



The GSH-A is a **compact** and **robust draw wire sensor** designed for combined **linear position** and **single axis tilt angle** measurement in mobile machines.

Its optimized mechanical design allows **easy integration** even in space-constrained installations.

Based on **non-contact Hall-effect technology** for the **linear position** detection and on **MEMS technology** for the tilt measurement, it ensures **stable measurement** performance, **high repeatability** and long-term reliability without wear of the sensing element.

With **linear position** measurement **ranges up to 8300 mm** and **360° tilt angle detection**, it is suitable for applications such as stabilizers, telescopic booms, lifting systems and articulated machine structures.

The sensor is engineered to withstand **harsh operating conditions**, including **shock**, **vibration** and **demanding EMC** environments typical of **off-highway equipment**.

Multiple output options are available, including **CANopen** and **CANopen Safety** interfaces, enabling **flexible system integration**.

PLd/SIL2 certified variants are available, designed according to Category 2 and HFT = 0 (Category 3 and HFT = 1 for electronic subsystem) in compliance with **EN ISO 13849-1** and **EN IEC 62061** (See information for use for further details).

Detailed installation instructions, safety related informations and CAN communications details are provided in the detailed user documentation.

TECHNICAL SPECIFICATIONS

Measurement range (FS)

Linear position: 1800 mm, 2300 mm, 3300 mm, 4300 mm, 4800 mm, 5300 mm, 6300 mm, 7300 mm, 8000 mm, 8300 mm; Tilt angle: 360 deg

Supply voltage (Us)

8...32 V DC (overvoltage 36 V DC continuous)

Supply current

< 50 mA (terminated CAN-bus line)

Reverse polarity protection

Yes

Short circuit protection

Yes

Output signal

Digital output: CANopen; CANopen Safety

Load conditions

Internal 120 Ω terminating resistor not included

Power-on start-up time

< 1s

Response time

Linear position: Typ. 200 ms; Tilt angle: Typ. 500 ms

Electrical connections

M12 connector; Electrical cable

Resolution

Linear position: 14 bit; Tilt angle: 0.1 deg

Linearity factory verification@ 25 °C

Linear position: < $\pm 0.5\%$ FS

Tilt angle: < $\pm 0.5^\circ$

Repeatability

Linear position:

Typ. $\pm 0.15\%$ FS (for strokes 1800...6300 mm)

Typ. $\pm 0.5\%$ FS (for strokes 7300...8300 mm)

Accuracy

Linear position: < $\pm 1.1\%$ FS (-40...+85 °C)

Inclinometer temperature drift

< $\pm 0.015^\circ$ /°C

Working temperature

-40...+85 °C

Sinusoidal vibrations

20g, 10-2000 Hz, 3 axes (IEC 60068-2-6)

Mechanical shock

50g, 11 ms, 3 axes (IEC 60068-2-27)

Electromagnetic compatibility

2014/30/EU Electromagnetic Compatibility

(EMC)

Reference standards: EN ISO 13766-1:2018; EN ISO 13766-2:2018

Safety

SIL 2 according to EN IEC 62061 and IEC/EN 61508; Performance Level d (PL d) according to EN ISO 13849-1 Category 2

Life cycles

500,000 cycles @ $v \leq 1$ m/s, $a \leq 0.5$ g

250,000 cycles @ $v \leq 2$ m/s, $a \leq 1$ g

(v = linear cable velocity; a = linear cable acceleration)

Measuring cable pull-in/out force

> 4 N at start of stroke (retracted)

> 8 N at end of stroke (extended)

Measuring cable speed/acceleration

Max. 2 m/s @ 1g, Typ. 1m/s @ 0.5g

IP Protection level

IP67, IP69k (with mating connector)

Material

Housing: PBT

Measuring cable: AISI316 stainless steel, $\varnothing$ 0.85 mm nylon coating

Measuring cable break load

Typ. 300 N

Drum circumference

248 mm

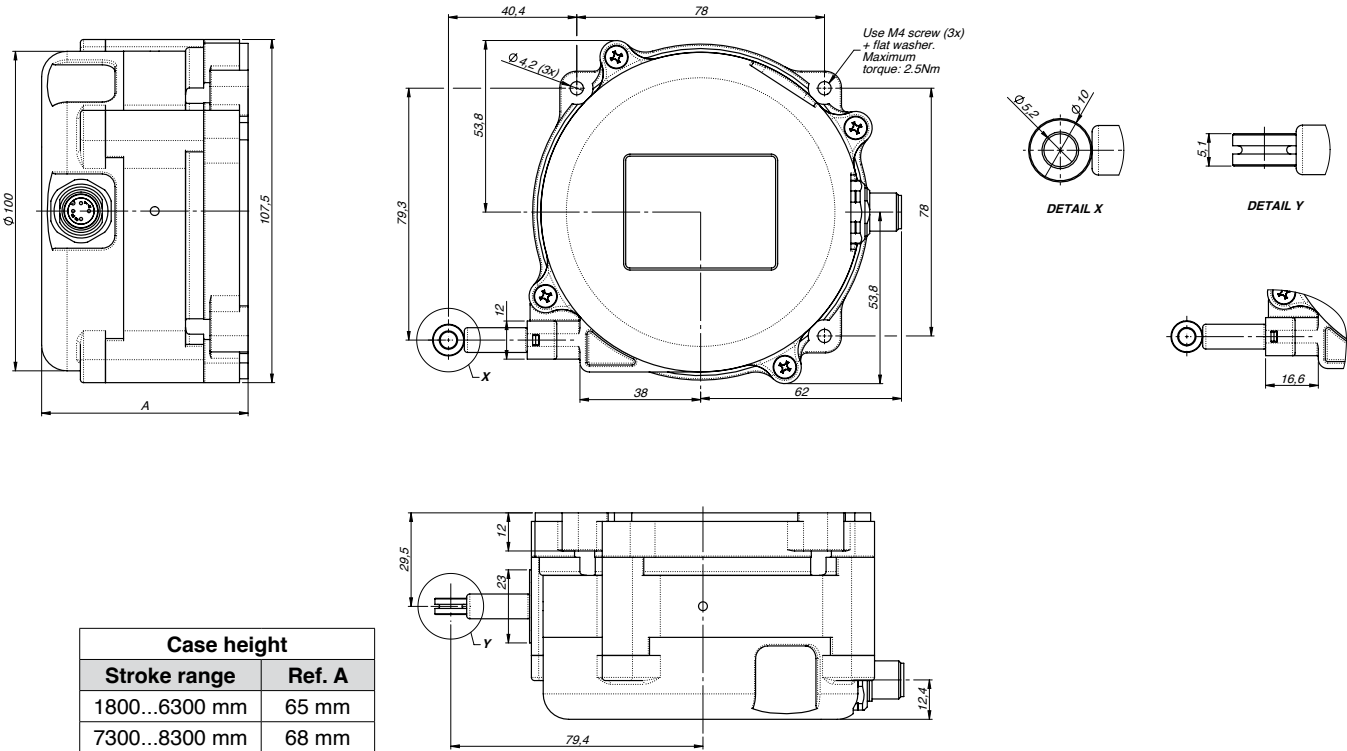
Weight

< 0.8 kg

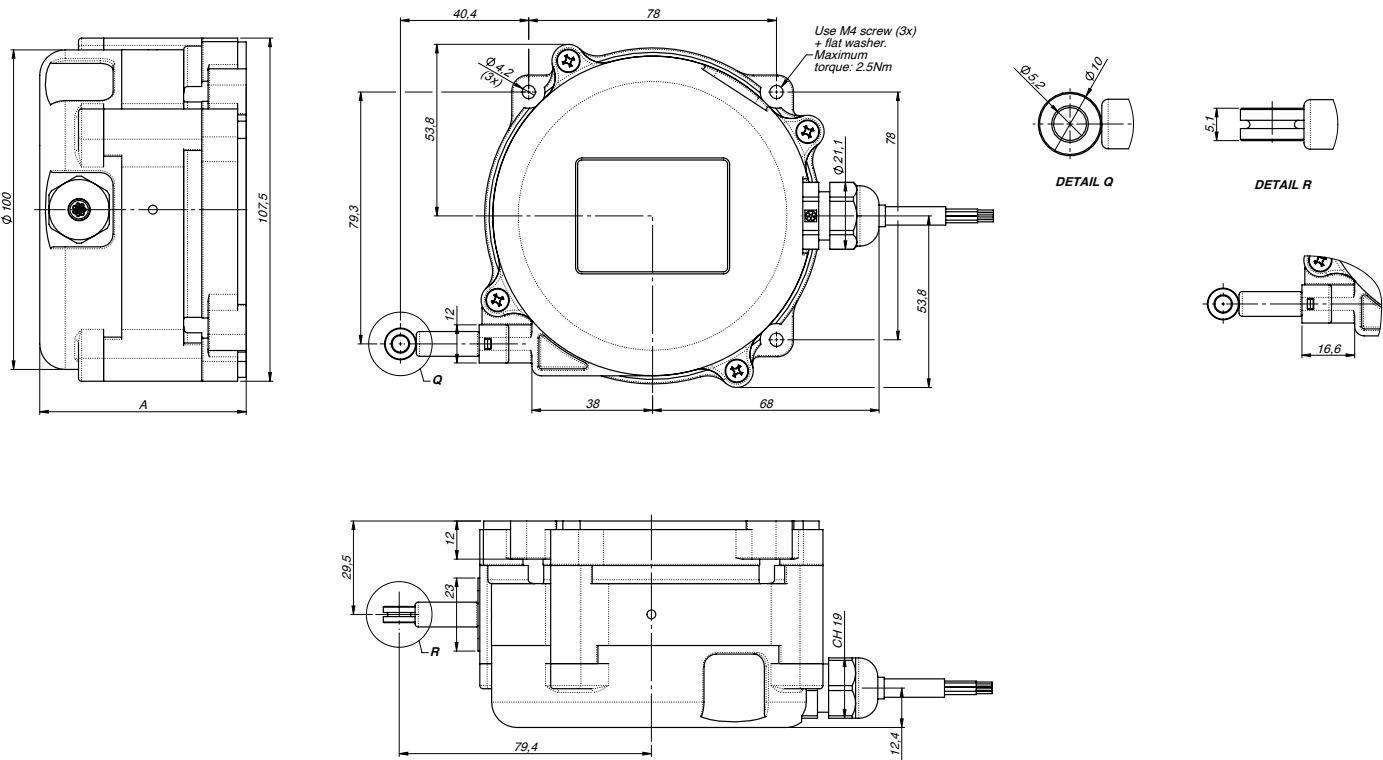
MECHANICAL DIMENSIONS

All dimensions are in mm. Decimal separator in drawings is comma.

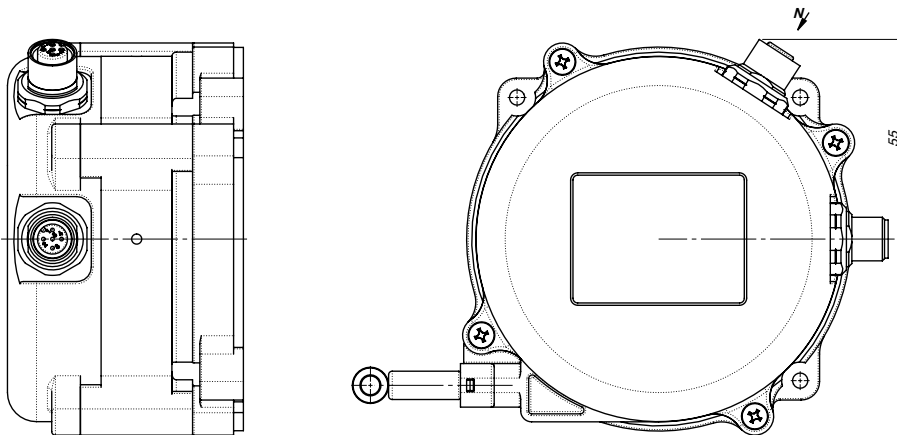
M12 1x Version



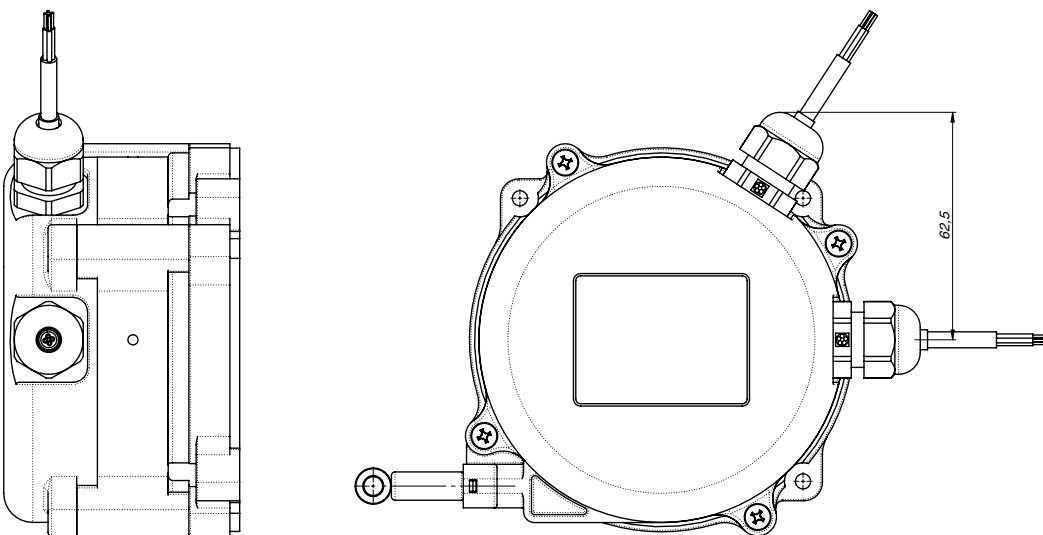
Cable Version



IN-OUT - M12 5P VERSION - CANopen



IN-OUT - CABLE VERSION - CANopen

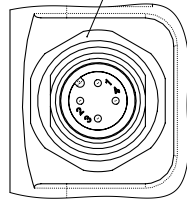


All dimensions are in mm. Decimal separator in drawings is comma.

ELECTRICAL CONNECTIONS - M12 VERSION

1xM12 4 poles connectorM-1

M12x1 4-pin male connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. V+

2. 0V

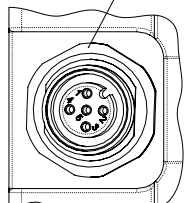
3. CAN_H

4. CAN_L

IN-OUT with M12 5 poles connectorP-3

(CAN pin 1 0V)

M12x1 5-pin female connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. 0V

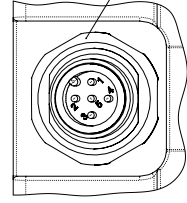
2. V+

3. 0V

4. CAN_H

5. CAN_L

M12x1 5-pin male connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. 0V

2. V+

3. 0V

4. CAN_H

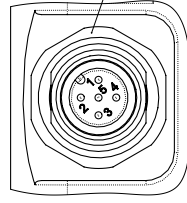
5. CAN_L

VIEW FROM N

1xM12 5 poles connectorP-1

(CAN pin 1 0V)

M12x1 5-pin male connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. 0V

2. V+

3. 0V

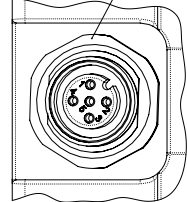
4. CAN_H

5. CAN_L

IN-OUT with M12 5 poles connectorN-3

(CAN pin 1 FLOATING)

M12x1 5-pin female connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. FLOATING

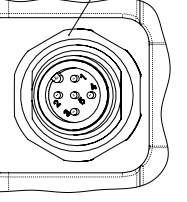
2. V+

3. 0V

4. CAN_H

5. CAN_L

M12x1 5-pin male connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. FLOATING

2. V+

3. 0V

4. CAN_H

5. CAN_L

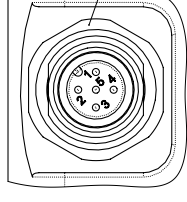
VIEW FROM N

The male and female M12 connectors are internally wired in pass-through configuration. Corresponding pins, including Pin 1 (floating), are directly connected between connectors.

1xM12 5 poles connectorN-1

(CAN pin 1 FLOATING)

M12x1 5-pin male connector



DIGITAL OUTPUT CONNECTOR PINOUT

1. N.C.

2. V+

3. 0V

4. CAN_H

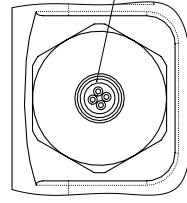
5. CAN_L

PINS MARKED "N.C." MUST NOT BE CONNECTED

ELECTRICAL CONNECTION - CABLE VERSION

IN-OUT with cable connectionF-0F-3

IEC 60228 Cable
4 pole 0.34mm2
PUR OD 4.4mm



DIGITAL OUTPUT CONNECTOR PINOUT

RED1. V+

BLACK2. 0V

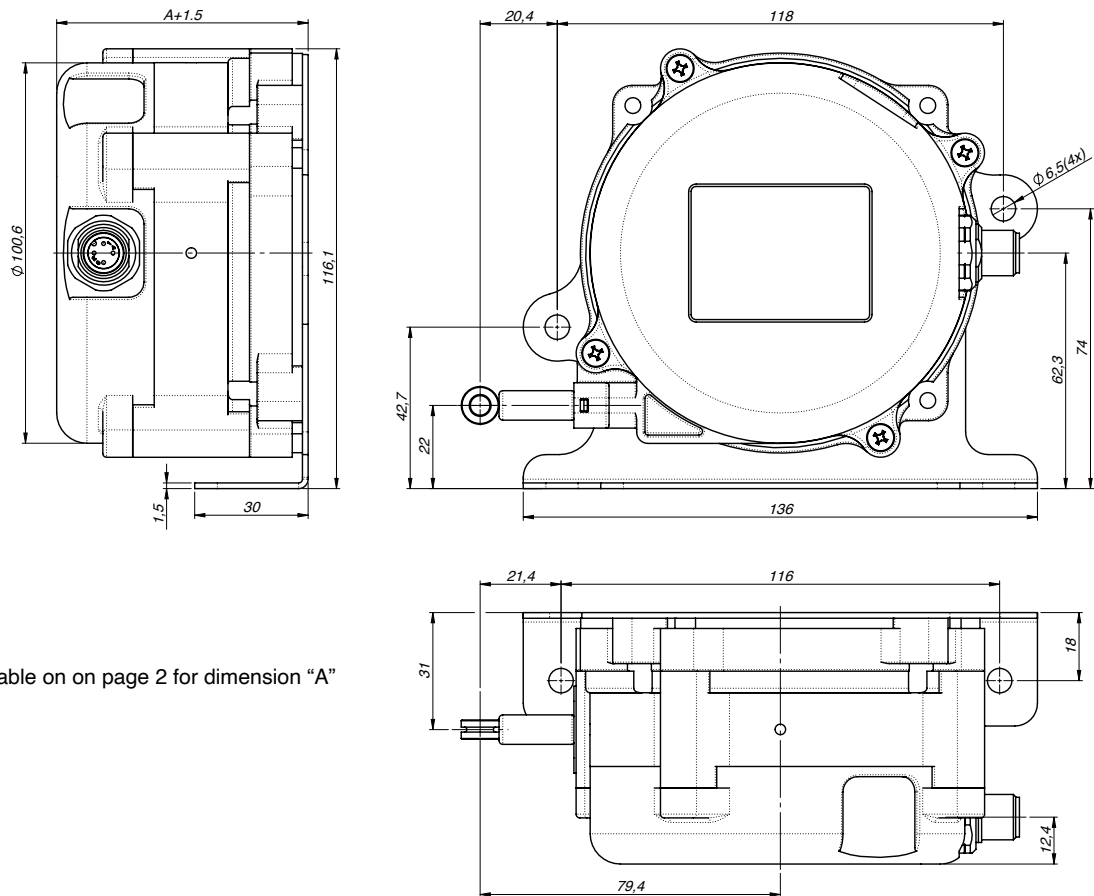
BLUE3. CAN_H

WHITE4. CAN_L

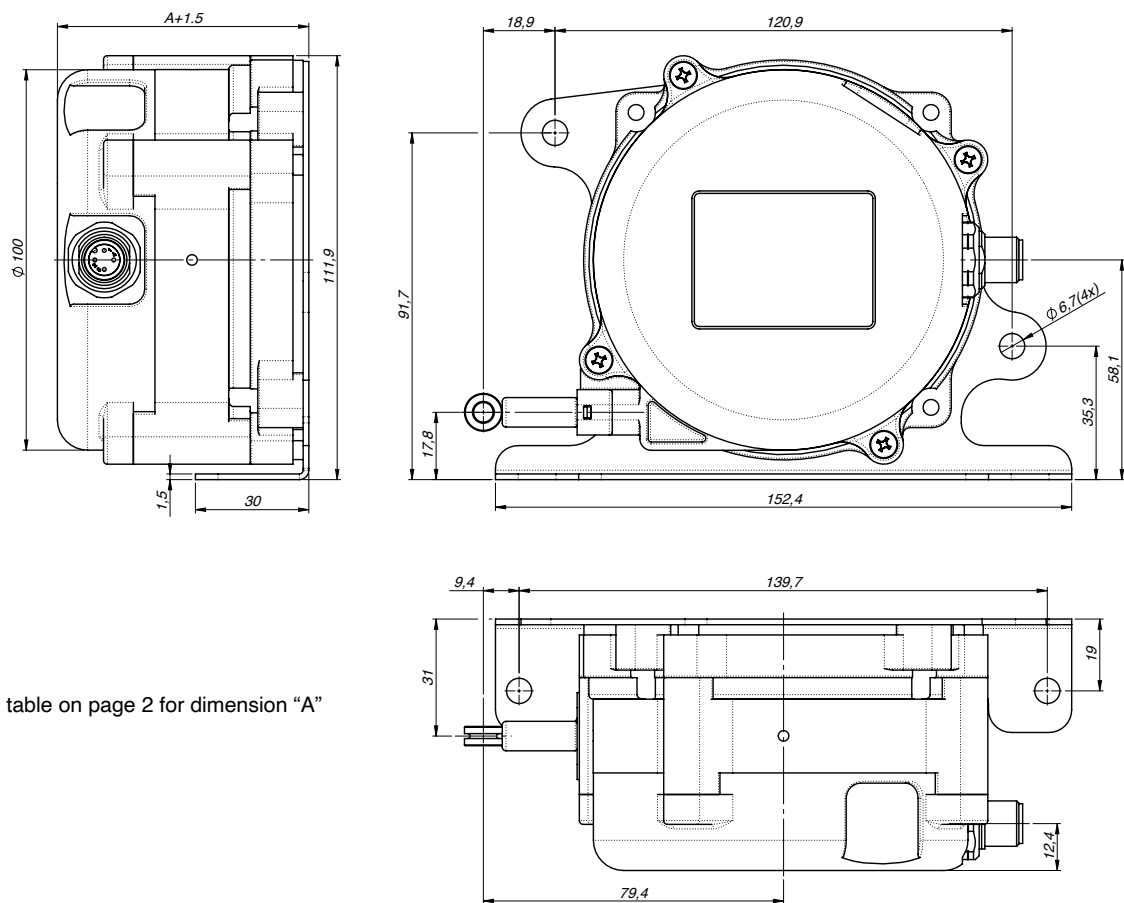
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ACCESSORIES

FIXING FLANGE MODEL A - FLA033 (optional accessory to order)



FIXING FLANGE MODEL B - FLA034 (optional accessory to order)



All dimensions are in mm. Decimal separator in drawings is comma.

ORDERING CODE

GSH A M 1 H 1800 S C3 - XXX 0 000 X 00

TRANSDUCER TYPE

Wire linear position sensor with tilt angle measurement

A

ELECTRICAL CONNECTIONS

M12 4P connector

M

M12 5P connector

(CAN pin 1 FLOATING)

N

M12 5P connector (CAN pin 1 0V)

P

Cable

F

CONNECTOR OPTIONS

Cable output

0

1 connector

1

1 Male & 1 Female connectors* or 2 cables**

3

*Only for electrical connections: "N", "P"

**Only for electrical connection: "F"

MEASUREMENT RANGE

1800 mm

1800

2300 mm

2300

3300 mm

3300

4300 mm

4300

4800 mm

4800

5300 mm

5300

6300 mm

6300

7300 mm

7300

8000 mm

8000

8300 mm

8300

ARCHITECTURE

Standard

H

PLd/SIL2

S

OUTPUT SIGNAL

CANopen

C1

CANopen Safety *

C3

*Available only with architecture "S"

Special execution

XXX

CABLE LENGTH

00 No cable

01 100 mm

02 200 mm

05 500 mm

10 1 m

20 2 m

30 3 m

40 4 m

50 5 m

A0 10 m

... Other lengths on request

ACCESSORIES

X No accessories

A Fixing flange model A (FLA033)

B Fixing flange model B (FLA034)

C 4-pin female mating connector M12x1; IP67-rated (CON293)

D 8-pin female mating connector M12x1; IP67-rated (CON469)

E 5-pin female mating connector M12x1; IP67-rated (CON031)

F Protective cap kit for M12x1 female connector (PKIT811)

G Protective cap kit for M12x1 male connector (PKIT812)

H 4-pin female connector, 90°, M12x1; IP67-rated (CON050)

I 5-pin female connector, 90°, M12x1; IP67-rated (CON041)

000 Special configuration

LINEARITY REPORT

0 Individual linearity report not included

EXAMPLE OF DESCRIPTION:

GSH A N 1 H 8300 S C3 0 000 X 00

GSHA - M12 5P (CAN pin 1 FLOATING) connector - 1 male connector - 8300 mm-PLd/SIL2 certified architecture - CANopen Safety output - individual linearity report not included - no special special execution - no accessories

GEFRAN spa reserves the right to make any kind of design or functional modification at any moment without prior notice.

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