



Inclinometer HIT 1500

MEMS Technology

Motion compensated

Increased Functional Safety
CANopen Safety



Description:

In many applications, the measurement of the angle of inclination is required in order to ensure safe machine functions and to control processes.

HIT 1500 was developed in particular for the special use in dynamic system.

In the version for use in applications with enhanced functional safety, the data can be transmitted via the CANopen Safety protocol.

The inclinometers are particularly suited for application in safety circuits according Functional Safety in Machines and Systems up to SIL 2 (IEC 61508) or PL d depending on the version category 2 or 3 (ISO 13849), respectively.

By using both an accelerometer and an additional gyroscope based on MEMS technology (Micro-Electro-Mechanical System), two measured variables which are entirely independent from one another from the physical point of view are detected by the HIT 1500 and combined by the device.

A motion compensation is performed hence the contouring error, which occurs in damped or low-pass filtered systems, is avoided.

Thus, the HIT 1500 provides excellent dynamic characteristics and is therefore particularly suited for the active orientation, stabilisation and control of the inclination of mobile machines such as boom lifts and work platforms, cranes and mobile cranes, construction and drilling systems, agricultural, and municipal machines, etc.

Especially for the use in public traffic vehicles, HIT 1500 is approved for road vehicles according to ECE type approval.

Technical data:

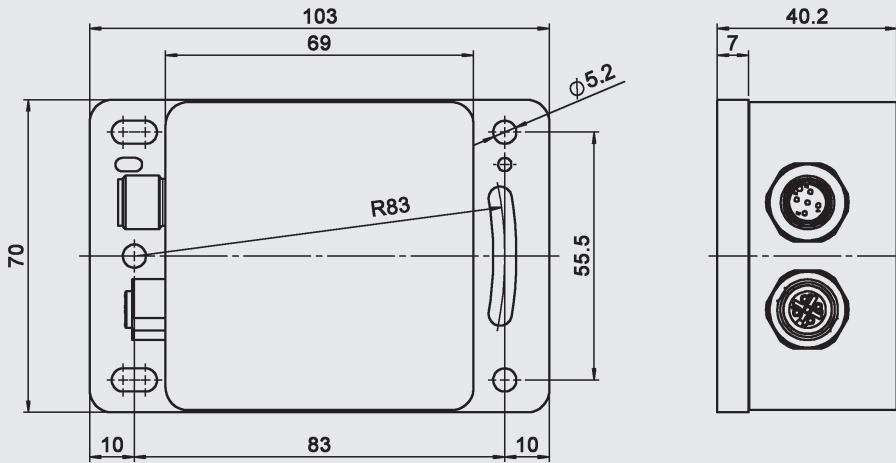
Input data	
Inclination	
Axes	1/ 2
Measuring range ("slope long")	$\pm 15^\circ / \pm 60^\circ / \pm 120^\circ / \pm 180^\circ$
Measuring range ("slope lateral")	$\pm 15^\circ / \pm 60^\circ / \pm 90^\circ$
Resolution	0.01 °
Dynamics	30 .. 50 Hz (-3 dB)
Update rate	200 Hz
Accuracy (static RMS)	< 0.1 ° over the entire measuring range
Temperature coefficient	Active temperature control, warm-up phase depending on ambient temperature ¹⁾
Acceleration	
Axes	3
Measurement range	± 3 g in 3 axes
Resolution	0.01 m/s ²
Cutoff frequency	30 .. 50 Hz
Gyro	
Axes	3
Measurement range	± 250 °/s in 3 axes
Resolution	0.2 mrad/s
Cutoff frequency	30 .. 50 Hz
Output data	
Output signal	CANopen Safety
Environmental conditions	
Compensated temperature range	-20 .. +60 °C
Operating temperature range	-40 .. +85 °C
Storage temperature range	-40 .. +85 °C
CE mark	EN 61000-6-1 / 2 / 3 / 4 (see Declaration of Conformity)
Vibration resistance acc. to DIN EN 60068-2-6 at 10 .. 500 Hz	5 g (criteria B)
Shock resistance acc. to DIN EN 60068-2-27	20 g, 11 ms half sine (criterion B) 50 g, 6 ms half sine (criterion B)
Protection class ²⁾ acc. to DIN EN 60529 ISO 20653	IP66, IP67, IP69 IP6K9K
Protocol data for CANopen Safety	
Communication profile	CiA DS 301 V4.2
NMT-Services	CiA DSP 302 V4.1
Layer setting services and protocol	CiA DSP 305 V2.2
Device profile	CiA DS 410 V1.3
CANopen Safety	CiA DS 410 V1.0
Baud rates	10 kbit .. 1 Mbit acc. to. CiA DS 305 V2.2
Transmission services - SRDO (inclination) / PDO - Transfer	Measured value as 16 bit value, status synchronous, asynchronous, cyclical
Node ID / baud rate Default setting	Can be set via Manufacturer Specific Profile & LSS 250 kbps / Node ID 1
Safety-relevant data	
Performance Level	
Based on PL	DIN EN ISO 13849-1:2015
PL	PL = d
Architecture	Cat 2 or Cat 3
Safety Integrity Level	
Based on SIL	DIN EN 61508:2010
SIL	2
Architecture	1oo1 / 1oo2
Other data	
Supply voltage	9 .. 36 V DC
Residual ripple supply voltage	< 5 %
Power consumption	< 5 W
Housing material	Aluminium, anodized
Weight	~ 400 g

Note: Reverse polarity protection of the supply voltage and overvoltage protection are provided.

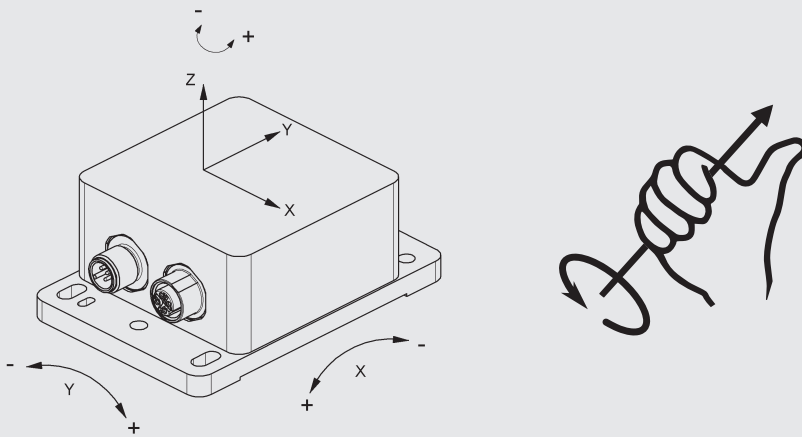
¹⁾ e.g. approx. 40 s at 20 °C, < 2 min at 0 °C

²⁾ With mounted mating connector in corresponding protection class

Dimensions:

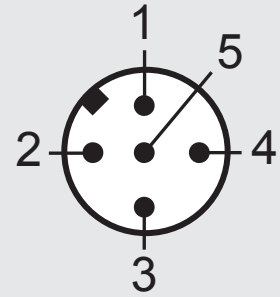


Coordinate system and direction of rotation:

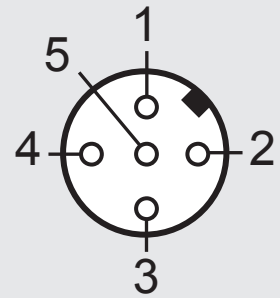


Pin connections:

Male M12x1, 5 pole



Female M12x1, 5 pole



Pin	Signal	Description
1	CAN_SHLD	CAN shield
2	CAN_V+	CAN external positive supply
3	CAN_GND	Ground / 0 V / V-
4	CAN_H	CAN_H bus line (dominant high)
5	CAN_L	CAN_L bus line (dominant low)

Model code:

HIT 1508 - F13 - X - XXX - X - XX - X - S2PD - X - 000

Motion compensation

5 = included

Electrical connection

8 = male M12x1, 5 pole

Output signal

F13 = CANopen Safety

Primary inclination axis (slope long)

X / Y / Z

Measuring range rotation about primary axis in °¹⁾

015; 060; 120; 180

Secondary inclination axis (slope lateral)

X / Y / Z / 0 (0 = not available)

Measuring range rotation about secondary axis in °¹⁾

15; 60; 90; 00 (00 = axis not available)

Additional CAN socket

0 = none

1 = female M12x1, 5 pole

Functional safety

S2PD = SIL2 acc. to IEC 61508 and PLd acc. to DIN EN 13849-1

Design architecture

2 = category 2 acc. to DIN EN 13849-1

3 = category 3 acc. to DIN EN 13849-1

Modification number

000 = standard

Note:

¹⁾ Other measuring ranges on request

Note:

The information in this brochure relates to the operating conditions and applications described.

For applications or operating conditions not described, please contact the relevant technical department.

Subject to technical modifications.

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