QG series

SIL2 / PLd Certified sensor

QG76N-SDXYh-090-CANS-C(F)M-UL-2d

Safety inclination sensor

2 axis horizontal mounting

Programmable device
Interface: CANopen Safety

SIL CL 2 (acc. to IEC 62061)
PLd (acc. to EN ISO 13849)

Measuring range
± 90°



General specifications 12980/12935, v20230412	
Housing	Stainless steel (AISI 316)
Dimensions (indicative)	70x60x33 mm
Mounting	Not Included: 4x M4x30 mm stainless steel (A4) Hexagon socket head screws
Ingress Protection (IEC 60529)	IP67, IP69K (with IP69K mating connector), (IP68 with optional cable gland)
Relative humidity	0 - 95% (non condensing, housing fully potted)
Weight	approx. 700 gram
Supply voltage	8 - 32 V dc SELV
Polarity protection	Yes
Current consumption	≤ 25 mA For CFM models (daisy-chained CANbus): max. current internal T-junction: 2.5A
Operating temperature	-40 .. +80 °C
Storage temperature	-40 .. +85 °C
Measuring range	± 90°
Centering function	Yes (CANout 0 = 0°), range: ±5°
Frequency response (-3dB)	0 - 10 Hz
Accuracy (overall @20°C)	0,15° typ.
Offset error	± 0,05° typ. (± 0,1° 2σ) after centering
Non linearity	± 0,1° typ., ± 0,15° 2σ, ± 0,2° max.
Sensitivity error	not applicable. Repeatability 0,1°
Resolution	0.05°
Temperature coefficient	± 0,02°/K typ.
Max mechanical shock	10.000g
CAN interface (physical layer)	According to ISO 11898-1 & ISO 11898-2 (CAN 2.0 A/B), Short circuit protected
CANopen application layer and communication profile	CANopen Safety protocol: EN 50325-5, CANopen protocol: EN 50325-4 (CiA 301 v4.0 and 4.2.0) CANopen device profile for inclinometers: CiA 410 version 2.0.0
Baud rate	125 kbit/s (default, range 10/20/50/100/125/250/500/800/1000 kbit/s)
Node ID	01h (default, range: 01h - 7Fh)
TPDO1 event time	50 ms (default, range 10-5000 ms)
Sync mode (TPDO's)	off (default, range on/off)
Heartbeat	off (default, range on/off)
Output format	Integer: -9000 to +9000 (SRDO:X=byte 2,1; Y=byte 4,3) (byte 5,6,7,8: integer 0)
SRDO1 COB-ID1	101h (default, range: FFh + 2x node ID -> 101h-17Fh)
SRDO1 COB-ID2	102h (default, range:100h + 2x node ID -> 102h-180h)
Safeguard cycle time (SCT)	80ms(default, worst case 100ms)
Safety related validation time (SRVT)	20ms
Filtering	Output filter disabled
Reaction on error	Emergency message 080h+Node-ID followed by NMT stop state (no CAN communication)
Boot time	< 1 s
Programming options	by CANopen object dictionary (CAN parameters, filtering)

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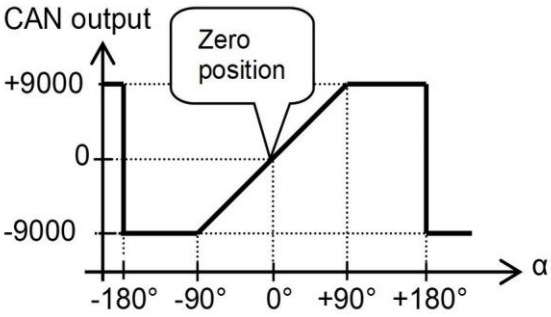
QG series

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CANoutput = 100*α

Clipping outside measuring range

Transfer characteristic

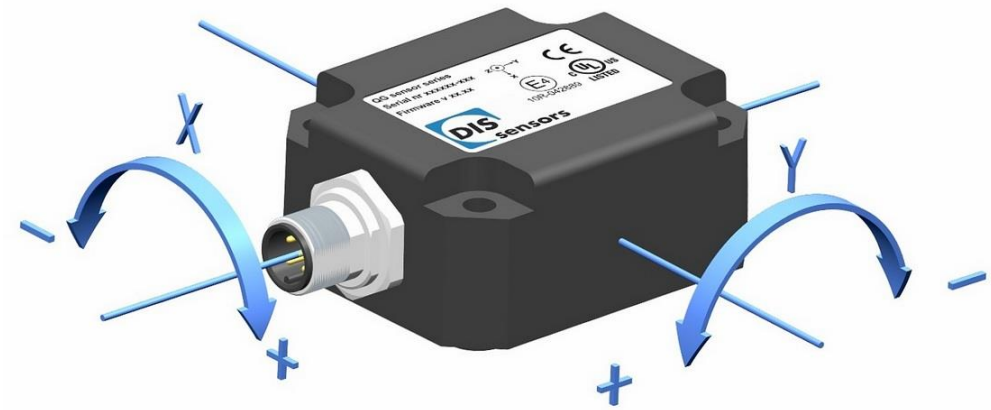


Default 0°: horizontal (label upwards), no acceleration applied. To eliminate mounting offsets the sensor can be centered within ±5° tilt (by the CAN object dictionary)

Cross tilt sensitivity error:
< (0,12 * cross tilt angle)² % typ.

→ one axis <10° tilt for max. accuracy
→ only one axis may exceed 45° tilt

Measurement orientation



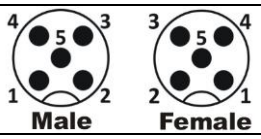
Connection

Connectivity (cable length ±10%)

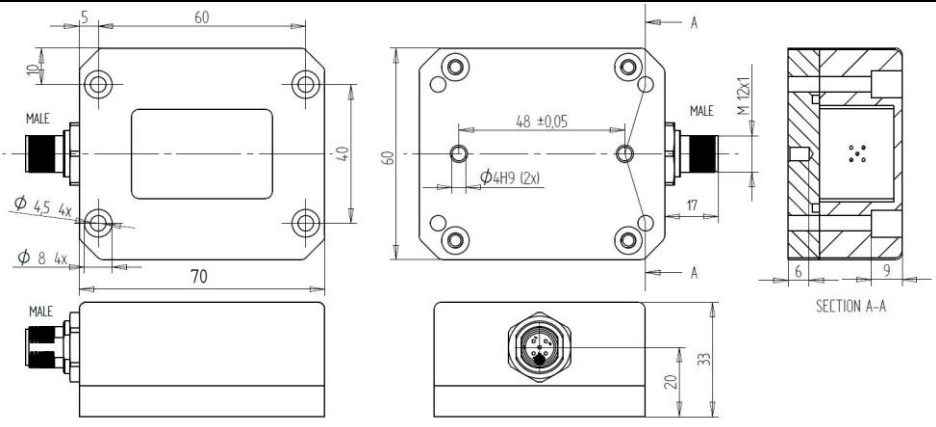
Male only or Male & Female (internal T-junction) M12 connector (5 pins, A-coding)
(CiA303 V1.8.0) (stainless steel 1.4404 (316L), contacts copper alloy)
No bus termination inside. A CANbus always has to be terminated properly. For bus termination order seperate M12 termination resistor (optional: T-connector)

Wire / pin coding

Pin 1:	Shield
Pin 2:	Vcc
Pin 3:	Gnd & CAN_GND
Pin 4:	CAN_H
Pin 5:	CAN_L



Mechanical dimensions (indicative only)



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CAN-manual, EDS-file, UL, Safety information, Ordering codes

A CANopen-safety manual, EDS-files (CiA306 V1.3.0) and a Declaration of Conformity are available on www.dis-sensors.com/downloads

Safety information:
- this datasheet + relevant manual must be read and understood before using this safety device
- certified level: SIL CL 2 (acc. to IEC 62061), PLd (acc. to EN ISO 13849)
- EC type examination by DEKRA testing and Certification GmbH Certificate no. 4821024.21001
- Hardware architecture: HFT=1 (according IEC 62061, CAT.3 (according to EN ISO 13849)
- Standard (-40°C to +45°C): MTTFd: 447 year, DC: 93%, CCF: 70 pt, SFF: 98%, PFHd: 14E-09
- High Temp. (up to +85 °C): MTTFd: 73 year, DC: 93%, CCF: 70 pt, SFF: 98%, PFHd: 91E-09
- only a SELV power supply should be used
- Redundancy Compare Time (error if this time is expired): customer adjustable (default 2000ms)
- Redundancy Compare Angle (error if angle-difference > this value): customer adjustable (default 3°)
- Redundancy error: Redundancy Compare Angle & Redundancy Compare Time exceeded
- Error: any detected error or a redundancy error
- Safety Related Fault Respons Time (SRFRT): 100ms + Redundancy Compare Time (default 2000ms)

QG series sensors are intended to measure inclination/acceleration/tilt. Flawless function (acc. spec.) is ensured only when used within specifications. Modifications or non-approved use will result in loss of warranty and void any claims against the manufacturer.

UL & c-UL listed product (File number E312057, UL508 standards UL60947-5-2 & CSA-C22,2 No. 14)
Product Identity / Category Code Number (CCN): Industrial Control Equipment / NRKH & NRKH7
Enclosure rating: type 1, Ambient temperature: max 80 °C (see also datasheet, lowest value applies)
Electrical ratings: Intended to be used with a Class 2 power source in accordance with UL1310,
max. input Voltage 32V dc (see also datasheet, lowest value applies), max. current 200mA
Accessory Cable Assembly: Any UL-listed (CYJV/7) mating connector with mechanical locking, wire thickness of at least 30 AWG (0,05 mm²), recommended ≤23 AWG (≥0,25 mm²)

As this device is accelerometer-based the sensor is inherent sensitive for accelerations/vibrations. Application specific testing must be carried out to check whether this sensor will fulfil your requirements.
Ordering codes:
M12 Male: QG76N-SDXYh-090-CANS-CM-UL-2d, [12980]
M12 Male & Female: QG76N-SDXYh-090-CANS-CFM-UL-2d [12935]

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