



Inclinometer

HIT 1500

CAN interface

MEMS Technology

Motion compensated

Accuracy: 0.1° typ.

CANopen®
SAE J1939

CE

E13

Features

- Motion compensated inclination measurement via sensor fusion
- High signal dynamics
- High degree of accuracy
- Temperature compensation
- Diverse signal output
 - Inclination static
 - Motion compensated inclination
 - Acceleration in 3 axes
 - Rotation rate in 3 axes
- E13 approved for road vehicles

Description

In many applications, inclination angles have to be measured to ensure the function of machines and systems and to control processes.

The HIT 1500 measuring systems are single or double axis measuring systems for the detection of the inclination with regards to their horizontal plane. The HIT 1500 family has been especially developed for the detection of the inclination inside of dynamic systems.

The inclination signal is calculated in quasi-static condition, based on a 3 axis acceleration sensor using MEMS technology (Micro-Electro-Mechanical System).

An additional gyroscope is provided for the calculation of the inclination in the dynamic system. A motion compensated inclination signal is calculated by fusing the two physically independent signals of acceleration and gyro.

In addition to the inclination signals, the acceleration and gyro values are also available in all 3 spatial axes. The application developer is provided with a higher degree of freedom which can be used for the optimisation of control processes in the machine control.

Application fields

All mobile working machines with requirements especially for dynamic position or inclination detection are used.

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

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

Sensors for applications with increased functional safety are also available on request.

Technical details

Input data inclination			
Axes		1/2	
Measuring range (primary axis; "longitudinal")		° ±180 (±15 / ±60 / ±120 available)	
Measuring range (secondary; "lateral")		° ±90 (±15 / ±60 available)	
Resolution		° 0.01	
Temperature coefficient (-20 to +60 °C)		°/10K < 0.03 typ. (RMS)	0.06 max.
Long term stability		°/1000h < 0.1 typ. (RMS)	0.15 max.
Static¹⁾	Dynamic performance	Hz 2 (-3 dB)	
	Accuracy	° < 0.1 typ. (RMS)	0.2 max.
	Repeatability	° < 0.05 typ. (RMS)	0.1 max.
Motion compensated	Dynamic performance	Hz 50 (-3 dB)	
	Update rate	Hz 200	
Input data acceleration (ACC)			
Axes		3	
Measurement range		m/s ² ±30 in 3 axes	
Resolution		m/s ² 0.01	
Cutoff frequency		Hz 50 (-3 dB)	
Accuracy		m/s ² < 0.02 typ. (RMS)	0.04 max.
Temperature coefficient (-20 to +60 °C)		(m/s ²)/10K < 0.005 typ. (RMS)	0.01 max.
Long-term stability		(m/s ²)/1000h < 0.01 typ. (RMS)	0.02 max.
Input data gyro (GYRO)			
Axes		3	
Measurement range		°/s ±250 in 3 axes	
Resolution		°/s 0.01	
Cutoff frequency		Hz 50 (-3 dB)	
Noise density (band width 100 Hz)		(°/s)/Hz ^{1/2} 0.03	
Accuracy		°/s < 0.4 typ. (RMS)	1.0 max.
Temperature coefficient (-20 to +60 °C)		(°/s)/10K < 0.03 typ. (RMS)	0.1 max.
Long term stability		(°/s)/1000h < 0.05 typ. (RMS)	0.2 max.
Output data			
Output signal		CANopen protocol or SAE J1939 protocol, depending on version	
Ambient conditions			
Compensated temperature range		°C -20 .. +60	
Operating temperature range		°C -40 .. +85	
Storage temperature range		°C -40 .. +85	
Operating altitude		mNN 0 .. 3000	
CE marked		EN 61000-6-1 / 2 / 3 / 4 (see Declaration of Conformity)	
UL marked ²⁾		UL Certificate number: E318391	
E marked		E13*10R00*10R05*14421*00	
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 (criteria B)	
Protection class ³⁾		acc. to DIN EN 60529 IP66, IP67, IP69 acc. to ISO 20653 IP6K9K	
Other data			
Supply voltage when applied acc. to UL specifications		V DC	9 .. 36 - limited energy - according to 9.4 UL 61010; Class 2; UL 1310/1585; LPS UL 60950
Residual ripple of supply voltage		%	< 5
Power consumption		W	< 1
Housing material		Aluminium, anodized	
Weight		g	~400

Protocol data for CANopen

Communication profile	CiA 301 V4.2
Layer setting services and protocol	CiA 305 V2.2
Device profile	CiA 410 V1.3
Bit rates	10 kbit .. 1 Mbit acc. to CiA DS 305 V2.2
Node ID / Bit rate	Can be set via Manufacturer Specific Profile & LSS
Default Settings	Bit rate: 250 kbit/s Node ID: 1

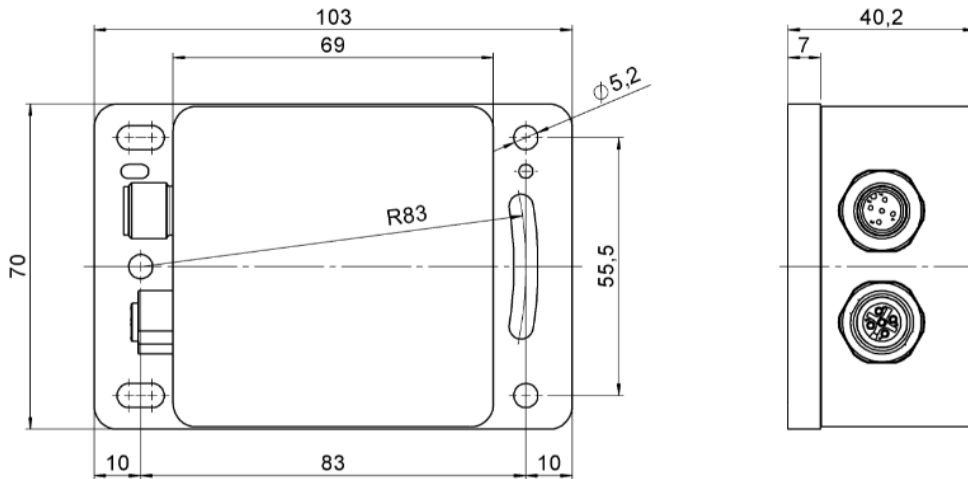
Protocol data for SAE J1939

Data link layer	SAE J1939-21
Network Layer	SAE J1939-31
Network Management	SAE J1939-81
SSI, SSI2	SAE J1939-DA
Default Settings	Bit rate: 250 kbit/s Source address: 1

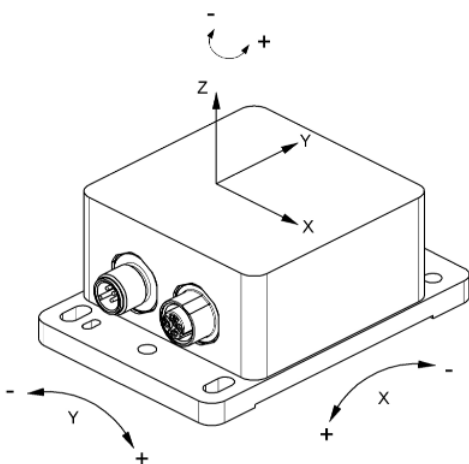
Note: Reverse polarity protection of the supply voltage and overvoltage protection are provided.

- 1) Please see chapter *Product description* in operation instructions. Download of the operation instructions at www.hydac.com (enter „HIT 1500,“ in the search box)
- 2) Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 no. 61010-1
- 3) With mounted mating connector in corresponding protection type

Dimensions

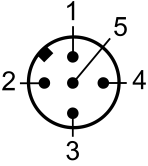
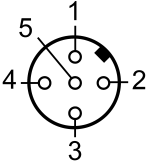


Coordinate system and turning direction



right hand rule

Pin connections

Plug M 12x1, 5 pole	Socket M12x1, 5 pole	Pin	Output signal: F1X	
			Signal	Description
		1	CAN_SHLD	Shield/housing
		2	CAN_V+	External supply +
		3	CAN_GND	Ground / 0 V / V -
		4	CAN_H	Bus line dominant high
		5	CAN_L	Bus line dominant low

Model code

HIT 1 508 - F1X - X - XXX - X - XX - X - 000

Motion compensation

5 = Included

Electrical connection

8 = Plug M12X1, 5 pole (mating connector not included)

Output signal

F11 = CANopen
F12 = SAE J1939

Primary inclination axis (longitudinal; slope long)

X / Y / Z

Measuring range rotation about primary axis in °

180 [015; 060; 120] optional

Secondary inclination axis (slope lateral)

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

Measuring range rotation about secondary axis in °

90 [15; 60; 00 (00 = axis not available)] optional

Additional CAN connector

0 = None
1 = Connector M12x1, 5 pole

Modification Number

000 = Standard

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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