ACCELENS INCLINOMETER 360°
SYNCHRONOUS SERIAL INTERFACE (SSI)

The ACS industrial inclinometers are compact sensors for determining the inclination or tilt in both single and dual axes with remarkable precision and at a lower expense. The molded housing provides mechanical stability and the fully encapsulated sensor has a high environmental protection making it ideal for measuring tilt / slope in industrial environments. The synchronous serial interface (SSI) with its RS422 differential line drivers allows transmission cable length up to 1200m. The simple protocol makes it easy to connect the sensor to common PLC systems or embedded controllers.

Main Features

- Configured for One Axis
- Measurements 0 – 360°
- 13 Bit Resolution (0.04°)
- 0.14° Accuracy/Linearity
- Active Linearization and Temperature Compensation
- Rugged, UV Stabilized Housing
- Synchronous Serial Interface (SSI)

Electrical Features

- Polarity Inversion Protection
- Over-Voltage-Peak Protection

Programmable Parameters

- Preset Value
- Counting Direction

Applications

- Cranes and Construction Machines
- Robotic Arms & Positioning Systems
- Mobile Platforms
- Solar Trackers
- Medical Systems

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Technical Data

Electrical Data

Model	ACS 360
Measuring Range	360°
Number of Axes	1
Resolution	13 Bit (0.04°)[1]
Accuracy	0.14°
Sensor Response Time	100ms ± 10%[1]
Interface	Synchronous Serial Interface (SSI)
Current Consumption	<250mA at 5V DC, <100 mA at 10 V DC, <80 mA at 24 V DC
Power consumption	below 1.5 W
Clock Input	Via opto-coupler
Data Output	Line-driver according to RS 422
Clock Frequency	100 kHz – 2 MHz
Supply Voltage	4.5 – 30 V DC (absolute maximum ratings)[2]
Turn on time	< 1 s
EMC	Emitted interference: EN 61000-6-4 Noise immunity: EN 61000-6-2

1) Changes in response time and Resolution on request

2) According EN 50178 (SELF)

Mechanical Data

Housing Material	Glass Fiber Reinforced PBT (Polybutylene Terephthalate) (UV-Stabilized, UL 94-V0 Standard)
Potting Material	PUR (Polyurethane)
Weight	75 g [3 oz]

Environmental Conditions

Operating Temperature	-40 °C to +85 °C [-40 °F to 185 °F]
Protection class (EN 60529)	IP 69K & IP68 (With Appropriate Mating Connector)
Shock (EN 60068-2-27)	≤ 100 g (half sine, 6 ms)
Vibration (EN 60068-2-6)	1.5mm (10 to 58 Hz) ≤ 20 g (58 to 2000 Hz)

MTBF Data

Failure Rate [FIT]	759
MTBF [Hours]	1,317,822
MTBF [Years]	150

The data above were calculated for the electronics of ACS under following conditions:

SNA: Non mobile operation ground benign (Gb),

Tu: 40°C mean component ambient temperature

Zf: Continuous operation 8760 h per year

Interface

Detailed SSI-Interface description and Application example under technical description SSI interface. This product is also available with analog, RS232, DeviceNET and CANopen interface, please check our website for further information.

Synchronous Serial Interface (SSI)

Driver	Driver meets EIA standard RS 422; transmission rates up to 10 MBit/s
Transfer	Transfer distance up to 1.200 m
Transmission	Balanced transmission provides high noise immunity, shielded and twisted pair cables are recommended

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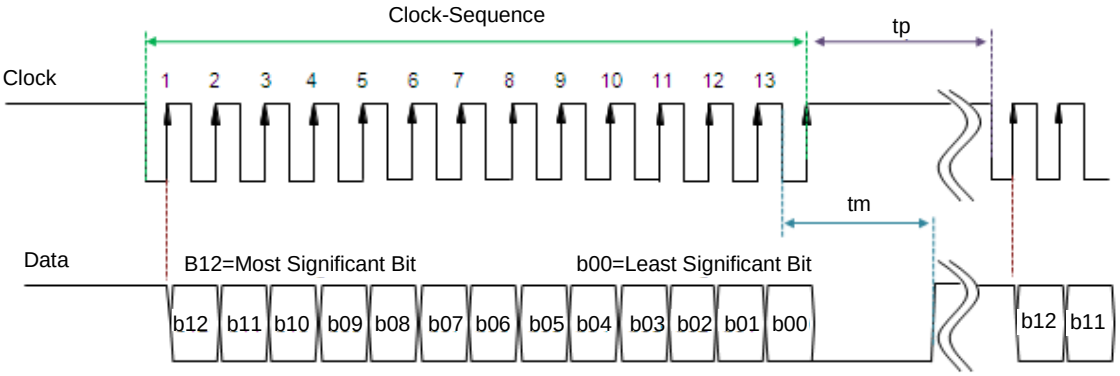
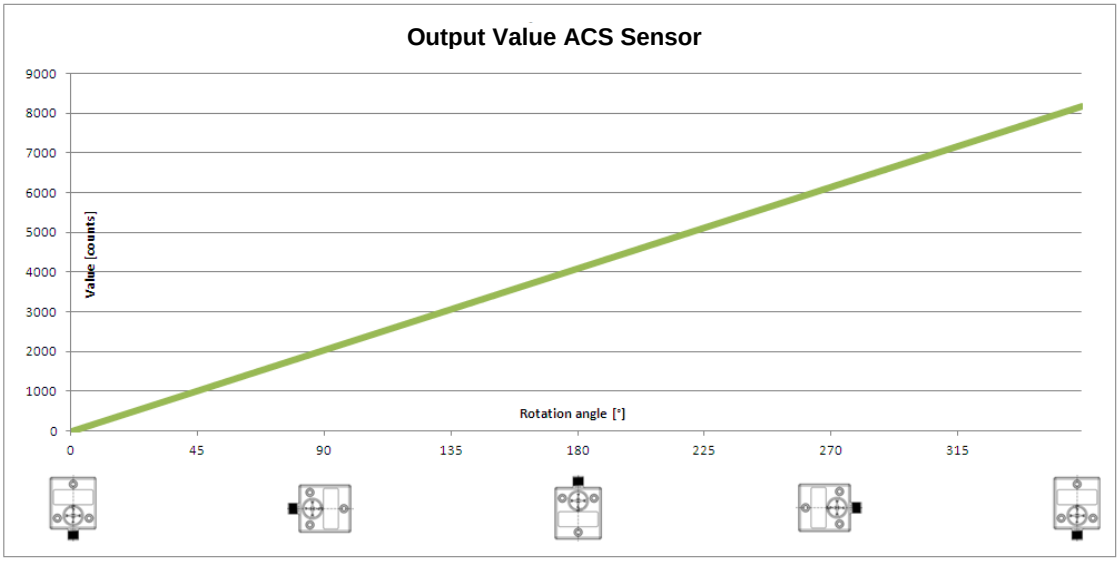
Protocol[1]



tm = 20µs marks the end of a single transmission. After tp > 25µs the output is set to idle state and a new transmission can be started anytime with a falling Clock signal. Output in binary format or gray code format.

Data values according to angular position of inclinometer



1) Changes in protocol on request

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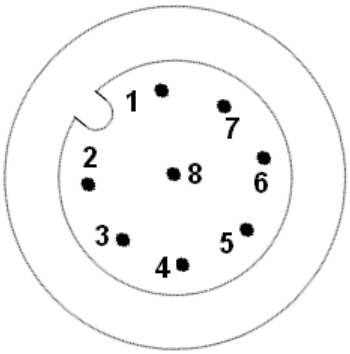
Electrical Connection

The inclinometer is connected via an 8 pin M12 A-coded round connector (male side at sensor).

Pin	Function
1	GND
2	Supply Voltage
3	SSI Clk+
4	SSI Clk-
5	SSI Data+
6	SSI Data-
7	Preset
8	Counting Direction (Complement)



Preset Function

Voltage Level	Function
0 (Input = N.C. or GND)	Inactive
1 (Input ≥ 4.5V / Input ≤ Supply Voltage)	Preset is activated[1]. The inclinometer value will be set to 0 in the moment the Preset Level will change to inactive again (falling edge)
Input Resistance	110 kOhm

1) The Preset needs to be activated for at least 1s before the falling edge will be detected.

Counting Direction / Complement Function

Voltage Level	Inclinometer counting direction for clockwise rotation (Cap Facing Towards Viewer)
0 (Input = N.C. or GND)	Down
1 (Input ≥ 4.5V / Input ≤ Supply Voltage)	Up
Input Resistance	110 kOhm

The inclinometer value is inverted after the Complement level is activated

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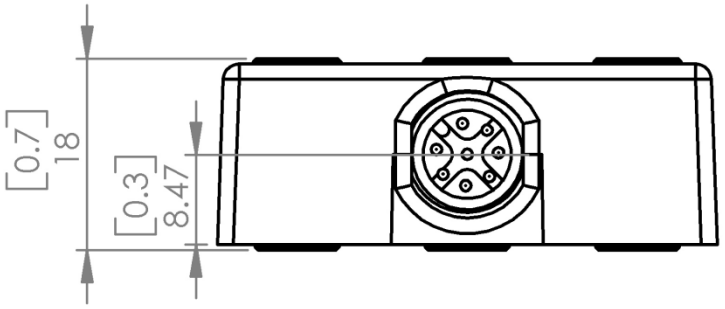
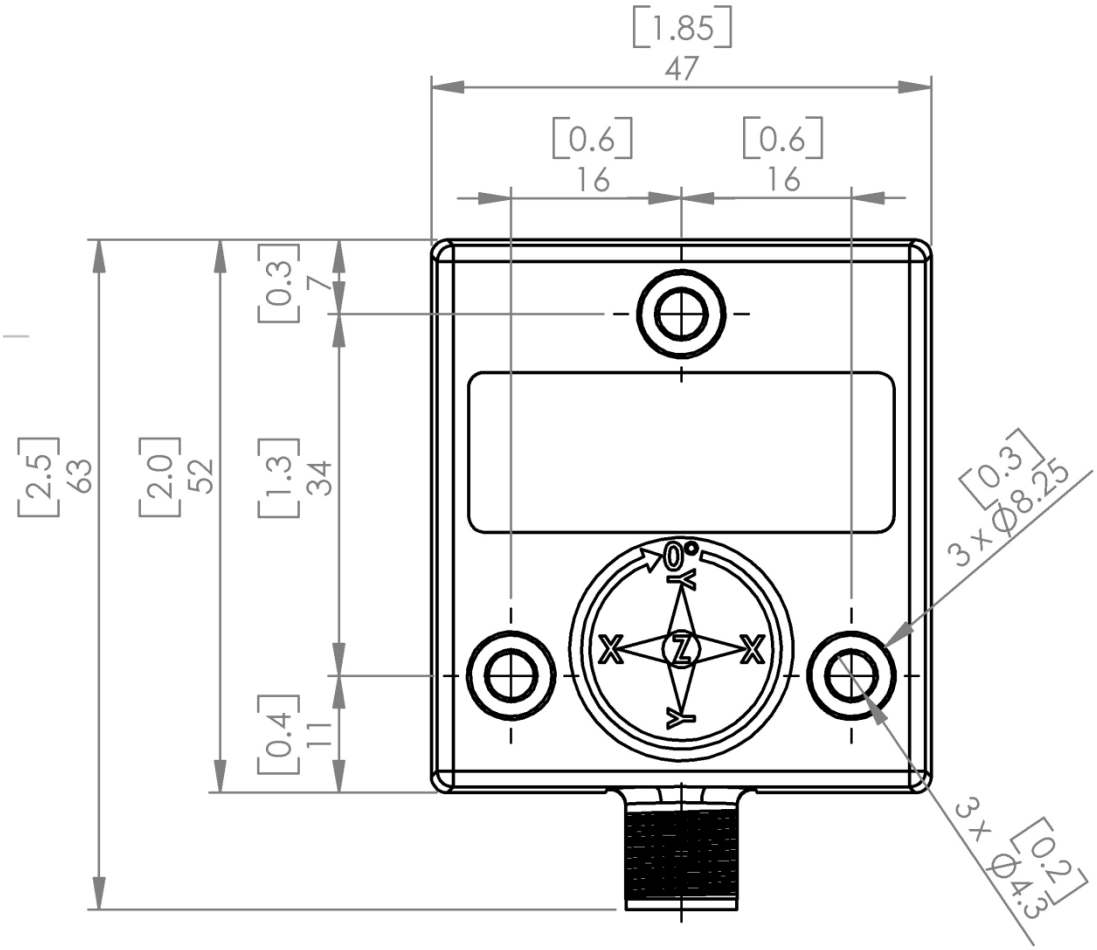
Mechanical Drawings





All dimensions in [inch] mm

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Models/Ordering Description

Description	Type key								
	ACS-	XXX-	X-	XX	XX	X	X	X-	XX
Range	360° (1 axis)	360							
Number of axis	One for 360° Version		1						
Interface	SSI binary code			S1					
	SSI gray code			S3					
Version	Software Version				02				
Mounting	Vertical for 360° Version					V			
Housing Material	Industrial (PBT)						E		
	Heavy Duty (Aluminum)						H		
Inclinometer Series	ACS II							2	
Connection	Connector								PM

Typekey:

ACS-360-1-S102-VE2-PM

ACS-360-1-S302-VE2-PM

ACS-360-1-S102-VH2-PM (Heavy Duty model please refer website for datasheet)

ACS-360-1-S302-VH2-PM (Heavy Duty model please refer website for datasheet)

Accessories

Article Number	Description
34500801	Female M12, 8pin A-coded connector with 2m shielded PUR
34500805	Female M12, 8pin A-coded connector with 5m shielded PUR

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Check out some of the other POSITAL Products

Draw Wire Sensor to Measure Linear Displacements

To measure linear movements or linear displacements, an absolute magnetic rotary encoder can be combined with a draw wire sensor. The contact-free measuring sensor stage of the MCD Sensor doesn't have any abrasion. The sensor can directly be connected to digital control units via SSI- or CANopen or Analog Interface.

More Information

Heavy Duty Magnetic Encoder Line for Thoughest Environments

Special constructive features of this magnetic rotary encoder ensure up to IP69K protection throughout the lifetime. Combined with the sturdy ball bearings these sensors offer an ideal choice for reliable measurements under extreme environmental conditions such as great temperature fluctuations, high humidity, high-pressure water or salty liquids. The Sensor can be connected to digital control units via SSI, CANopen or Analog Interface.

More Information

SSI Absolute Rotary Encoder

The absolute Multi-Turn rotary encoder from POSITAL comes with an enhanced interface that enables simultaneous communication of absolute and incremental rotary position data. The interface reports absolute rotary position data to the PLC using the synchronous serial interface (SSI) standard, operating over an RS-422/485 communication link. The encoder can also transmit a series of electronic pulses as the shaft rotates – up to 16, 384 pulses per rotation.

More Information

Disclaimer