Baumer
Passion for Sensors

Inclination sensor

# GIM140R - 1-dimensional, CANopen®

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

Article number:

## Overview

- Size 48 mm
- MEMS capacitive measuring principle
- Interface CANopen® / CANopen® redundant
- Protection up to IP 69K
- Corrosion protection CX (C5-M)
- E1 approval (KBA)
- UL approval
- Load dump protection
- Connection cable and cable with M12
- Wire cross section 0.5 mm²
- Redundant version (2-channel architecture)


E1

## Technical data

| Technical data - electrical ratings | |
|---|---|
| Voltage supply | 8...36 VDC |
| Reverse polarity protection | Yes |
| Short-circuit proof | Yes (28 VDC or ground) |
| Consumption typ. | 28 mA (24 VDC, w/o load)<br>56 mA (24 VDC, w/o load, redundant) |
| Initializing time | ≤ 0.5 s after power on |
| Interface | CANopen® |
| Measuring range | 0...360° |
| Resolution | 0.1 ° |
| Accuracy (+25 °C) | Typ. ±0.2° |
| Temperature coefficient | 0.01 °/K |
| Sensing method | MEMS technology |
| Repeatability | ± 0.1 ° (+25 °C) |
| Sensing rate | 1600 Hz (0.625 ms) |
| Limit frequency | 0.1...25 Hz, 2. order / low-pass filter (Default: 2 Hz) |
| Output stages | CAN-Bus compatible ISO 11898 |
| Load dump protection | ISO 16750-2<br>Test Level A, 12 V/24 V systems |
| Interference immunity | EN 61000-6-2<br>ECE Reg. No. 10R06<br>ISO 7637-2 |
| Emitted interference | EN 61000-6-3<br>ECE Reg. No. 10R06<br>ISO 7637-2 |

| Technical data - electrical ratings | |
|---|---|
| Programmable parameters | Preset and offset<br>Filter |
| Approval | E1-type<br>UN ECE 10R06<br>UL approval / E217823 |

| Technical data - mechanical design | |
|---|---|
| Dimensions W x H x L | 48 x 14 x 45 mm |
| Protection EN 60529 | IP 67<br>IP 69K |
| Material | Housing: aluminium, anodised |
| Corrosion protection | IEC 60068-2-52 Salt mist<br>for ambient conditions CX (C5-M) according to ISO 12944-2 |
| Operating temperature | -40...+85 °C (see general information) |
| Resistance | EN 60068-2-6<br>Vibration 20 g, 58-2000 Hz<br>EN 60068-2-27<br>Shock 50 g, 6 ms |
| Temperature changes | EN 60068-2-14, -40…+85 °C, 5 cycles |
| Weight approx. | 45 g |
| Connection | Cable 0.3 m<br>Cable 0.3 m with connector M12 |

## Optional

- With integrated terminating resistor
- Connection with DEUTSCH or AMP connector on cable end

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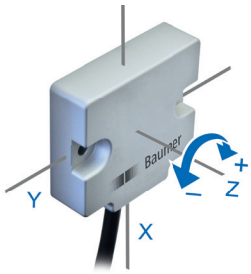
## General information

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-heating 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.

## 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 ±5°.

The 1-dimensional sensor default position is 0° as shown in the following illustration.

**Z = 0°**


**Z = +90°**


**Z = +180°**


**Z = +270°**

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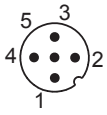
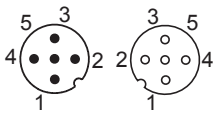
## Terminal assignment

**Cable with connector M12, 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 |

**Cable with connector 2xM12, 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 |

**Cable**

| Core color | Assignment | Description |
|---|---|---|
| White | GND | Ground connection relating to +Vs |
| Brown | +Vs | Voltage supply |
| Green | CAN_H | CAN Bus Signal (dominant High) |
| Yellow | CAN_L | CAN Bus Signal (dominant Low) |
| Grey | CAN_GND | Ground connection relating to CAN |
| Cable data: 5 x 0.5 mm² | | |

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 0.5 A each.

## CANopen® features

| | |
|---|---|
| Bus protocoll | CANopen® |
| Device profile | CANopen® - CiA<br>Communication profile DS 301 V4.2<br>Inclinometer profile DS 410 V1.3<br>Layer Setting Services (LSS) DSP 305 V3.0 |
| Default | Resolution 0.1°<br>Baud rate 250 kbit/s<br>Node ID 1, Node ID 2<br>Timer driven 100 ms |

## Data transfer

**PDO Mapping / ID 1 / PDO 1**

| LSB | MSB | LSB | MSB | LSB | MSB |
|---|---|---|---|---|---|
| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
| Temperature | | Inclination angle<br>Z = 0 ▶ 3600<br>in steps of 0.1°<br>Angle increasing<br>in size and value | | | |

**PDO Mapping / ID 2 / PDO 1**

| LSB | MSB | LSB | MSB | LSB | MSB |
|---|---|---|---|---|---|
| Byte 0 | Byte 1 | Byte 2 | Byte 3 | Byte 4 | Byte 5 |
| Temperature | | Inclination angle<br>Z = 0 ▶ 3600<br>in steps of 0.1°<br>Angle increasing<br>in size and value | | | |

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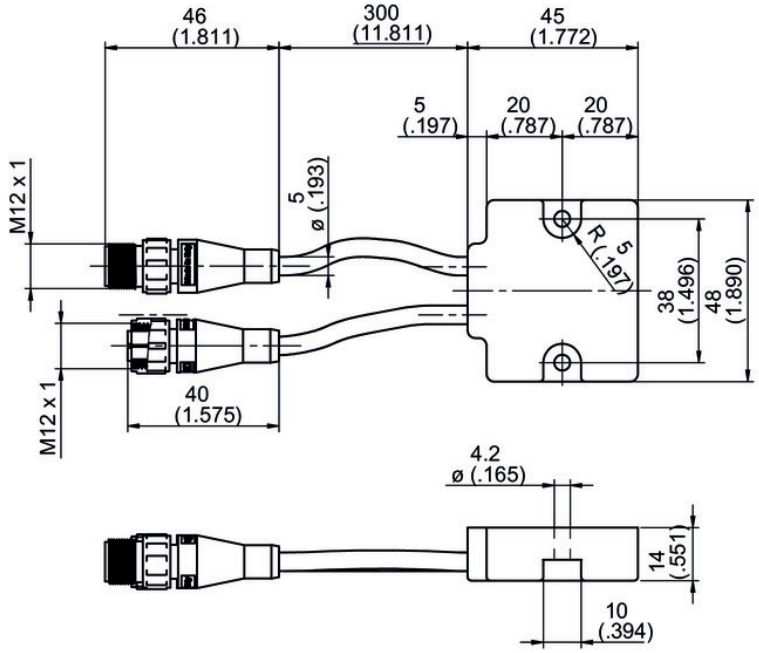
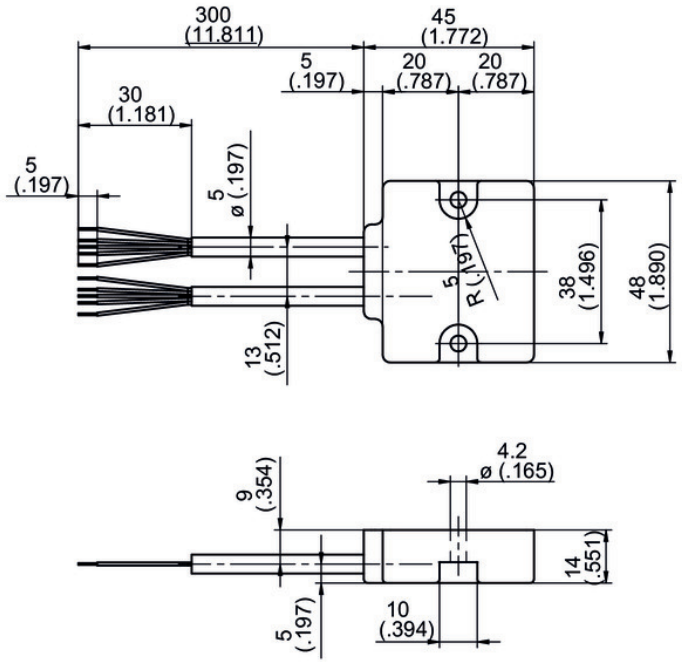
## Dimensions




2x cable with connector M12




2x cable

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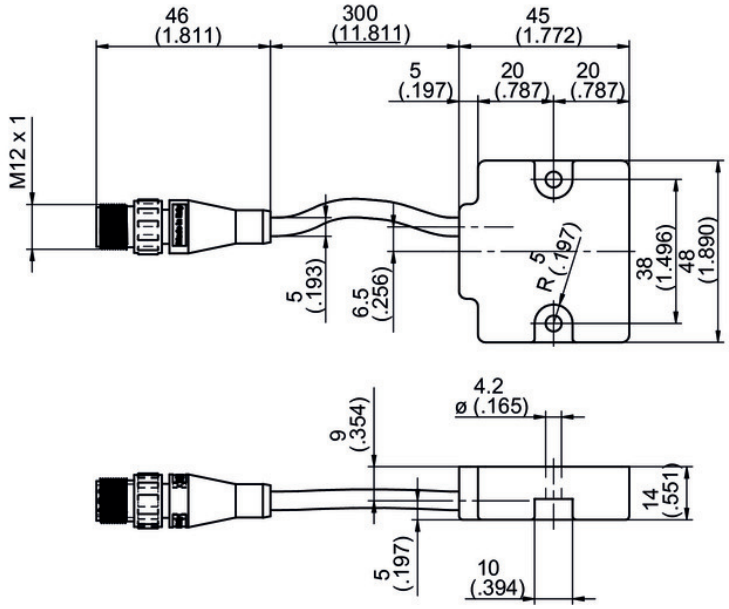
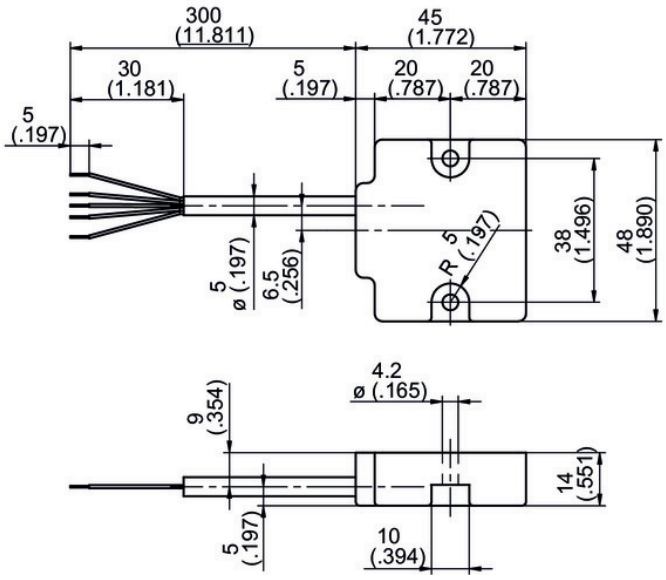



Cable with connector M12




Cable

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## Ordering reference

| | GIM140R | - | M | 1 | 36 | . | # | ## | . | A | ##### |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Product** | | | | | | | | | | | |
| | GIM140R | | | | | | | | | | |
| **Housing** | | | | | | | | | | | |
| Metal | | | M | | | | | | | | |
| **Number of axes** | | | | | | | | | | | |
| 1-dimensional | | | | 1 | | | | | | | |
| **Measuring range** | | | | | | | | | | | |
| 0...360° | | | | | 36 | | | | | | |
| **Connection** | | | | | | | | | | | |
| Cable 0.3 m, Standard 5x0.5 mm² | | | | | | | M | | | | |
| 2x cable 0.3 m, Standard 5x0.5 mm² | | | | | | | N | | | | |
| Cable 0.3 m with M12, 5-pin, male contacts | | | | | | | S | | | | |
| 2x cable 0.3 m with M12, 5-pin, male and female contacts (Bus-in/Bus-out) | | | | | | | P | | | | |
| **Voltage supply / interface** | | | | | | | | | | | |
| 8...36 VDC / CANopen® (DS410) | | | | | | | | C6 | | | |
| 8...36 VDC / CANopen® (DS410) redundant (2-channel design) | | | | | | | | C8 | | | |
| **Operating temperature** | | | | | | | | | | | |
| -40...+85 °C | | | | | | | | | | A | |
| **Option** | | | | | | | | | | | |
| Without option | | | | | | | | | | | |
| With integrated terminating resistor (only with connection M and S) | | | | | | | | | | | /4816 |