

General Description

OIAC320 redundant inclinometers are available in two-axes or single-axis versions. 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.

OIAC320 is a hybrid device that combines two completely independent devices in one package: a digital inclinometer with CANopen interface (CiA DS-301, device profile DSP-410) and an analog inclinometer with 4-20mA output. The main advantage of this architecture is the score you get considering the device in safety operations (refer to the ISO13849 standard).

The compact sturdy anodized metal enclosure occupies the same space needed to mount a single-channel device without any compromise on the robustness. The enclosure can withstand shocks and vibrations, while the filling resin makes OIAC320 waterproof and dustproof.

The two MEMS transducer raw signals are independently filtered, conditioned, and elaborated with algorithms aimed for good noise rejection and measure stability.

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

OIAC320 inclinometers can be requested with different options in connectors, cable length, redundancy, or customer-specific device configurations.

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



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

Features

- Two fully independent channels: analog and digital
- Rugged device: fully metal case filled with a protective resin
- High MTTF @ 12V and 24V
- Single-axis or dual axes version
- Medium accuracy (typ ± 0.10 deg)
- Different angle ranges
- Operating temperature -40°C to $+85^{\circ}\text{C}$
- IP67 protection grade
- Customizable on customer request

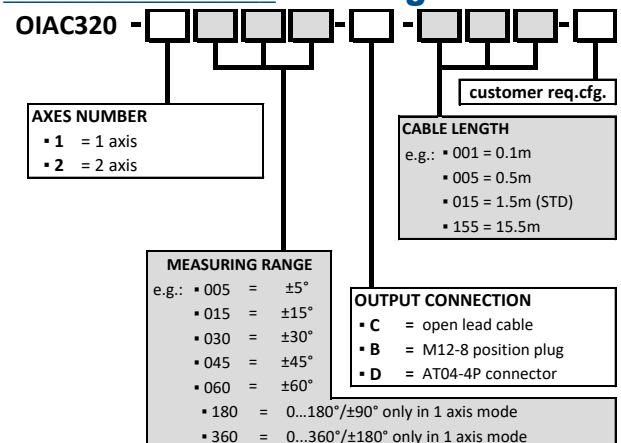
Applications

- Mobile and fixed cranes
- Aerial platforms
- Telehandlers
- Drilling rigs
- Earth moving machines
- Agricultural machines
- Forestry machines
- Mowers inclination control
- Levelling control

Pin Functions

OIAC320 inclinometers are available with different cable and connector options. For more details, see pinout information on page number 4.

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)	10	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, range ±30deg unless otherwise noted.

Symbol	Parameter	Conditions	Min	Typ	Max	Unit
V _{CC}	Supply Voltage Range	-40 < T _A < +85	10	12/24	30	V
I _{CC}	Current consumption	CH1 CANOPEN average value		50		mA
		CH2 ANALOG average value*		10		
Rg ₁	Range of measurement	CH1 CANOPEN Single-Axis		360		deg
		CH2 ANALOG		±180		
Rg ₂	Range of measurement	CH1 CANOPEN Dual-Axes	±5	±60	±60	deg
		CH2 ANALOG	±5	±30	±60	
Reso	Output Resolution	CH1 CANOPEN		0.01		deg
		CH2 ANALOG average value†		2.3		µA
Resa	Angle Resolution	CH1 CANOPEN			0.05	deg
		CH2 ANALOG				
A	Accuracy	CH1 CANOPEN Rg ₁ =±180°-360°		±0.1	±0.25	deg
		CH2 ANALOG Rg ₂ < +/-30°				
X _A	Cross Axis Error	CH1 CANOPEN Dual-Axes		±0.1	±0.5	% FS
		CH2 ANALOG		±1.0		
D _T	Temperature drift	CH1 CANOPEN		± 0.01		deg/°C
		CH2 ANALOG				
R _L	Output load resistor‡	CH2 ANALOG see pag.5		250		kΩ
R _T	CAN BUS termination resistor	CH1 CANOPEN external only		120		Ω
BR	Bit Rate	CH1 CANOPEN	10	500	1000	Kbit/s

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	345	years
		Environment GM; T _A = 40°C; V _{CC} = 24V	301	
	Mean time to failure 1 axis	Environment GM; T _A = 40°C; V _{CC} = 12V	364	
		Environment GM; T _A = 40°C; V _{CC} = 24V	317	
DC	Diagnostic coverage		None	-
S	Structure		Not redundant	-

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

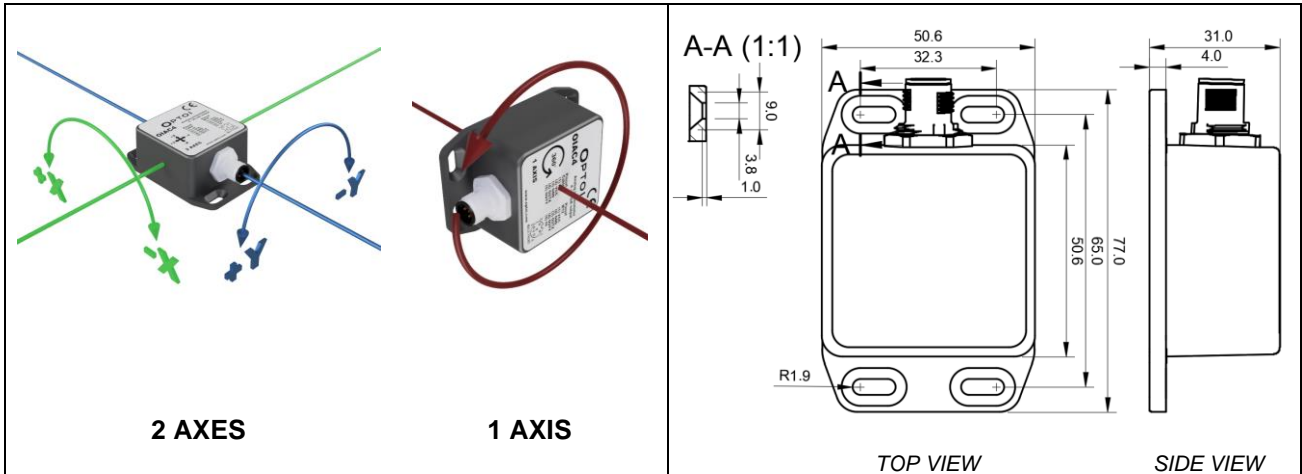
* Device's output current isn't considered: with 4-20mA output, add more 24mA per axis when measured angle goes out of positive measurement range limit

† For a dual-axes device with measurement range of +/-30deg, 2.3uA corresponds approx. 0.0085deg, for a single-axis device +/-180deg 2.3uA corresponds approx. 0.05deg

‡ Depending on VCC value, for minimum and maximum load resistor value see safe operating area on page 5

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	12 poles 0.25sqmm open lead		200		g
		additional cable		66		g/m
C _L	Cable standard length	12 poles 0.25sqmm open lead		1.5		m
C _ø	Cable outer diameter			6.8		mm



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, inclinometer isolation from vibration is required; if not the measured angles may be inexact.
- Strong accelerations applied to the inclinometers lead to inexact measure values.

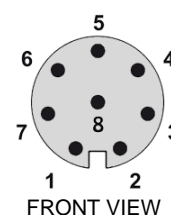
Pin Functions

CABLE VERSION OIAC320-XXXX-C

No	Color	Name	Function
1	GREY	TX1	Factory use only (don't connect if present)
2	RED	VCC ₂	CH2 Power Supply ANALOG
3	BLACK	GND ₂	CH2 Ground ANALOG
4	PINK	OUTX ₂	CH2 Analog output X 4-20mA ANALOG
5	PURPLE	OUTY ₂	CH2 Analog output Y 4-20mA (not present if 1D mode) ANALOG
6	PINK/GREY	RX1	Factory use only (don't connect if present)
7	WHITE	VCC ₁	CH1 Power Supply CANOPEN
8	BLUE	GND ₁	CH1 Ground CANOPEN
	BROWN	CAN_H	CH1 CAN line HIGH CANOPEN
	GREEN	CAN_L	CH1 CAN line LOW CANOPEN
	YELLOW	-	NOT USED/NOT PRESENT
	RED/BLUE	-	NOT USED/NOT PRESENT

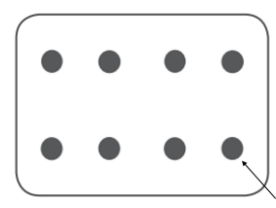
M12-8 POLES MALE PLUG CONNECTOR VERSION: OIAC320-XXXX-B

No	Color	Name	Function
1		VCC ₂	CH2 Power Supply ANALOG
2		VCC ₁	CH1 Power Supply CANOPEN
3		CAN_H	CH1 CAN line HIGH CANOPEN
4		CAN_L	CH1 CAN line LOW CANOPEN
5		GND ₂	CH2 Ground ANALOG
6		OUTX ₂	CH2 Analog output X 4-20mA ANALOG
7		OUTY ₂	CH2 Analog output Y 4-20mA (not present if 1D mode) ANALOG
8		GND ₁	CH1 Ground CANOPEN

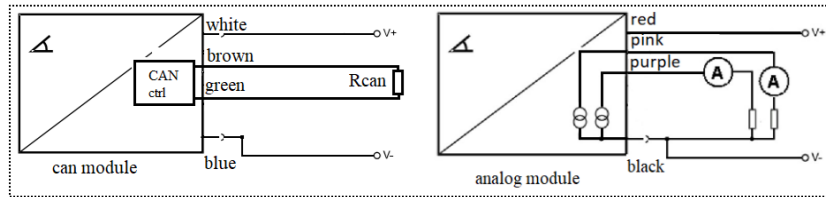


DT04-08PA CONNECTOR VERSION: OIAC320-XXXX-D

No	Color	Name	Function
1	WHITE	VCC ₁	CH1 Power Supply CANOPEN
2	BROWN	CAN_H	CH1 CAN line HIGH CANOPEN
3	GREEN	CAN_L	CH1 CAN line LOW CANOPEN
4	BLUE	GND ₁	CH1 Ground CANOPEN
5	RED	VCC ₂	CH2 Power Supply ANALOG
6	PINK	OUTX ₂	CH2 Analog output X 4-20mA ANALOG
7	PURPLE	OUTY ₂	CH2 Analog output Y 4-20mA (not present if 1D mode) ANALOG
8	BLACK	GND ₁	CH1 Ground CANOPEN

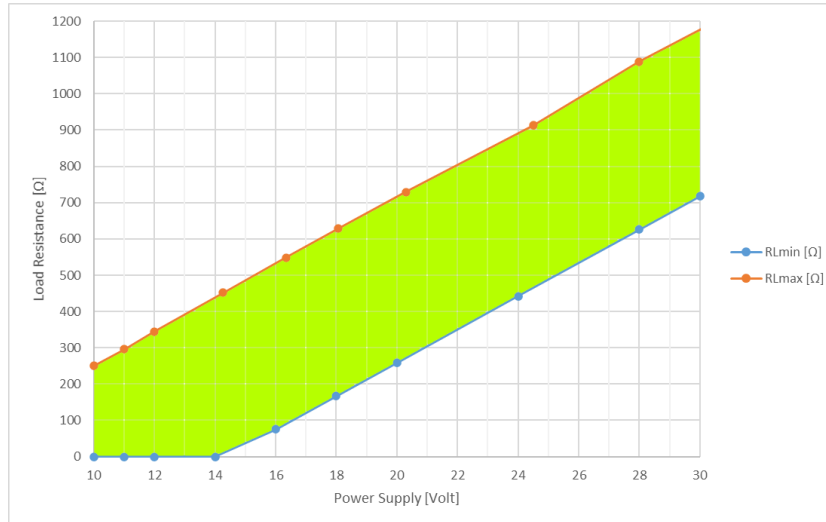


CONNECTIONS



LOAD RESISTANCE SAFE OPERATING AREA

The max and min load resistance are considered as the sum of load resistor and cable resistance.



OUTPUT CHARACTERISTICS

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

