



Inclinometer

HIT 500

CAN interface

MEMS technology

Motion-compensated

Accuracy 0.1 ° typ.

CANopen
SAE J1939

c **RA** **US**

E1

Features

- Motion-compensated inclination measurement via sensor fusion
- High signal dynamics
- High degree of accuracy
- Temperature compensation
- High variety of signal outputs
 - Static inclination
 - Inclination motion-compensated
 - Acceleration in 3 axes
 - Gyro in 3 axes
- E1 road approval

Other applicable documents:

- Operating Instructions HIT 500 CANopen / SAE J1939
Part no.: 670149
- Protocol Description HIT 500 CANopen
Part no.: 670150
- Protocol Description HIT 500 SAE J1939
Part no.: 670151

Description

Many applications depend on inclination angle measurements in order for machines and systems to work properly and for managing processes.

The HIT 500 measuring system family consists of double-axis measuring systems for the detection of the inclination related to the horizontal plane.

The HIT 500 family has been developed for the detection of the inclination in dynamic systems.

Based on a 3-axis acceleration sensor in MEMS technology (Micro-Electro-Mechanical System) the inclination signal is calculated in a quasi-static state (at rest).

A gyro sensor is also available for calculating the inclination in the dynamic range. By merging the two physically independent signals acceleration and gyro, a motion-compensated inclination signal is calculated.

In addition to the inclination signals, there are acceleration and gyro values also available as signal values in all 3 spatial axes. These signals offer the application engineer additional flexibility, which can be used for the optimisation of control functions in the machine control system.

Application fields

Applications are all mobile machines with requirements to the static or dynamic position or inclination detection.

Thanks to its excellent dynamics, the inclinometer HIT 500 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 crane trucks, construction and drilling machines, agricultural and municipal machines, etc.

The measuring system should be installed according to the orientation of its axis in a low-vibration location on the machine.

Specially designed for vehicles used on public roads, the measuring system is approved for road vehicles according to the ECE type approval.

Technical Data

Input data inclination				
Axes		2		
Measuring range (primary axis; "longitudinal")		°	± 180	
Measuring range (secondary axis; "lateral")		°	± 90	
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.
Static ¹⁾	Dynamic performance	Hz	2 (-3 dB) Standard setting 0.5..10 parameterisable	
	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		
Measuring range		m/s²	±30 in 3 axes	
Resolution		m/s²	0.01	
Cutoff frequency		Hz	50 (-3 dB)	
Accuracy		m/s²	< 0.02 typ. (RMS)	0.04 max.
Temperature coefficient (-20 to +60 °C)		(m/s²)/10 K	< 0.005 typ. (RMS)	0.01 max.
Long-term stability		(m/s²)/1000 h	< 0.01 typ. (RMS)	0.02 max.
Input data gyro (GYRO)				
Axes		3		
Measuring 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)/1000 h	< 0.05 typ. (RMS)	0.2 max.
Output data				
Output signal		CANopen protocol or SAE J1939 protocol, depending on version		
Environmental conditions / Approvals / Tests				
Compensated temperature range		°C	-20..+60	
Operating temperature range		°C	-40..+85	
Storage temperature range		°C	-40..+85	
Operating altitude		mNN	0..3000	
EMC		EN 61000-6- 2 / 4 (see declaration of conformity)		
Vibration resistance		DIN EN 60068-2-6	10 g (criterion B) (10..2000 Hz)	
		DIN EN 60068-2-64	7 g (RMS) Random vibration (5..2000 Hz)	
Shock resistance		DIN EN 60068-2-27	50 g, 11 ms half sine (criterion B)	
Other standards / standards		EN IEC 60068-2-11 salt spray		
Protection type ²⁾		ISO 20653	IP6K7, IP6K9 IP6K6K, IP6K9K	
CE - / UKCA conformity		Available		
ULus mark ³⁾		E332387		
E approval		available acc. to UN/ECE10		
Other data				
Supply voltage when applied acc. to UL specifications		V DC	9..36 (9..35 for wet locations) -limited energy- acc. 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		PBT		
Weight		g	65	

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
Bitrates	10 kbit..1 Mbit acc. to CiA 305 V2.2
Node-ID / Bitrate	adjustable via Manufacturer Specific Profile & LSS
Default settings	Bitrate: 250 kbit/s Node ID: 1

Protocol data for SAE J1939

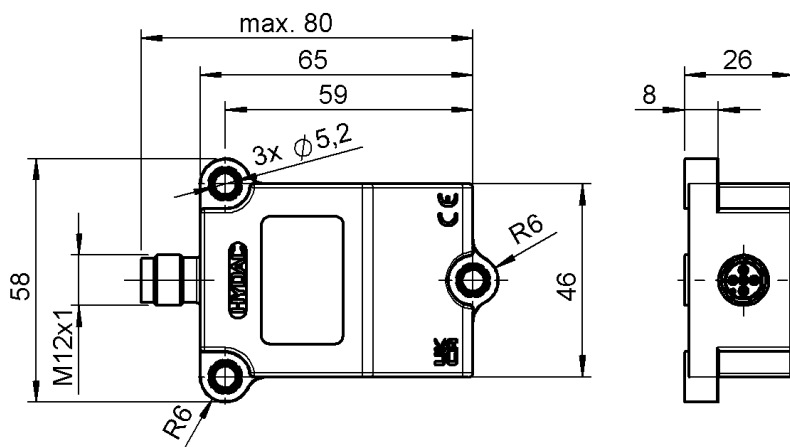
Data link layer	SAE J1939-21
Network Layer	SAE J1939-31
Network management	SAE J1939-81
SSI, SSI2	SAE J1939-DA
Default settings	Bitrate: 250 kbit/s Device address: 1

Note: Reverse polarity protection of the supply voltage, excess voltage, override and short circuit protection are provided.

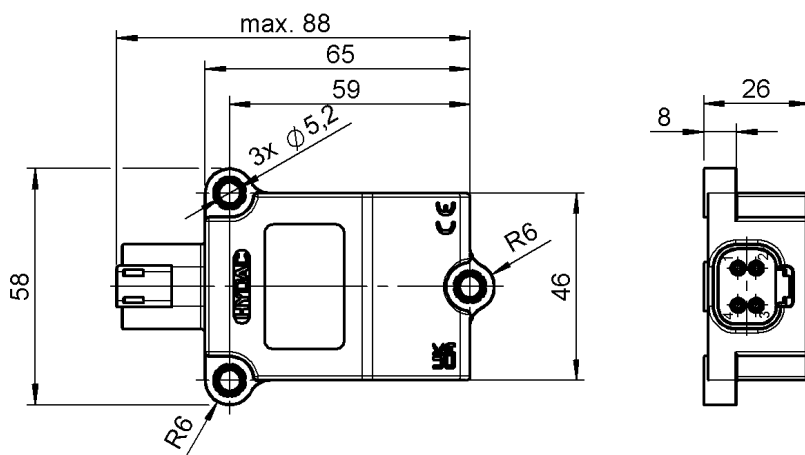
- ¹⁾ Observe chapter *Product description* of the operating instructions (BA). Download of the operating instructions under www.hydac.com (Enter „HIT 500,“ in the search box)
- ²⁾ With mounted mating connector in corresponding protection type
- ³⁾ Environmental conditions acc. to 1.4.2 UL 61010-1; C22.2 no. 61010-1

Dimensions

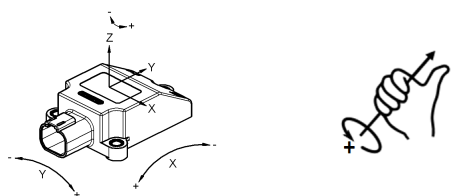
With M12x1 5 pole plug



Plug connector Deutsch DT04, 4 pole



Coordinate system and turning direction



Pin connections

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

Deutsch DT 04, 4 pole	Pin	Output signal: F1X	
		Signal	Description
	1	+U _B	Supply +
	2	0 V	supply -
	3	CAN_H	Bus line dominant high
	4	CAN_L	Bus line dominant low

Model code

	H	I	T	5	0	X	-	F	1	X	-	X	-	X	-	0	0	0
Motion compensation																		
5 = with																		
Electrical connection																		
8 = Plug connector M12x1, 5 pole (without mating connector)																		
V = Plug connector DT04, 4 pole (without mating connector)																		
Output signal																		
F11 = CANopen																		
F12 = SAE J1939																		
Primary inclination axis (slope long; longitudinal)																		
X / Y / Z																		
Secondary inclination axis (slope lateral)																		
X / Y / Z																		
Modification number																		
000 = Standard																		

Note

The information in this brochure relates to the operating conditions and applications described.
For applications and/or operating conditions not described please contact the relevant technical department.
Subject to technical modifications.

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