

T-SERIES MODELS

SINGLE AXIS INCLINOMETER WITH SSI OUTPUT

Introduction

Industrial inclinometers are typically used for determining the inclination or tilt of a platform or controlled surface with remarkable precision. 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 and standard SSI protocol makes it easy to connect the sensor to common PLC systems or embedded controllers.



Features

- Configured for a Single 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)
- 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

SPECIFICATIONS

Mechanical

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

Electrical

Model	T-P1-360-S3-XX
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)

Environmental

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 under following conditions:

SNA: Non mobile operation ground benign (Gb),

Tu: 40°C mean component ambient temperature

Zf: Continuous operation 8760 h per year



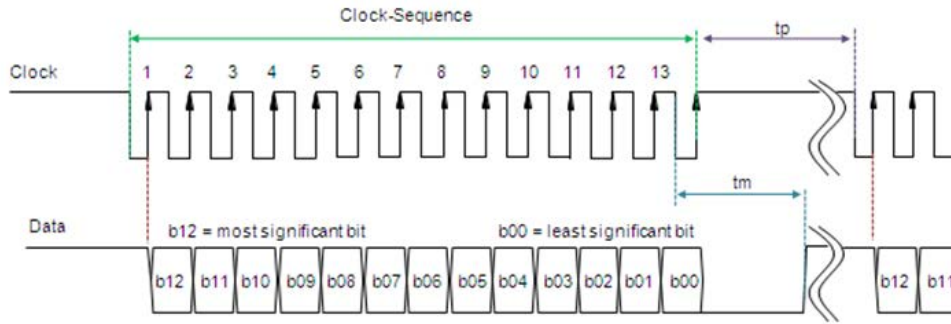
INTERFACE

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

Synchronous Serial Interface (SSI)

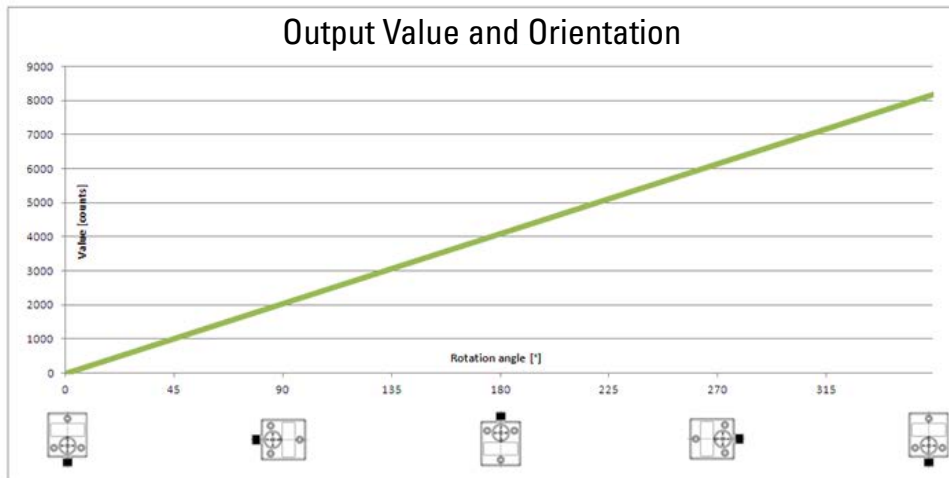
Driver	Driver meets EIA standard RS 422; transmission rates up to 10 MBit/s
Transfer	Transfer distance up to 1.200 m
Transmission	Balanced transmission provides high noise immunity, shielded and twisted pair cables are recommended

Protocol



$t_m = 20\mu s$ marks the end of a single transmission. After $t_p > 25\mu s$ 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.

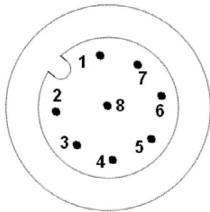
Data values according to angular position of inclinometer



ELECTRICAL CONNECTION

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

Pin	Cable Color	Function
1	White	GND
2	Brown	Supply Voltage
3	Green	SSI Clk+
4	Yellow	SSI Clk-
5	Grey	SSI Data+
6	Pink	SSI Data-
7	Blue	Preset
8	Red	Counting Direction



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

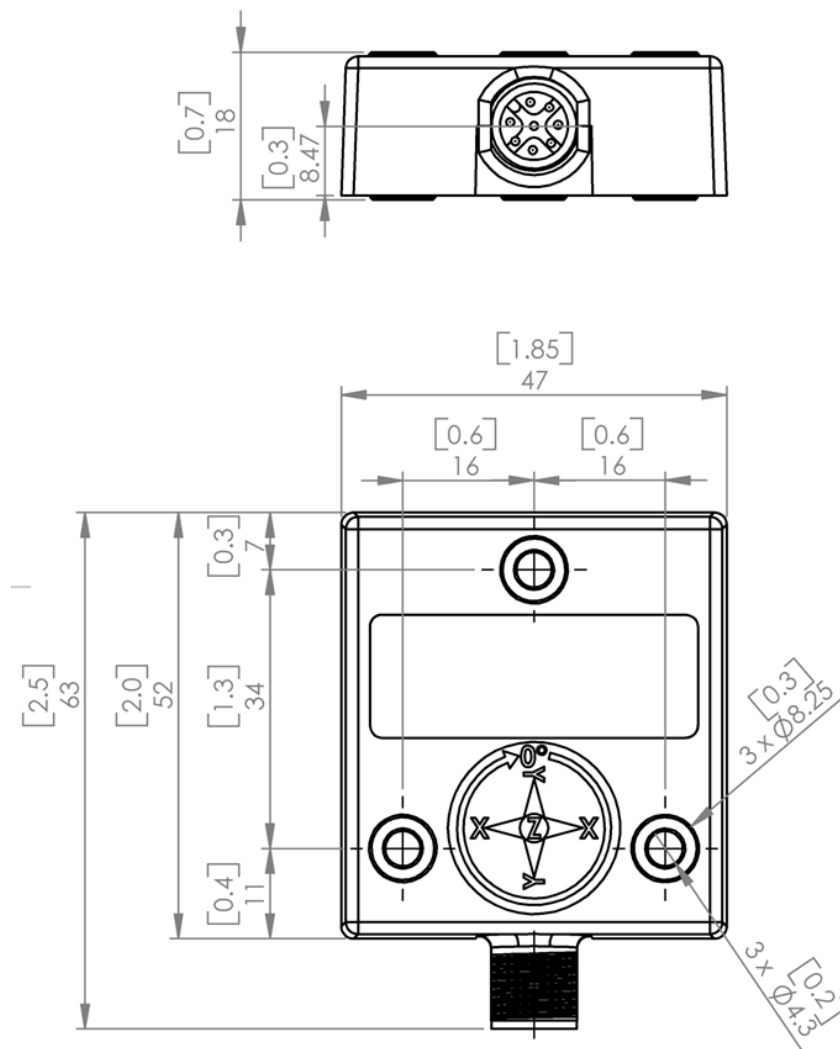
Voltage Level	Inclinometer counting direction for clockwise rotation (Cap Facing Towards Viewer)
0 (Input = N.C. or GND)	Down
1 (Input ≥ 4.5V / Input ≤ Supply Voltage)	Up
Input Resistance	110 kOhm

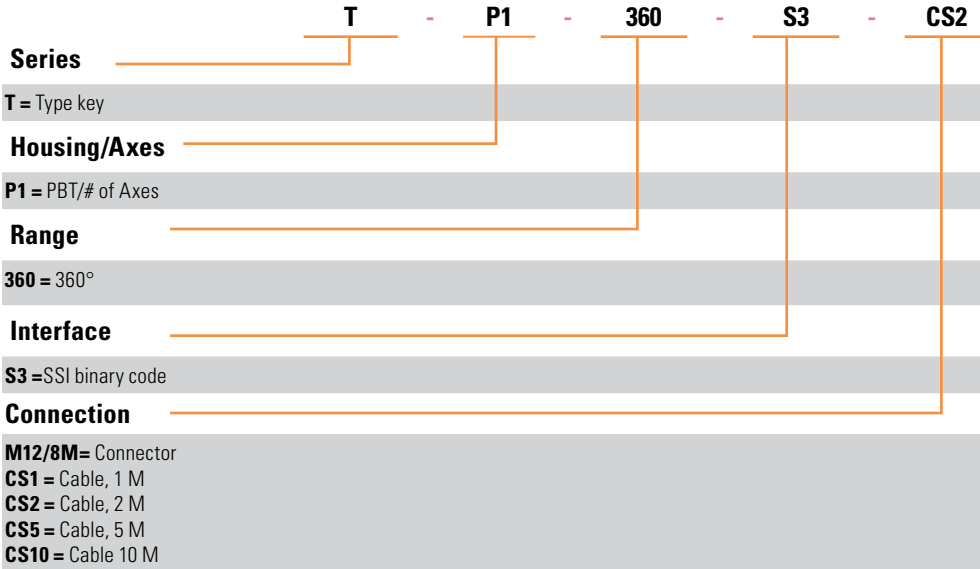
The inclinometer value is inverted after the Complement level is activated



DIMENSIONS

Dimensions are in [inches] and mm





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Mailing Address: Sensata Technologies, Inc., 529 Pleasant Street, Attleboro, MA 02703, USA.

CONTACT US

Americas

+1 (800) 350 2727 – Option 1
sales.beisensors@sensata.com
Europe, Middle East & Africa
+33 (3) 88 20 8080
position-info.eu@sensata.com

Asia Pacific

sales.isasia@list.sensata.com
China +86 (21) 2306 1500
Japan +81 (45) 277 7117
Korea +82 (31) 601 2004
India +91 (80) 67920890
Rest of Asia +886 (2) 27602006
ext 2808