

General Description

OIAC3 is a 1D or 2D inclination sensor based on MEMS (Micro Electro Mechanical Systems) technology. The device senses tilt angles up to ± 60 degrees in the pitch and roll axis and 360 degrees in a single-axis measure.

OIAC3 is compact and rugged. The metal anodized enclosure makes it robust to external shocks and vibrations, dust and harsh conditions. The MEMS signals are internally filtered by an analog second order low-pass filter with cut-off frequency of 20Hz (hardware filter) and an user programmable digital filter (moving average). The two filters produce an enhanced noise rejection, increasing the measure stability.

The output interface is CAN-OPEN certified, fully compliant with DS 301 DSP 410. OIAC3 is programmable via CAN frames without additional tools.

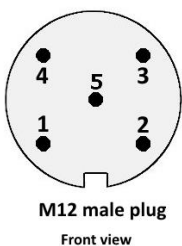
OIAC3-A000-M is highly accurate ($\pm 0.05^\circ$) and can be set in the preferred mode of measurement (1 or 2 axes). OIAC3-1360-M and OIAC3-2060-M are respectively 1-axis and 2-axes inclinometers with medium accuracy ($\pm 0.2^\circ$). Single channel or redundant versions are available.

OIAC3 is guaranteed in the full industrial temperature range $[-40; +85]^\circ\text{C}$. A compensation in the temperature range is available in order to reduce the thermal drift by a factor of 4. Such compensation is available for OIAC3-A000 and it is suggested whenever a higher total accuracy is required (e.g. concentrated solar power).

Applications

- Construction equipment
- Aerial platforms
- Concentrated Solar Power plants
- Agricultural and forestry machines
- Mining and well drilling equipments

Pin function



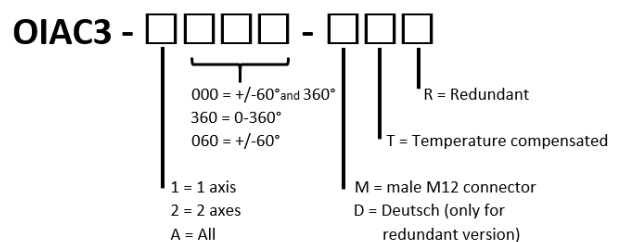
	Name	Function
1	SHIELD	Optional CAN shield
2	VCC	Power Supply
3	GND	Ground
4	Data AH	CAN_H bus line (dominant high)
5	Data BL	CAN_L bus line (dominant low)



Features

- High resolution (up to 0.001 deg)
- High accuracy (OIAC3-A000) or medium accuracy (OIAC3-1360, OIAC3-2060) models
- MTTF = 102 years
- Internal software diagnostic checks
- 1D and 2D inclination measurement
- Anti-Vibration programmable filter
- CANopen certified interface (DS301 DSP-410)
- IP67 protection class and industrial temperature range
- Very easy programming via CAN frames without additional tools

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 CHARACTERISTICS¹

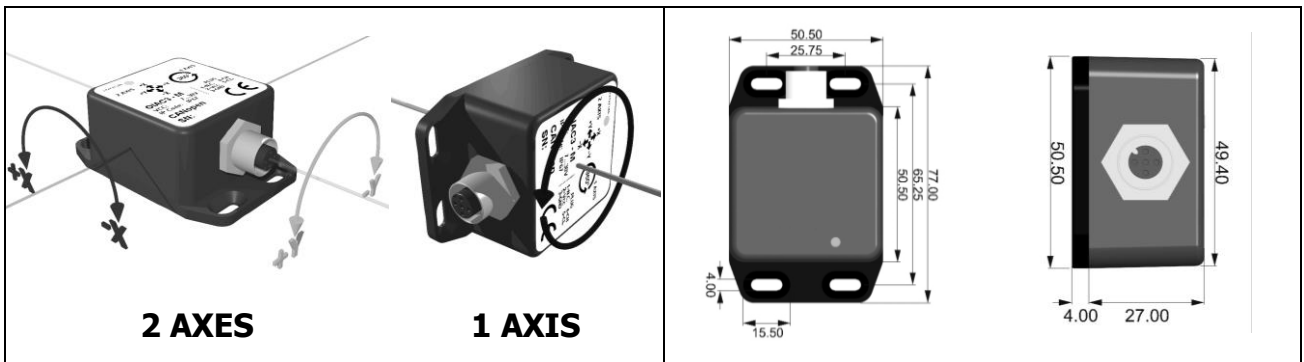
T_A = 25°C, unless otherwise noted.

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		30	45	mA
Rg ₁	Range of measurement	OIAC3-A000 (1D-mode), OIAC3-1360	0-360 or ± 180			deg
Rg ₂	Range of measurement	OIAC3-A000 (2D-mode), OIAC3-2060	±5		±60	deg
R	Resolution	user programmable	1.0	0.01	0.001 ²	deg
A _H	High Accuracy (OIAC3-A000 model)	Rg ₁ =0-360°;		±0.05	±0.10	deg
		-60° < Rg ₂ < +60°		±0.05	±0.15	deg
A _M	Medium accuracy (OIAC3-1360/2060 models)	Rg ₁ =0-360°; -30° < Rg ₂ < +30°		±0.20	±0.50	deg
X _A	2-DIM Cross Axis Error	OIAC3-A000 model		±0.1	±0.5	% FS
X ₂	2-DIM Cross Axis Error	OIAC3-2060 model, -30° < Rg ₂ < +30°		±1.0		% FS
SR	Sample Rate			550		S/s
BR	Baud Rate	user programmable	10	500	1000	Kbit/s
D	Temperature Drift			±0.008 ³		deg/°C

MECHANICAL CHARACTERISTICS AND DIMENSIONS

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
W	Width		50	50,50	51	mm
L	Length		76,50	77	77,50	mm
H	Height		30,50	31	31,50	mm
W	Weight		150	180	220	g
C	Connector		5-pole M12 male			

Units = mm ; Mechanical tolerance=+/-0.2mm



Zero degrees on 1-axis models are obtained by keeping the connector on the left, as shown in the picture above.

Mounting procedure: in order to get the high accuracy performances, Optoi suggests to fix the inclinometer with 4 countersunk screws, placed at the edges of the 4 slot-holes.

¹ Reference manual reports a complete description of the technical data

² Only if range is below ± 30deg in two-axes mode

³ Temperature drift can be decreased to typ ±0.002 deg/°C by thermal calibration: available as option

USER PROGRAMABLE SETTINGS

See reference manual for further details

■ 1D (0-360deg) or 2D Operational Mode	■ Pitch and Roll Transmission on Inclination Change (2D Mode)
■ Angle Resolution (from 0.001 to 1 degree)	■ Transmission on Inclination Change (1D Mode)
■ Pitch and Roll Measurement Range (from ±5 to ±60 deg)	■ Pitch and Roll Axis Inversion (2D Mode)
■ Pitch and Roll Offsets (2D mode)	■ Temperature Surveillance High and Low Thresholds
■ Angle Offset from 0 to 360 deg or ±180 deg (in 1D Mode)	■ RTR, Cyclic, Event-Driven, Synchronized TPDO Transmission
■ Moving Average Noise-Rejection Filter (0-1000 points)	■ EMCY Producer, Failure Monitoring (Heartbeat, Nodeguarding/Lifeguarding)

REGULATORY COMPLIANCE TABLE

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
12V ⁴	4 -12V	IV	A 1 pulse
24V	5a 350ms +173V R _L =0.5Ω	IV	C 5 pulses

⁴ 12V test specifications are more severe than 24V