAC3-XXXX-A-LLL

No	Color	Name	Function
1	BLACK	CAN_GND	Ground / 0V / V-
2	BLACK	CAN_H	CAN H bus line (dominant high)
3	BLACK	CAN_L	CAN L bus line (dominant low)
4	BLACK	CAN_V+	Positive power supply

FRONT VIEW

M12-5 POLES MALE PLUG CONNECTOR VERSION: OIAC3-XXXX-M

No	Color	Name	Function
1		SHIELD	Optional CAN shield
2		CAN_V+	Positive power supply
3		CAN_GND	Ground / 0V / V-
4		CAN_H	CAN H bus line (dominant high)
5		CAN_L	CAN L bus line (dominant low)

FRONT VIEW

OTHER VERSIONS ARE AVAILABLE ON REQUEST

MAIN USER PROGRAMMABLE SETTINGS

See the [reference manual](https://optoi.com/en/downloads/certificates-manuals) for further details (available for download on: <https://optoi.com/en/downloads/certificates-manuals>)

- 1 Axis or 2 Axes Operational Mode
- Angle Resolution (from 0.001 to 1 degree)
- Programmable 2 Axes Measurement Range
- Programmable Offsets
- 0...360deg or ±180deg 1 Axis Angle Format
- Programmable Numeric Filter
- Transmission on Inclination Change
- Axis Sign Inversion
- Temperature Surveillance
- RTR, Cyclic, Event-Driven and Sync TPDO Transmission
- EMCY Producer
- Failure Monitoring (Heartbeat, Nodeguarding/Lifeguarding)

Regulatory Compliance Tables

ELECTROMAGNETIC COMPATIBILITY (EMC)

EN61000-6-3 – Emission standard for residential, commercial and light-industrial environments

Test	Environmental phenomena	Test specifications
EN 55022	Continuous disturbance voltage	Frequency range 150KHz – 30 MHz, DC power port
EN 55022	Radiated disturbance	Frequency range 30 – 1000 MHz, Enclosure port

EN61000-6-2 – Immunity standard for industrial environments

Test	Environmental phenomena	Test specifications
EN 61000-4-2	Electrostatic discharge	8kV Air Discharge, 4kV Contact Discharge, Enclosure port
EN 61000-4-3	Radiated electromagnetic field	10V/m, frequency range 80 – 1000 MHz, Enclosure port
EN 61000-4-4	Electrical Fast Transient/ Burst	2kV, in and out DC power ports
EN 61000-4-5	Surge	+/-0,5kV, in and out DC power ports
EN 61000-4-6	Injected currents	10 Vrms, 150KHz-80MHz, in and out DC power ports

SHOCK AND VIBRATIONS

Test	Environmental phenomena	Test specifications
EN 60068-2-6	Sine vibration testing	8,2-500Hz, const. acceleration 40m/s ² , 5 cycles, on 3 axes
EN 60068-2-64	Random vibration test	10-500Hz, acceleration 3g, 1h per axis on 3 axes
EN 60068-2-27	Shock test	Peak acceleration 300g, pulse duration 11ms, on 3 axes

ROAD VEHICLES – ISO 7637-2 (IMMUNITY TO CONDUCTED DISTURBANCES)

12-24V system	Test pulse	Severity level	Performance criteria and min. number of pulses
24V	1 -450V	III	C 5000 pulses
24V	2a +50V	IV	A 5000 pulses
24V	2b +20V	IV	C 10 pulses
24V	3a -200V	IV	A 1 hour
24V	3b +200V	IV	A 1 hour
12V4	4 -12V	IV	A 1 pulse
24V	5a 350ms +173V RL=0.5Ω	IV	C 5 pulses

⁴ 12V test specifications are more severe than 24V

RELIABILITY PARAMETERS

All MTTF calculation are made according to Siemens SN 29500.

Symbol	Parameter	Conditions	Value	Unit
MTTF	Mean time to failure 1-2 axes	Environment GM; T _A = 40°C; V _{CC} = 12V	200	years
		Environment GM; T _A = 40°C; V _{CC} = 24V	182	
DC	Diagnostic coverage		None	-
S	Structure		Not redundant	-

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