

Inclination sensors

1-dimensional, measuring range 0...360°

CANopen® / SAE J1939 / Analog

GIM500R - 1-dimensional



GIM500R with housing in aluminium

Technical data - electrical ratings

| | |
|-----------------------------|---|
| Voltage supply | 8...36 VDC |
| Reverse polarity protection | 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...4.5 V / 0...5 V / 0...10 V) |
| Load resistor | ≥1 kΩ / voltage output ≤800 Ω / current output |
| Measuring range | 0...90°, 0...120°, 0...180°, 0...270°, 0...360° |
| Resolution | 0.1 ° CANopen® 0.1 ° SAE J1939 12 Bit Analog |
| Accuracy (+25 °C) | Typ. ±0.1° |
| Temperature coefficient | 0.008 °/K |
| Repeatability | ±0.1° (+25 °C) |
| Sensing rate | 1600 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 52 mm
- MEMS capacitive measuring principle
- ISO 13849 compliant firmware
- E1 compliant design
- Interface CANopen®, SAE J1939, Analog
- Connection M12 and cable
- Protection up to IP 69K

Optional

- With integrated terminating resistor
- Connection with DEUTSCH connector
- Output signal with out-of-range diagnostics

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 for ambient conditions C5-M (CX) according to ISO 12944-2 |
| Operating temperature | -40...+85 °C (see general information) |
| Resistance | DIN EN 60068-2-6 Vibration 20 g, 60-2000 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 |
| Instruction | Use in safety functions exclusively based on Application Note and MTTFd reliability prediction (request separately). |

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Part number

GIM500R- **M** **1** . **A**

Option

Without option

/4816 With integrated terminating resistor (CANopen, SAE J1939)

/4822 Output signal with out-of-range diagnostics (Analog)

Voltage supply / interface

C6 8...36 VDC / CANopen®

C9 8...36 VDC / SAE J1939

V4 8...36 VDC / Analog 0.5...4.5 V

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

09 0...90° (Analog with zero setting)

12 0...120° (Analog with zero setting)

18 0...180° (Analog with zero setting)

27 0...270° (Analog with zero setting)

36 0...360° (Analog with 2-point Teach / CANopen®, SAE J1939)

Number of axes

1 1-dimensional

Housing

M Metal

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Accessories

Connectors and cables

| | |
|----------|---|
| 10127844 | Connection cable 2 m shielded with female connector M12, 8-pin, straight (ESG 34FH0200G) |
| 10129332 | Connection cable 5 m shielded with female connector M12, 8-pin, straight (ESG 34FH0500G) |
| 10129333 | Connection cable 10 m shielded with female connector M12, 8-pin, straight (ESG 34FH1000G) |

Mounting accessories

| | |
|----------|---|
| 11120131 | Mounting kit 3x M4 x 25 DIN912, A 4.3 DIN125 |
| 11189609 | Mounting kit 3x M4 x 50 DIN912, A 4.3 DIN125, spacers |

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 | Resolution 0.1° Baud rate 50 kbit/s Node ID 1 |

Zero setting

Set Teach input for >250 ms on HIGH level ($\geq 0.7 * +Vs$) conforms inclination 0°.

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.

Vibration with frequency in the range of 1600 Hz acting on the sensor leads to reduced measuring accuracy.

Teach process

2-Point-Teach

Activate teach process

Start teach process within 5 minutes after power on. Set teach input for >5 seconds on HIGH level ($\geq 0.7 * +Vs$). DUO-LED: Oscillates after 5 seconds orange.

Position 1

Get inclination sensor on position intended for min. voltage output / current output. Set teach input for >0.1 seconds on HIGH.

DUO-LED: Lights for 3 seconds orange and afterwards oscillates.

Position 2

Get encoder on position intended for max. voltage output / current output. (Rotational direction of the teaching operation corresponds to rotational direction in the application). Set teach input for >0.1 seconds on HIGH.

DUO-LED: Lights for 3 seconds orange and afterwards oscillates 3 x green. If measuring range is exceeded or the limits are too close to each other (min. 5° difference), the teaching process was not successful (LED lights 3 x red) and has to be repeated.

Default

Set teach input for >15 seconds on HIGH.

DUO-LED: Oscillates after 5 seconds orange and lights after 15 seconds, 3 seconds orange.

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Installation position



When installing 1-dimensional inclination sensors, make sure the rotational axis as shown in the illustration is in a perpendicular position to the ground. Maximum misalignment $\pm 3^\circ$.

The 1-dimensional sensor default position is 0° as shown in the following illustration, but may be configured at will using the 2-point-teach or zero setting function.

Default 0°



Measured value 90°



Measured value 180°



Measured value 270°



Inclination sensors

1-dimensional, measuring range 0...360°

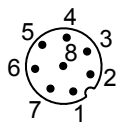
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Terminal assignment

Analog – M12 flange connector, 8-pin

| Pin | Assignment | Description |
|-----|---------------------|--------------------------------------|
| 1 | +Vs | Voltage supply |
| 2 | GND | Ground connection relating to +Vs |
| 3 | OUT | Output |
| 4 | d.u. | Do not use |
| 5 | Teach ¹⁾ | Teach-Input |
| 6 | d.u. | Do not use |
| 7 | d.u. | Do not use |
| 8 | A_GND | Ground connection relating to Analog |



M12 flange connector (male),
A-coded

Analog – cable

| Core color | Assignment | Description |
|------------|---------------------|--------------------------------------|
| White | +Vs | Voltage supply |
| Brown | GND | Ground connection relating to +Vs |
| Green | OUT | Output |
| Yellow | d.u. | Do not use |
| Grey | Teach ¹⁾ | Teach-Input |
| Pink | d.u. | Do not use |
| Blue | d.u. | Do not use |
| Red | A_GND | Ground connection relating to Analog |

1) Function zero setting:

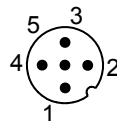
See description zero setting

Function 2-Point-Teach:

See description Teach process

CANopen® / SAE J1939 – M12 flange connector, 5-pin

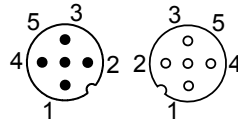
| Pin | Assignment | Description |
|-----|------------|-----------------------------------|
| 1 | CAN_GND | Ground connection relating to CAN |
| 2 | +Vs | Voltage supply |
| 3 | GND | Ground connection relating to +Vs |
| 4 | CAN_H | CAN Bus Signal (dominant High) |
| 5 | CAN_L | CAN Bus Signal (dominant Low) |



M12 flange connector (male),
A-coded

CANopen® / SAE J1939 – 2xM12 flange connector, 5-pin

| Pin | Assignment | Description |
|-----|------------|-----------------------------------|
| 1 | CAN_GND | Ground connection relating to CAN |
| 2 | +Vs | Voltage supply |
| 3 | GND | Ground connection relating to +Vs |
| 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 Vs-Vs and GND-GND is 1 A each.

CANopen® – Cable

| Core color | Assignment | Description |
|------------|------------|-----------------------------------|
| White | +Vs | Voltage supply |
| Brown | GND | Ground connection relating to +Vs |
| Green | d.u. | – |
| Yellow | d.u. | – |
| Grey | d.u. | – |
| Pink | CAN_H | CAN Bus Signal (dominant High) |
| Blue | CAN_L | CAN Bus Signal (dominant Low) |
| Red | CAN_GND | Ground connection relating to CAN |

Inclination sensors

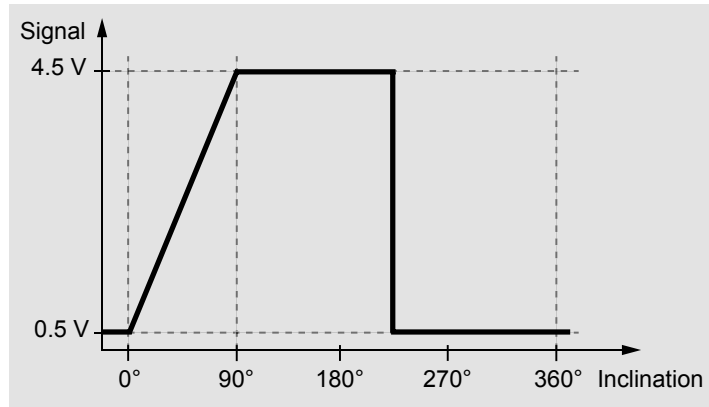
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Output signals

Analog output

Measuring range 0...90°



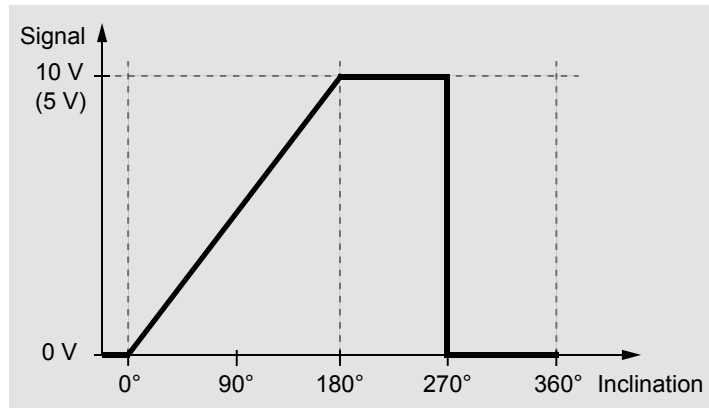
Inclination 0°



Inclination 90°



Measuring range 0...180°



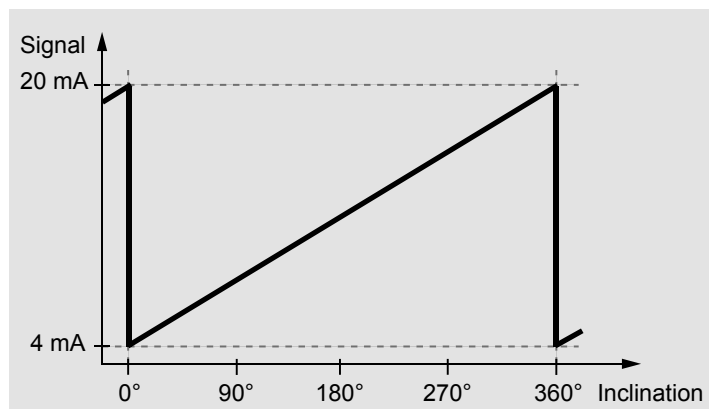
Inclination 0°



Inclination 180°



Measuring range 0...360°



Inclination 0°



Inclination 360°



Inclination sensors

1-dimensional, measuring range 0...360°

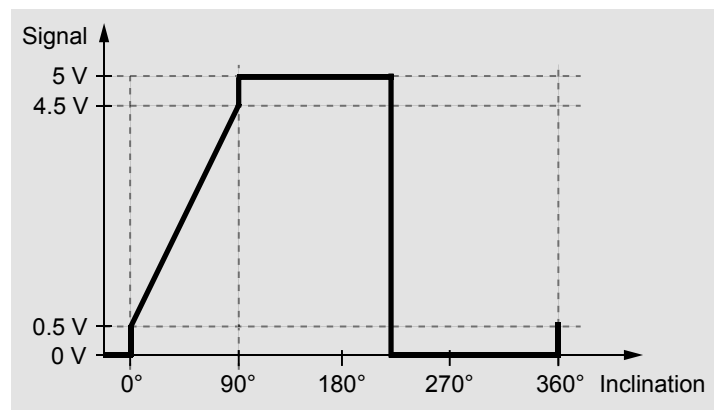
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GIM500R - 1-dimensional

Output signals

Analog output with out-of-range diagnostic (Option: /4822)

Measuring range 0...90°



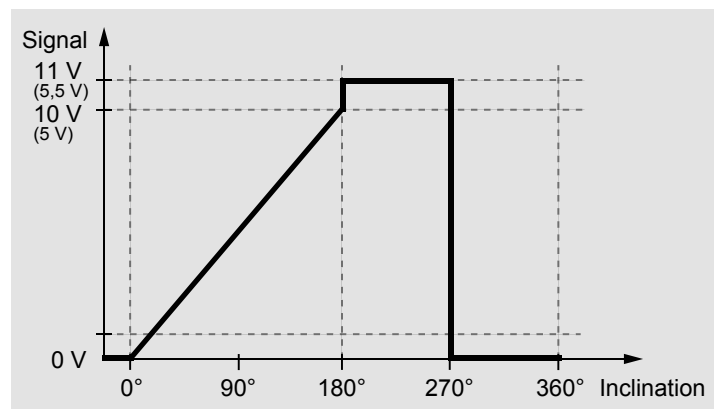
Inclination 0°



Inclination 90°



Measuring range 0...180°



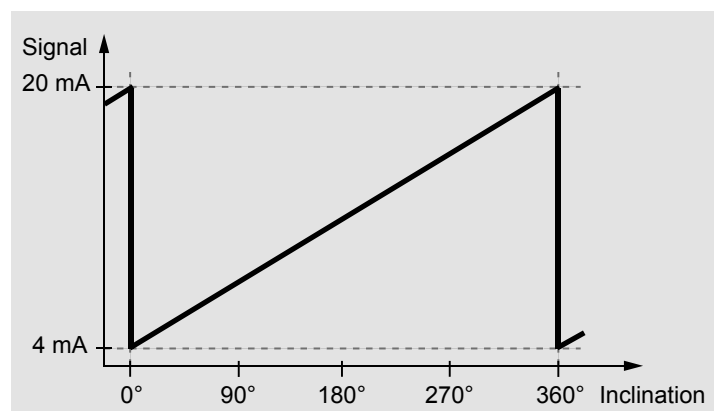
Inclination 0°



Inclination 180°



Measuring range 0...360°



Inclination 0°



Inclination 360°



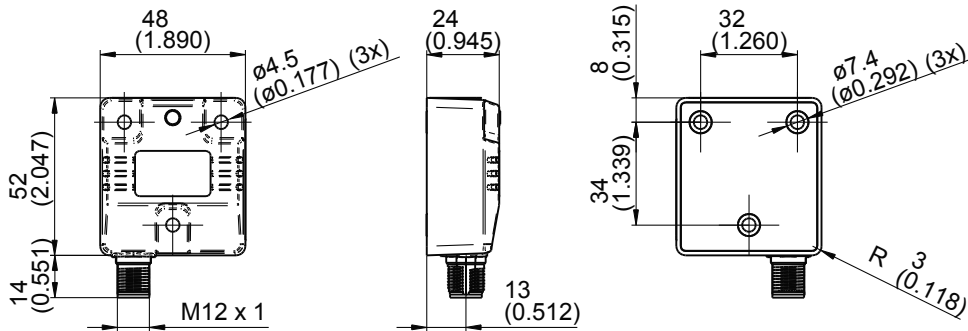
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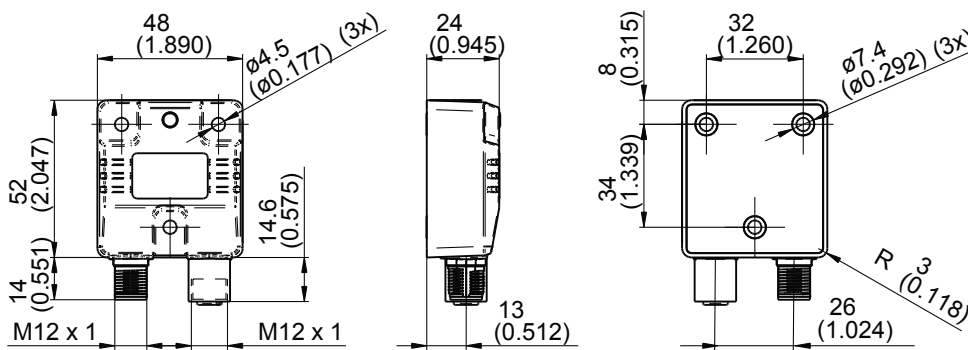
GIM500R - 1-dimensional

Dimensions

GIM500R - 1 x connector M12



GIM500R - 2 x connector M12



GIM500R - cable

