

Inclination sensors

2-dimensional, measuring range up to $\pm 90^\circ$

CANopen® / SAE J1939 / Analog

GIM500R - 2-dimensional



GIM500R with housing in aluminium

Technical data - electrical ratings

Voltage supply	8...36 VDC
Reverse polarity protection	Yes
Short-circuit proof	Yes
Consumption w/o load	≤ 40 mA (24 VDC)
Initializing time	≤ 0.5 s after power on
Interfaces	CANopen®, SAE J1939, Analog (4...20 mA, 0...5 V or 0...10 V)
Measuring range	$\pm 10^\circ / \pm 30^\circ / \pm 45^\circ / \pm 60^\circ / \pm 90^\circ$
Load resistor	≥ 1 k Ω / voltage output ≤ 800 Ω / current output
Resolution	0.025 $^\circ$
Accuracy (+25 $^\circ$ C)	Typ. $\pm 0.1^\circ$
Temperature coefficient	0.009 $^\circ$ /K (0...36 $^\circ$ C) 0.008 $^\circ$ /K (36...90 $^\circ$ C)
Cross-axis-sensitivity typ.	0.3 %
Repeatability	0.1 $^\circ$ (+25 $^\circ$ C)
Sensing rate	800 Hz
Limit frequency	0.1...25 Hz, 2. order / low-pass filter (Default: 5 Hz)
Interference immunity	DIN EN 61000-6-2 ECE Reg. No. 10R04 ISO 7637-2 ISO 11452-2 / ISO 11452-5
Emitted interference	DIN EN 61000-6-4 ECE Reg. No. 10R04 ISO 7637-2 / EN 55025
Programmable parameters	Preset and offset Filter
Diagnostic function	Parameter error
Status indicator	DUO-LED integrated in housing
Approval	UL approval / E63076

Features

- Size 50 mm
- MEMS capacitive measuring principle
- EN13849 compliant firmware
- E1 compliant design
- Interface CANopen®, SAE J1939, Analog
- Measuring range 2-dimensional: up to $\pm 90^\circ$
- Connection M12 and cable
- Protection up to IP 69K

Optional

- With integrated terminating resistor
- Connection with DEUTSCH connector

Technical data - mechanical design

Dimensions W x H x L	48 x 24 x 52 mm
Protection DIN EN 60529	IP 66, IP 67, IP 68, IP 69K
Material	Housing: aluminium, coated
Corrosion protection	IEC 60068-2-52 Salt mist Complies to ISO 12944-5:1998 Protective paint systems (C5-M)
Operating temperature	-40...+85 $^\circ$ C (see general information)
Resistance	DIN EN 60068-2-6 Vibration ± 1.5 mm - 10-58 Hz 20 g - 58-2000 Hz DIN EN 60068-2-27 Shock 200 g, 6 ms
Weight approx.	95 g
Connection	Flange connector M12, 8-pin Flange connector M12, 5-pin Cable 1 m

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Part number

GIM500R- **M** **2** . **A**

Option

Without option

/4816 With integrated terminating resistor

Voltage supply / interface

C6 8...36 VDC / CANopen®

C9 8...36 VDC / SAE J1939

V5 8...36 VDC / Analog 0...5 V

V1 8...36 VDC / Analog 0...10 V

C4 8...36 VDC / Analog 4...20 mA

Connection

K Cable 1 m, Standard 4x2x0.14 mm²
(Analog, CANopen®, SAE J1939)

A Flange connector M12, 5-pin, male contacts
(CANopen®, SAE J1939)

B Flange connector 2xM12, 5-pin, male and female contacts
(CANopen®, SAE J1939)

F Flange connector M12, 8-pin, male contacts
(Analog)

Measuring range

10 $\pm 10^\circ$

30 $\pm 30^\circ$

45 $\pm 45^\circ$

60 $\pm 60^\circ$

90 $\pm 90^\circ$

Number of axes

2 2-dimensional

Housing

M Metal

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Installation position



The 2-dimensional inclination sensor must be mounted with the base plate in horizontal position, i.e. parallel to the horizontal line.

The sensor can be inclined both towards the X and Y axis at the same time. For each axis a separate measured value is provided. Default on delivery the inclination sensor will apply the selected sensing range to both axis, for example $\pm 30^\circ$ with the zero passage being precisely in the horizontal line.

Y = 0°



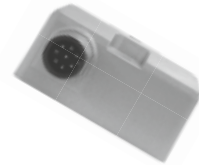
y = -30°



x = 0°



x = +30°



CANopen® features

Bus protocol	CANopen®
Device profile	CANopen® - CiA DSP 301 V4.2 Inclinometer profile DS 410 V1.3 LSS service profile DS 305 V2.2
Default	Baud rate 50 kbit/s Node ID 1

General information

Self-heating correlated to installation and ambient conditions as well as to electronics and supply voltage must be considered for precise thermal dimensioning. The inclination sensor is supposed to self-heat to approximately 5 K when attached to a varnished ground metal. Operating the inclination sensor close to the maximum limits requires measuring the currently prevailing temperature at the housing.

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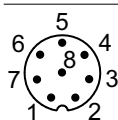
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GIM500R - 2-dimensional

Terminal assignment

Analog – M12 flange connector, 8-pin

Pin	Assignment	Description
1	UB	Voltage supply 8...36 VDC
2	GND	Ground connection relating to UB
3	OUT_X	Output
4	OUT_Y	Output
5	Teach ¹⁾	Teach-Input
6	n.c.	Do not use
7	n.c.	Do not use
8	A_GND	Ground connection relating to analog



M12 flange connector (male),
A-coded

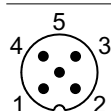
Analog – cable

Core color	Assignment	Description
White	UB	Voltage supply 8...36 VDC
Brown	GND	Ground connection relating to UB
Green	OUT_X	Output
Yellow	OUT_Y	Output
Grey	Teach ¹⁾	Teach-Input
Pink	n.c.	Do not use
Blue	n.c.	Do not use
Red	A_GND	Ground connection relating to analog

1) $U_{\text{teach}} \geq 0.7 \cdot UB$ longer than 250 ms / inclination = 0°

CANopen® / SAEJ1939 – M12 flange connector, 5-pin

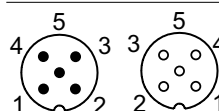
Pin	Assignment	Description
1	CAN_GND	Ground connection relating to CAN
2	UB	Voltage supply 8...36 VDC
3	GND	Ground connection relating to UB
4	CAN_H	CAN Bus Signal (dominant High)
5	CAN_L	CAN Bus Signal (dominant Low)



M12 flange connector (male),
A-coded

CANopen® / SAEJ1939 – 2xM12 flange connector, 5-pin

Pin	Assignment	Description
1	CAN_GND	Ground connection relating to CAN
2	UB	Voltage supply 8...36 VDC
3	GND	Ground connection relating to UB
4	CAN_H	CAN Bus Signal (dominant High)
5	CAN_L	CAN Bus Signal (dominant Low)



M12 flange connector (male /
female), A-coded

Terminals of the same significance are internally connected and identical in their functions. Max. load on the internal terminal connections UB-UB and GND-GND is 1 A each.

CANopen® – Cable

Core color	Assignment	Description
White	UB	Voltage supply 8...36 VDC
Brown	GND	Ground connection relating to UB
Green	n.c.	–
Yellow	n.c.	–
Grey	n.c.	–
Pink	CAN_H	CAN Bus Signal (dominant High)
Blue	CAN_L	CAN Bus Signal (dominant Low)
Red	CAN_GND	Ground connection relating to CAN

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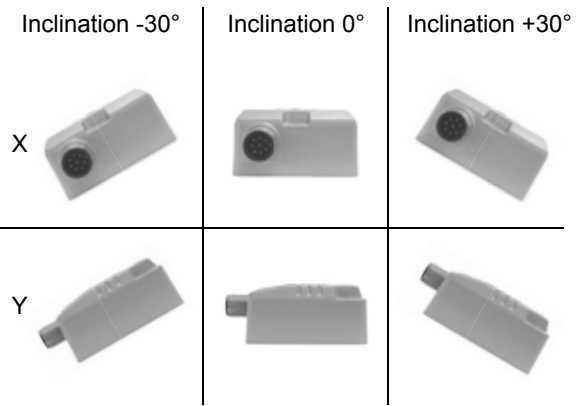
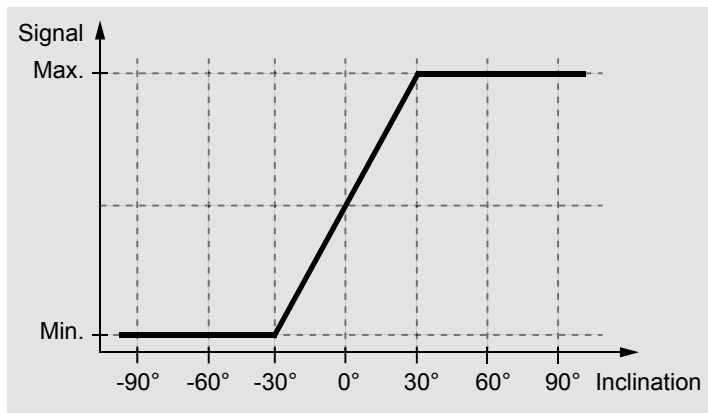
GIM500R - 2-dimensional

Output signals

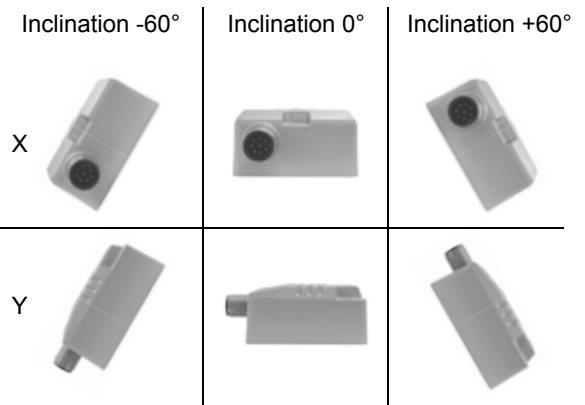
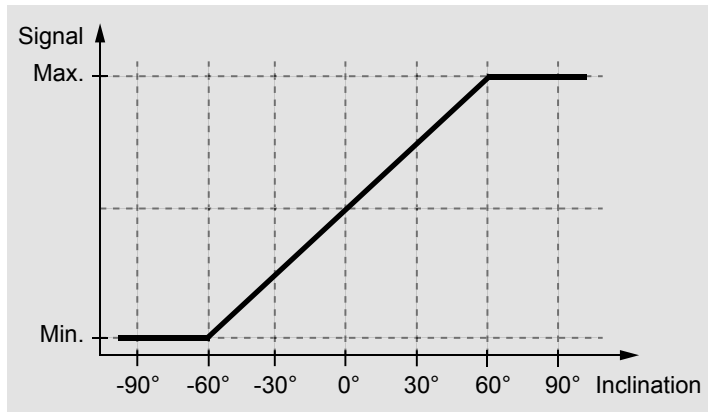
Analog output



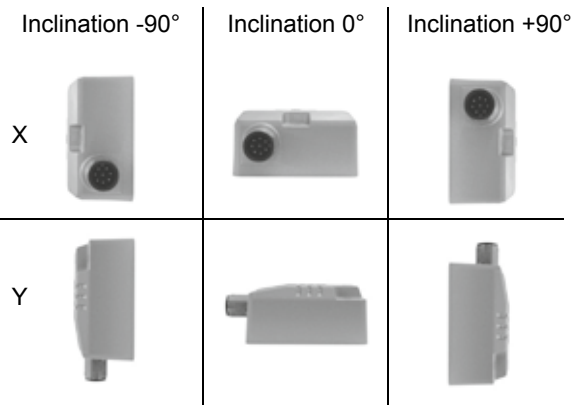
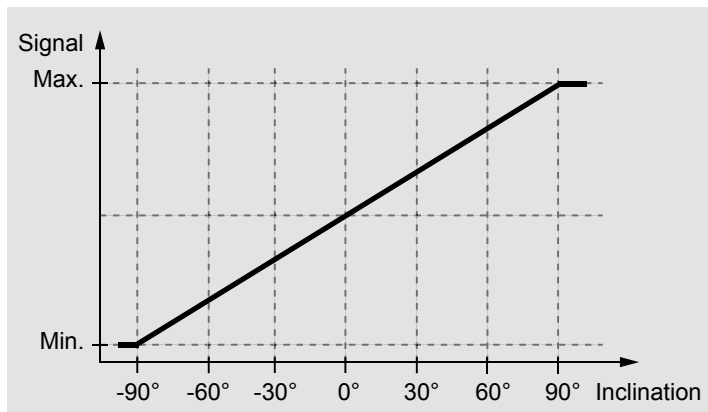
Measuring range $\pm 30^\circ$



Measuring range $\pm 60^\circ$



Measuring range $\pm 90^\circ$



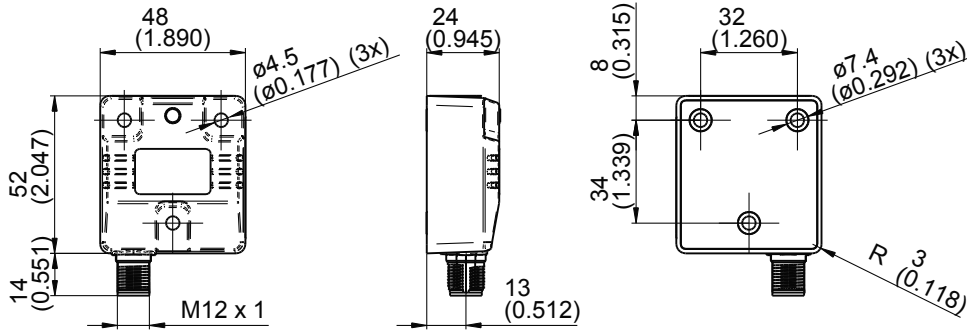
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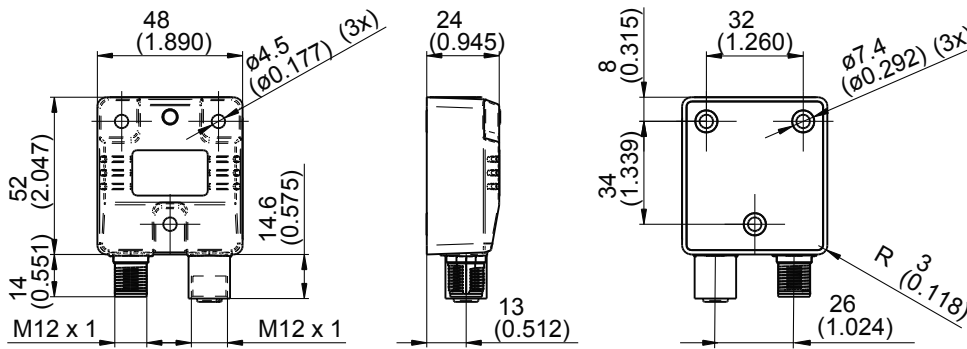
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Dimensions

GIM500R - 1 x connector M12



GIM500R - 2 x connector M12



GIM500R - cable

