



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 12500 mm** and **360° tilt angle detection**, it is suitable for applications such as stabilizers, telescopic booms, lifting systems and articulated machine structures.

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: 10000 mm, 12500 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: < $\pm 1\%$ FS

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

Repeatability

Linear position: Typ. $\pm 0.5\%$ FS

Accuracy

Linear position: < $\pm 1.4\%$ FS (-40...+85 °C)

Inclinometer temperature drift

< $\pm 0.015^\circ/\text{C}$

Working temperature

-40...+85 °C

Sinusoidal vibrations

15g, 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

50,000 cycles @ $v \leq 2 \text{ m/s}$, $a \leq 1 \text{ g}$

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

Measuring cable pull-in/out force

> 7 N at start of stroke (retracted); > 13 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, $\varnothing 0.85 \text{ mm}$ nylon coating

Measuring cable break load

Typ. 300 N

Drum circumference

308 mm

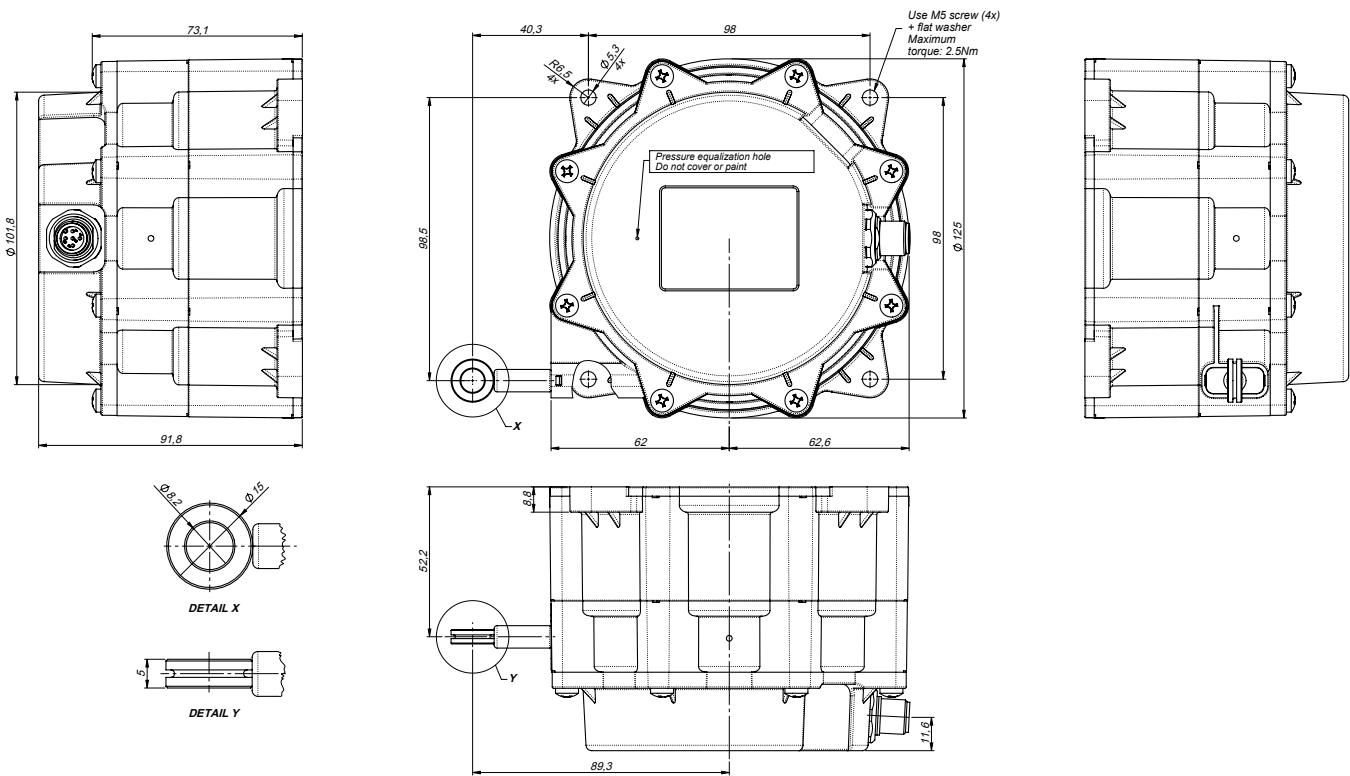
Weight

< 1.5 kg

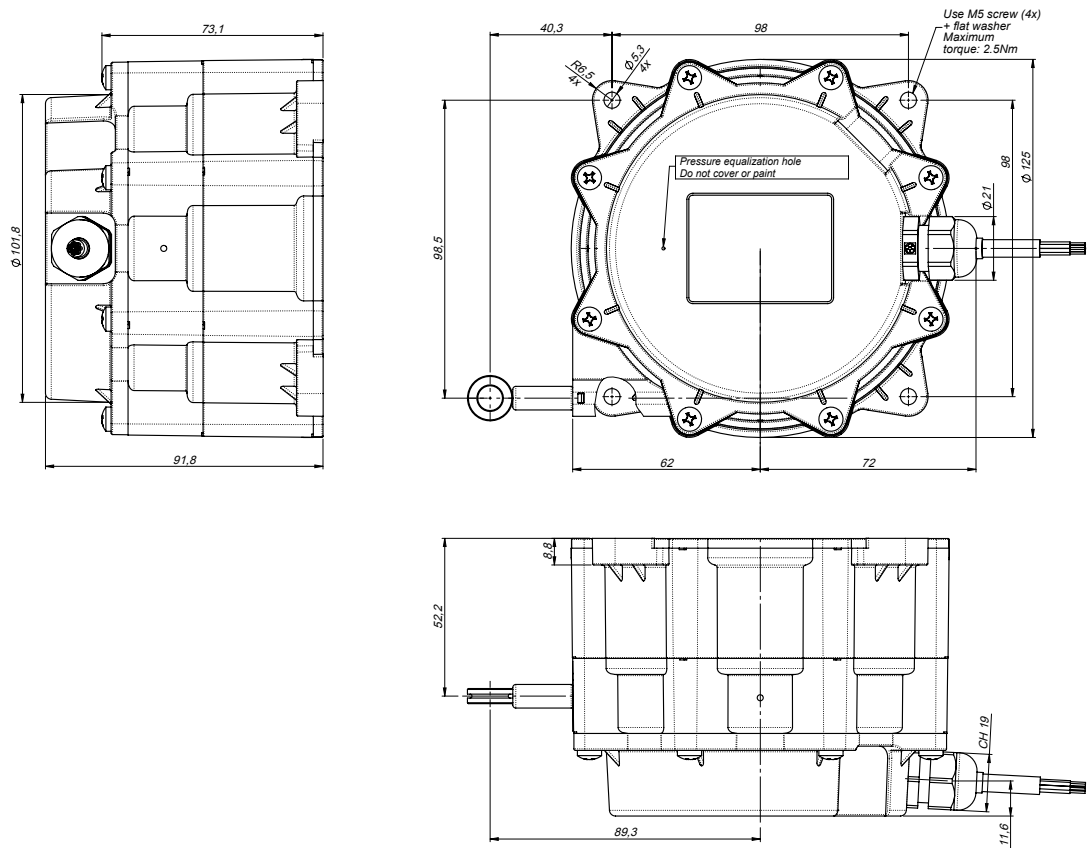
MECHANICAL DIMENSIONS

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

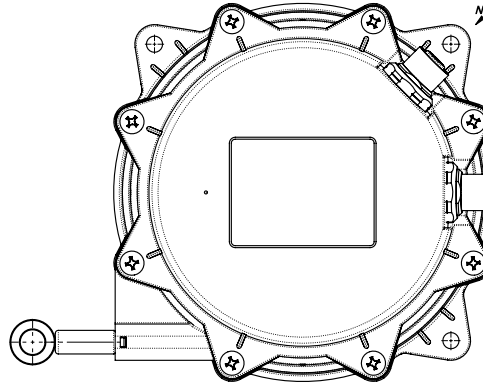
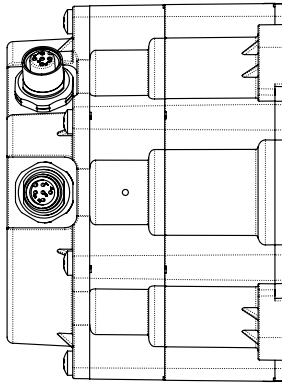
M12 1x Version



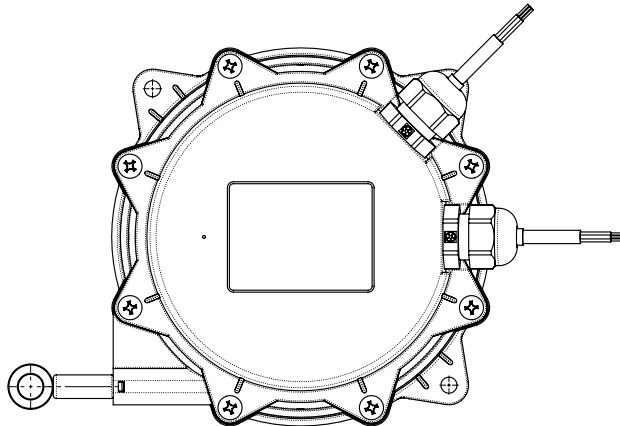
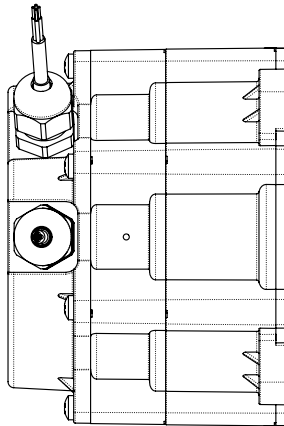
Cable Version



IN-OUT - M12 5P VERSION - CANopen



IN-OUT - CABLE VERSION - CANopen

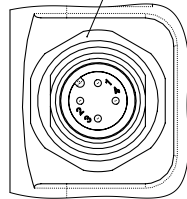


All dimensions are in mm. Decimal separator in drawings is comma.

ELECTRICAL CONNECTIONS - M12 VERSION

1xM12 4 poles connector M-1

M12x1 4-pin male connector

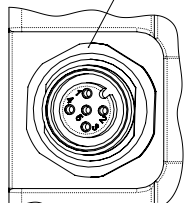


DIGITAL OUTPUT CONNECTOR PINOUT

- 1. V+
- 2. 0V
- 3. CAN_H
- 4. CAN_L

IN-OUT with M12 5 poles connector P-3
(CAN pin 1 0V)

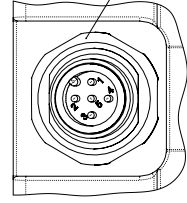
M12x1 5-pin female connector



DIGITAL OUTPUT CONNECTOR PINOUT

- 1. 0V
- 2. V+
- 3. 0V
- 4. CAN_H
- 5. CAN_L

M12x1 5-pin male connector



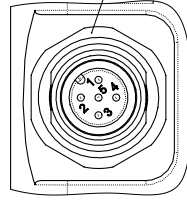
DIGITAL OUTPUT CONNECTOR PINOUT

- 1. 0V
- 2. V+
- 3. 0V
- 4. CAN_H
- 5. CAN_L

VIEW FROM N

1xM12 5 poles connector P-1
(CAN pin 1 0V)

M12x1 5-pin male connector

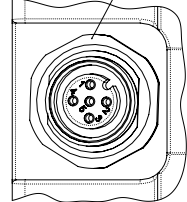


DIGITAL OUTPUT CONNECTOR PINOUT

- 1. 0V
- 2. V+
- 3. 0V
- 4. CAN_H
- 5. CAN_L

IN-OUT with M12 5 poles connector N-3
(CAN pin 1 FLOATING)

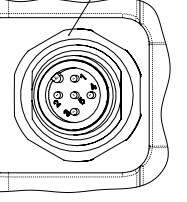
M12x1 5-pin female connector



DIGITAL OUTPUT CONNECTOR PINOUT

- 1. FLOATING
- 2. V+
- 3. 0V
- 4. CAN_H
- 5. CAN_L

M12x1 5-pin male connector



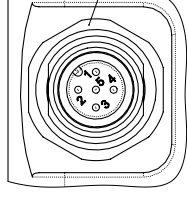
DIGITAL OUTPUT CONNECTOR PINOUT

- 1. FLOATING
- 2. V+
- 3. 0V
- 4. CAN_H
- 5. CAN_L

VIEW FROM N

1xM12 5 poles connector N-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

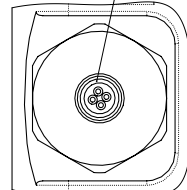
The male and female M12 connectors are internally wired in pass-through configuration. Corresponding pins, including Pin 1 (floating), are directly connected between connectors.

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

ELECTRICAL CONNECTION - CABLE VERSION

IN-OUT with cable connection F-0
F-3

IEC 60228 Cable
4 pole 0.34mm²
PUR OD 4.4mm



DIGITAL OUTPUT CONNECTOR PINOUT

- RED 1. V+
- BLACK 2. 0V
- BLUE 3. CAN_H
- WHITE 4. CAN_L

ORDERING CODE

GSH A M 1 H 100C 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

10000 mm	100C
12500 mm	125C

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	10m
....	Other lengths on request

ACCESSORIES

X	No accessories
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 100C S C3 0 000 X 00

GSHA - M12 5P (CAN pin 1 FLOATING) connector - 1 male connector - 10'000 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.