

GIM600R - 2-dimensional

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

CANopen® / SAE J1939

Preliminary

Overview

- Designed for mobile machines
- E1 compliant design
- Load dump protection
- Protection up to IP 69K
- Corrosion protection CX (C5-M)
- Connection cable / cable with M12 connector
- Interface CANopen® / SAE J1939
- Redundant versions (2-channel architecture)
- Applicable up to PLd (ISO 13849)



Picture similar

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.	30 mA (24 VDC, w/o load) 60 mA (24 VDC, w/o load, redundant)
Initializing time typ.	≤ 1 s after power on
Interface	CANopen® SAE J1939
Measuring range	$\pm 90^\circ$
Resolution	$\geq 0.001^\circ$ CANopen® 0.01° SAE J1939
Accuracy (+25 °C)	Typ. $\pm 0.1^\circ$
Repeatability typ.	0.025° (+25 °C)
Absolute accuracy max. (horizontal)	$\pm 0.24^\circ$ (+25 °C) $\pm 0.41^\circ$ (0...+50 °C) (measuring range $\pm 10^\circ$, see general information)
"Absolute accuracy max. (vertical)	$\pm 0.47^\circ$ (+25 °C) $\pm 0.86^\circ$ (0...+50 °C) (measuring range $\pm 10^\circ$, see general information)
Cross-axis-sensitivity max. (+25 °C)	$\pm 0.23^\circ$ (2-dimensional horizontal) $\pm 0.47^\circ$ (2-dimensional vertical) Measuring range $\pm 10^\circ$
Sensing method	MEMS technology
Sensing rate	1000 Hz (1 ms)
Limit frequency	0.1...25 Hz, 2. order / low-pass filter (Default: 5 Hz)
Output stages	CAN-Bus compatible ISO 11898
Load dump protection	ISO 16750-2 for 12 V/24 V systems Pulse 5b (test criteria A)

Technical data - electrical ratings

Interference immunity	EN 61000-6-2 ISO 7637-2* ISO 7637-3* ISO 11452-2* ISO 11452-4* ISO 11452-5* ISO 10605:2008 + Amd 1:2014 (CD ± 8 kV / AD ± 15 kV) * Severity level according to ECE R10 (Rev. 6 + Amd 02:2021-12)
Emitted interference	EN 61000-6-4 ISO 7637-2* CISPR 25:2008 (30...1000 MHz) * Severity level according to ECE R10 (Rev. 6 + Amd 02:2021-12)
MTTF _d (ISO 13849)	High (>100 years) Use in safety functions exclusively based on Application Note and MTTF _d reliability prediction (request separately).
Programmable parameters	Preset Zero position Signal low-pass filter Inverting of counting direction
Diagnostic function	Parameter error

Technical data - mechanical design

Dimensions W x H x L	72 x 24 x 64 mm
Protection EN 60529	IP 67 IP 68 (without connector) IP 69K (without connector)
Material	Housing: polyamide (glass fiber reinforced) Base plate: metal
Corrosion protection	IEC 60068-2-52 Salt mist for ambient conditions CX (C5-M) according to ISO 12944-2
Operating temperature	-40...+85 °C (see general information)

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Technical data - mechanical design

Resistance	EN 60068-2-6 Vibration 20 g, 60-2000 Hz EN 60068-2-27 Shock 200 g, 3 ms
Temperature changes	EN 60068-2-14, -40...+85 °C, 5 cycles

Technical data - mechanical design

Weight approx.	150 g
Connection	Flylead connector M12, 5-pin, length 300 mm

Optional

- 3-axis acceleration PDO mappable (range ± 2 g, see general information)

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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-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. Electromagnetic interference can lead to reduced measuring accuracy (see application note). Sensor referencing to the zero position only in installed condition. Regularly verify the sensor's zero position upon stability when installed. Acceleration output values (optional) for information only. Further information on request.

Installation position



Horizontal installation

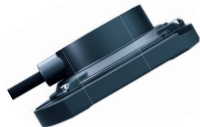
When installing the 2-dimensional inclination sensor with the housing in horizontal position, make sure the base plate is aligned parallel to the horizontal line.

The sensor can be inclined both around the X- and the Y-axis. There is one measured value supplied for each axis. Sensor default is 2-dimensional measuring within the selected range, e.g. $\pm 30^\circ$. Zero-crossing is exactly in the horizontal line.

X-axis 0°



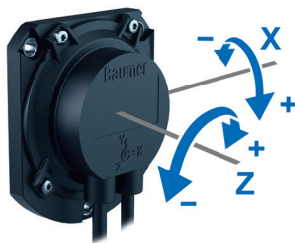
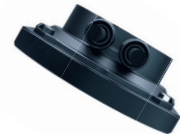
X-axis -30°



Y-axis 0°



Y-axis $+30^\circ$



Vertical installation

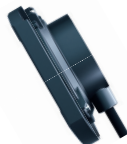
When installing the 2-dimensional inclination sensor with the housing in vertical position, make sure the base plate is aligned parallel to the vertical line. The sensor can be inclined both around the X and the Z axis. There is one measured value supplied for each axis.

Sensor default is 2-dimensional measuring within the selected range, e.g. $\pm 30^\circ$. Zero-crossing is exactly in the vertical line.

X-axis 0°



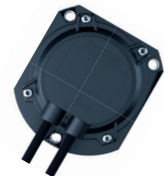
X-axis -30°



Z-axis 0°



Z-axis $+30^\circ$



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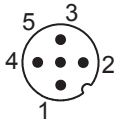
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Terminal assignment

Cable with connector M12, 5-pin

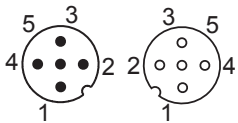
Pin	Assignment	Description
1	CAN_GND	Ground connection relating to CAN
2	+Vs	Voltage supply
3	GND	Ground connection relating to +Vs
4	CAN_H	CAN Bus Signal (dominant High)
5	CAN_L	CAN Bus Signal (dominant Low)



M12 flange connector (male),
A-coded

Cable with connector 2xM12, 5-pin (Bus-in/Bus-out)

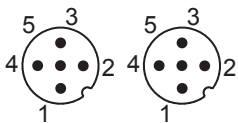
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2	+Vs	Voltage supply
3	GND	Ground connection relating to +Vs
4	CAN_H	CAN Bus Signal (dominant High)
5	CAN_L	CAN Bus Signal (dominant Low)



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

Cable with connector 2xM12, 5-pin (2x Bus-in)

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

For all connection types

Terminals GND and CAN_GND are internally connected and identical in their functions. Max. load on the internal terminal connections Vs-Vs and GND-GND is 1.5 A each. Daisy chain current max. 1.5 A.

SAE J1939 features

Default	Resolution 0.1° Transmission rate 250 kbit/s Address: 247, 248 (redundant version)
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CANopen® features

Device profile	CANopen® CiA DSP 301 V4.2 Encoder profile DS 406 V4.0.2 Inclinometer profile DS 410 V1.3 LSS service profile DS 305 V2.2
Default	Resolution 0.1° Baud rate 250 kbit/s Node-ID 1 Node-ID 2 (redundant version) Time-driven: 100 ms

Data transfer

CANopen - PDO Mapping / Node-ID 1 / PDO 1

LSB	MSB	LSB	MSB	LSB	MSB
Byte 0	1	2	3	4	5
Temperature		Inclination angle X = 0 ► $\pm 90^\circ$ in steps of 0.1° Angle increasing in size and value		Inclination angle Y = 0 ► $\pm 90^\circ$ in steps of 0.1° Angle increasing in size and value	

CANopen - PDO Mapping / Node-ID 2 / PDO 1

LSB	MSB	LSB	MSB	LSB	MSB
Byte 0	1	2	3	4	5
Temperature		Inclination angle X = 0 ► $\pm 90^\circ$ in steps of 0.1° Angle increasing in size and value		Inclination angle Y = 0 ► $\pm 90^\circ$ in steps of 0.1° Angle increasing in size and value	

SAE J1939 - PPGN 6563: 2-dimensional device message

Proprietary B message interpretation of 2-dimensional inclination sensors:

LSB	MSB	LSB	MSB	LSB	MSB	LSB	MSB
Byte 1	2	3	4	5	6	7	8
X-axis signed word tilt reading (resolution 0.1°)		Y-axis signed word tilt reading (resolution 0.1°)		Temp. signed byte (°C)	Module ID	Error ID	

Data length:	8 bytes
Extended data page:	0
Data page:	0
PF:	255 (Prop. B)
PS:	83
Priority:	6
PG number:	65363 (00FF53h)

Description of data payload:

- Byte 1: X-axis signed word LSB tilt reading (resolution 0.1°)
- Byte 2: X-axis signed word MSB tilt reading (resolution 0.1°)
- Byte 3: Y-axis signed word LSB tilt reading (resolution 0.1°)
- Byte 4: Y-axis signed word MSB tilt reading (resolution 0.1°)
- Byte 5: Device temperature signed byte (resolution 1 °C)
- Byte 6: Module ID
- Byte 7,8: Error ID

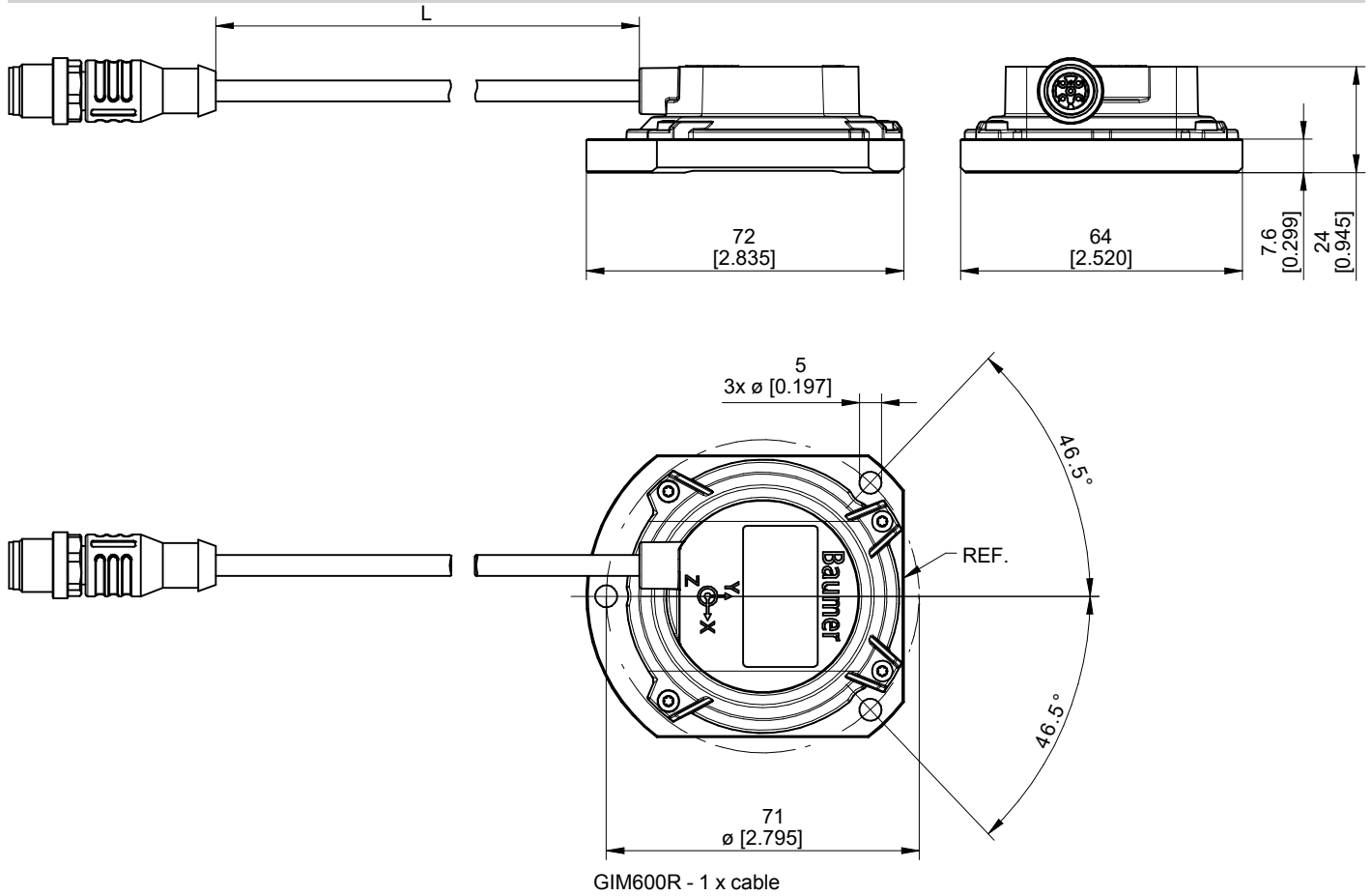
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Dimensions



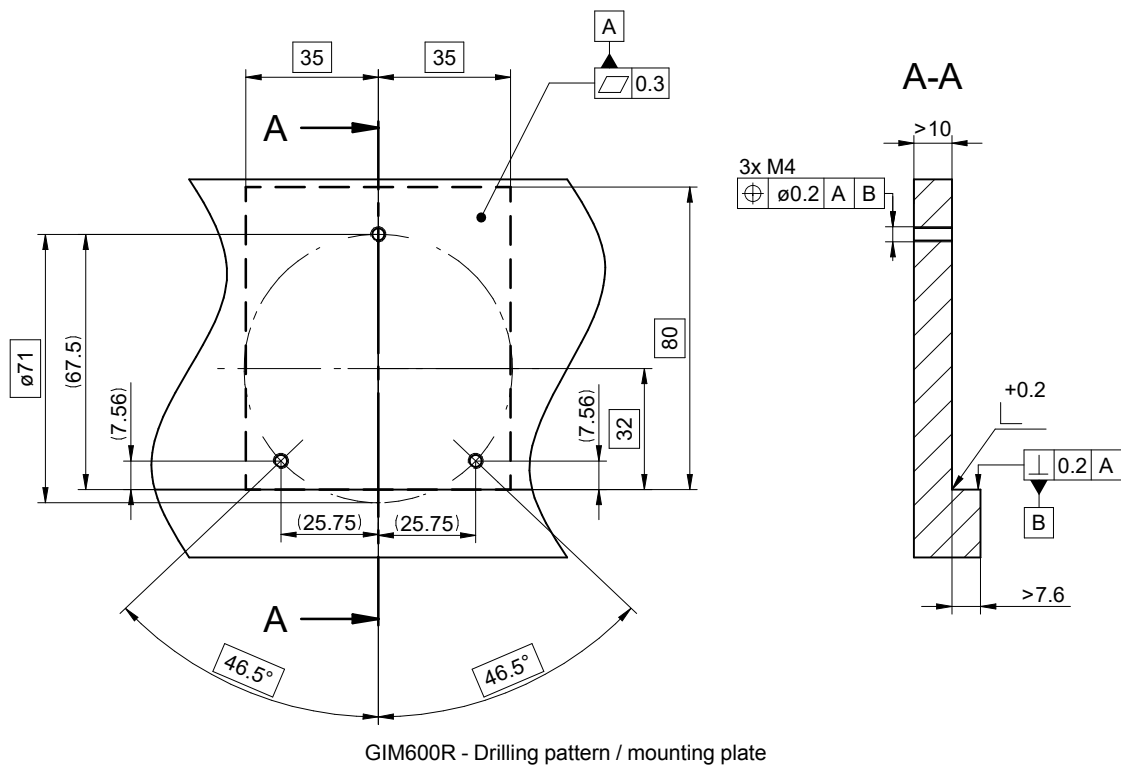
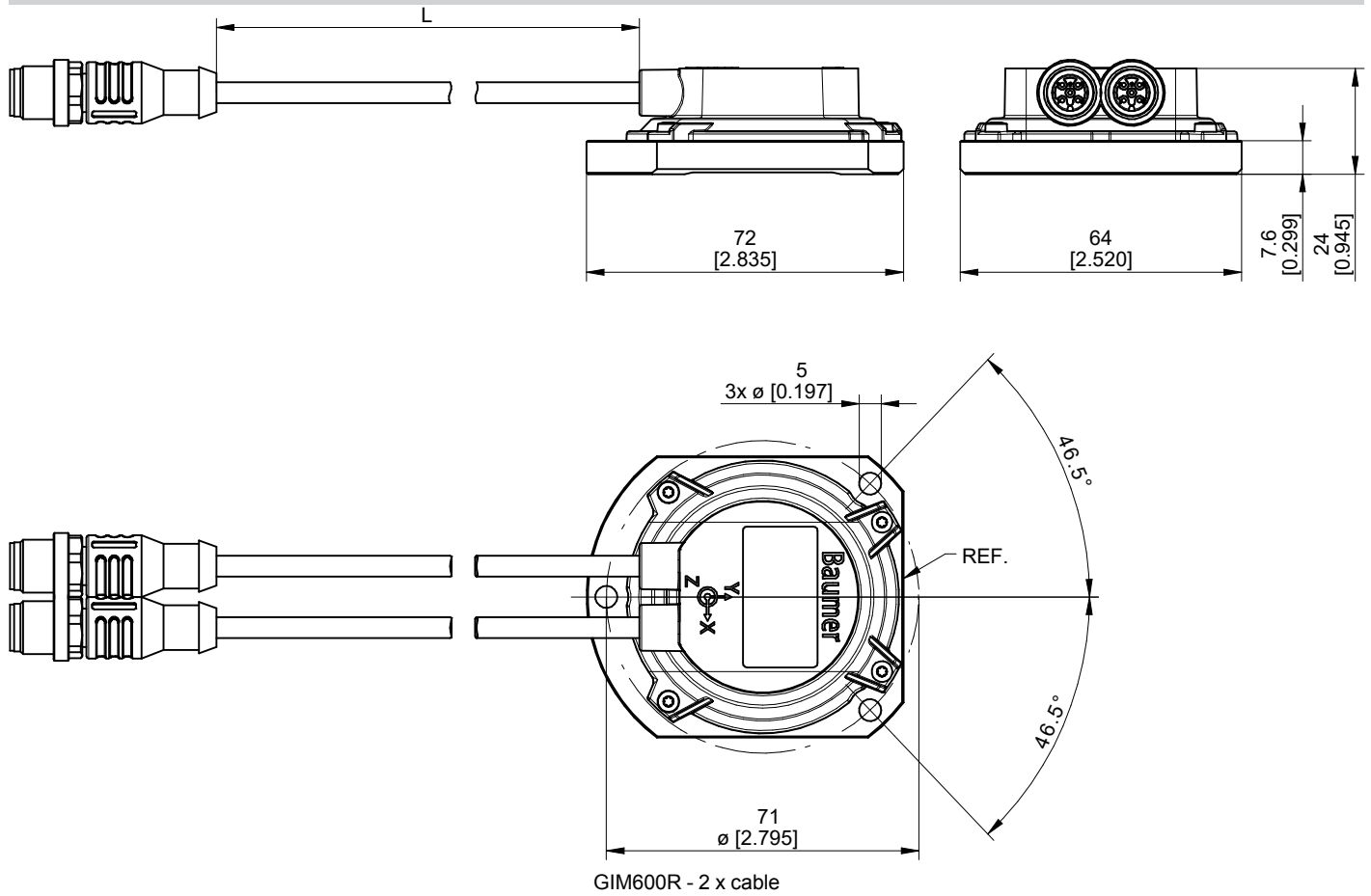
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Dimensions



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Ordering reference

	GIM600R	-	N	#	90	.	#	##	.	A	/
Product	GIM600R										
Housing	Plastic reinforced / base plate metal		N								
Number of axes	2-dimensional, housing horizontal			2							
	2-dimensional, housing vertical ⁽²⁾			V							
Measuring range	$\pm 90^\circ$				90						
Connection⁽¹⁾	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/out)									P	
	2x cable 0.3 m with M12, 5-pin, 2x male contacts (2x Bus-in)									R	
Voltage supply / interface	8...36 VDC / CANopen®										C6
	8...36 VDC / CANopen® (DS410) redundant (2-channel design)										C8
	8...36 VDC / SAE J1939										C9
	8...36 VDC / SAE J1939 redundant (2-channel design)										CR
Operating temperature	-40...+85 °C										A
Option	Without option										

(1) Other connection types on request

(2) On request