AXISENSE-G DUAL AXIS GYRO STABILIZED TILT SENSOR

SPECIFICATIONS

- **±75° Dual Axis Tilt Sensor**
- **Gyro Stabilized for Fast Response**
- **CAN J1939 Interface**
- **Packaged for Harsh Environments**
- **Inherent Shock Suppression**
- **Simple Mounting Features**

The Model AXISENSE-G is a dual axis tilt sensor that combines signals from a multi-axis accelerometer and multi-axis gyro into an accurate representation of pitch and roll angles. The addition of the gyro improves the reaction time of the sensor and reduces susceptibility to shock and vibration events.

The sensor uses gravity for the reference and reports any positive or negative tilt angle in both the X and Y axes. The static accuracy for these measurements is ±0.5°.

The tilt sensor is packaged in a rugged enclosure with simple mounting features. It's designed to be immune to harsh environments commonly found in automotive and off-road vehicle applications. The IP-67 rating makes the sensor suitable for use outdoors.

The sensor is supplied with a 400 mm (15.7") integrated cable and a 4-pin sealed, keyed, latching connector. The wide supply voltage range of 8 – 36 VDC allows the sensor to operate with most electrical systems. A built-in temperature sensor and self-diagnostic features immediately notify the user or system of any problems or malfunctions.

FEATURES

- Multi-axis Gyro and Accelerometer
- Sensitive to Pitch and Roll Movements
- Factory Calibrated and Compensated
- Built-in Diagnostics
- -40 to 85 °C Operating Temperature
- Survives 10,000 g Shock Events
- Cable with 4-pin Superseal™ Connector

APPLICATIONS

- Stationary and Mobile Cranes and Hoists
- Forklifts and Material Handling Equipment
- Dump Trucks
- Vehicle Chassis Levelling
- Excavation Equipment
- Agricultural Machines
- Road Paving Equipment
- Scissor and Man Lifts

ABSOLUTE MAXIMUM RATINGS[1]

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Supply voltage	V_{CC}	-40		40	V	Reference to GND
Operating/storage temperature	T_{STO}	-40		85	°C	
Operating humidity	H_{OP}			100	%RH	>80% <40% of time
Storage humidity	H_{STO}			60	%RH	Unpowered
Shock limit (any axis)	a_{shock}			10,000	g	Non-repetitive 0.2 ms
ESD		-4		4	kV	ISO 10605
Mounting screw torque	M_{fix}			15	Nm	M6 size
Cable bend radius		24 48			mm	Static Installation Dynamic Installation

(1) Maximum limits the device will withstand without damage.

ELECTRICAL SPECIFICATIONS

(Unless otherwise specified, all parameters are measured at 23 °C @ 12 V applied)

Parameters	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Excitation voltage	V_{CC}	8.0	12	36	Vdc	
Supply current	I_{CC1}	15	20	45	mA	
CAN speed	f_{CAN}		250		kbps	
CAN transmission rate		5		100	ms	Configurable[4]

OPERATING SPECIFICATIONS

(Unless otherwise specified, all parameters are measured at 23 °C @ 12 V applied)

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Measurement range		-75		+75	deg	X & Y axes, ref to gravity
Installation offset	Δ_{OFF}			±0.3	deg	Static
Absolute accuracy[1]	Δ_{STAT}			±0.5	deg	Static
RMS accuracy[7]	Δ_{DYN}		±1.5		deg	Dynamic
Long term stability	Δ_{SL}			±0.5		
Settling time[3]	t_{SET}		300		ms	90% of final reading
Cross axis sensitivity[2]	CCAS			±0.25	deg	
Resolution[5]	RES			0.01	deg	
Update rate[6]	f_U		100		Hz	
Startup time	t_S			1.0	s	V_{CC} 0 to 24V transition

(1) Absolute error is the worst-case deviation between output angle and actual angle.

(2) CCA is the maximum difference between actual and expected angle on the passive axis for the whole angular range of the active axis and full temperature range.

(3) Depends on filter setting.

(4) See notes on page 10

(5) Limited by CAN protocol.

(6) Gyro and accelerometer are sampled at 1 kHz. Signals are carefully filtered and downsampled to 100 Hz.

(7) Dynamic accuracy is the RMS (root mean square) deviation between output angle and set angle, tested under three different conditions:

- linear acceleration in one sensor axis with 0.3 g for a period of 1 second *or*
- random vibration with 0.3 g RMS *or*
- rotational movement of one sensor axis with a rotational velocity of 30 °/s
- It is important to note that this error depends very much on the desired application and the strength of vibration and additional acceleration. Testing the sensor in the application is recommended.

ENVIRONMENTAL SPECIFICATIONS

Parameter	Symbol	Min	Typ	Max	Unit	Notes/Conditions
Operating temperature		-40		85	°C	
Storage temperature		-40		85	°C	
Operating ambient humidity		0		60	%RH	>80% <40% of time
Ingress protection	IP	67				
Media compatibility		External exposed surfaces: Nylon Polyurethane Resin Brass Polyamid				
Compliance		RoHS 2 directive 2011/65/EU REACH 1907/2026				
Weight			60		grams	

BLOCK DIAGRAM

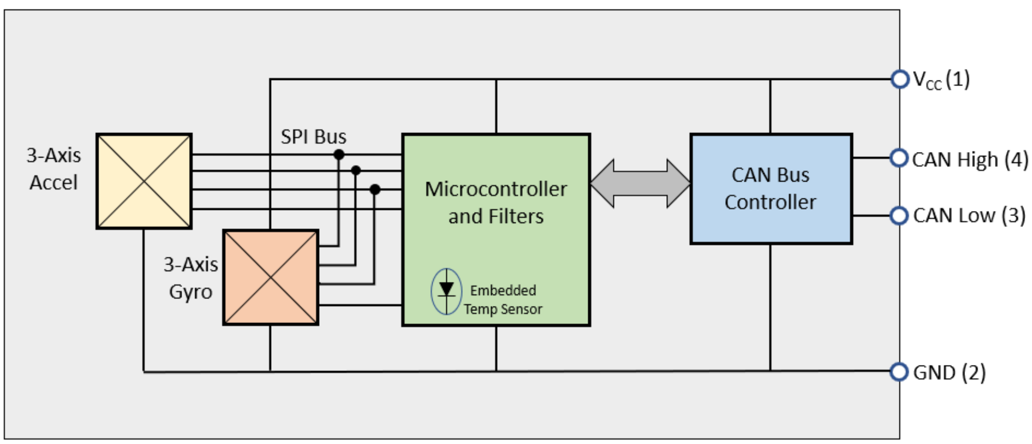

Figure 1. Block Diagram

OUTLINE DIMENSIONS

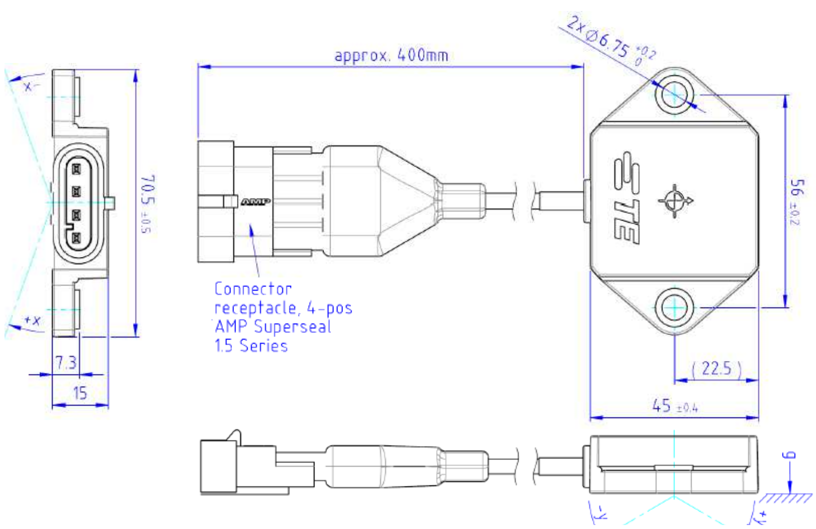

Figure 2. Dimensions

FUNCTIONAL OPERATION

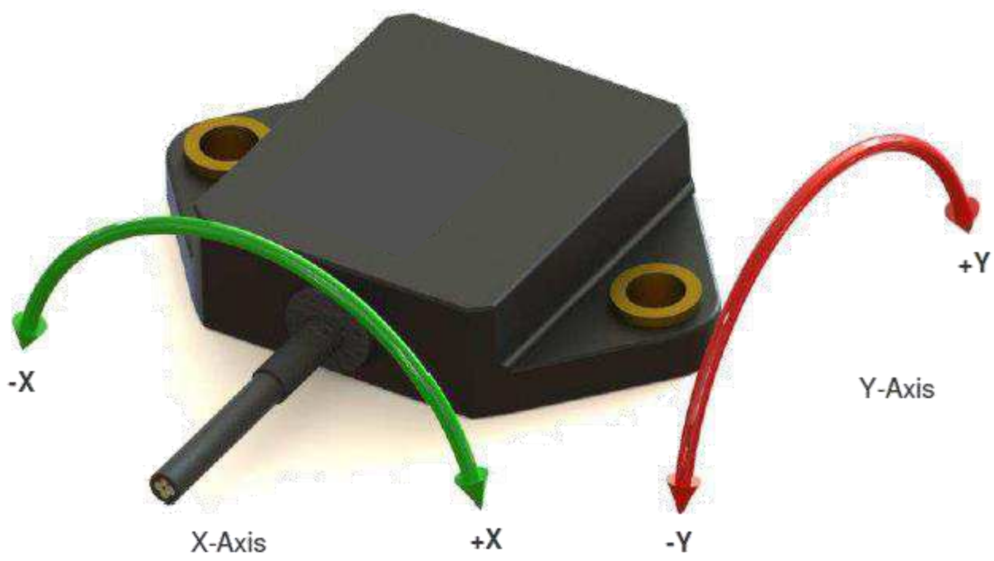

Figure 3. Sensitive Axes Orientation

Angles are defined according to DIN 70000 and ISO 8855:
- Roll measures rotation angle around the (local) body X axis
- Pitch measures rotation angle around the (local) body Y axis

CONNECTOR DETAIL

The tilt sensor has a Deutsch series connector with 4 terminals (TE Connectivity part-no. 282106-1).
It mates with TE Connectivity part-no. 282088-1.

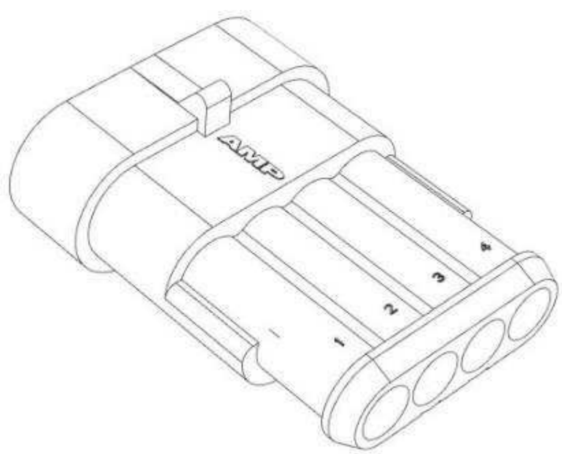

Figure 4. Connector Pinout

Pin Number	Function	Description	Wire Color	Direction
1	Supply voltage - V_{CC}	8 – 36V	White	Input
2	Ground - GND	0V	Yellow	Input
3	CAN_L	CAN low line	Green	Input/output
4	CAN_H	CAN high line	Brown	Input/output

ELECTRICAL INTERFACE

The tilt sensor has a SAE J1939 CAN-compatible interface described in detail in the following section.
OEM adaptation is possible.

Conventions

The tilt sensor complies with SAE J1939 CAN2.0B and uses a baud rate of 250 kbps. Proprietary A (0xEF) and B (0xFF) portions of SAE J1939 are used. The 29-bit message identifiers can be formulated using the following scheme:

Bit Position	Description
28:26	Message priority (6 is lowest, 0 is highest)
25:24	Future J1939 use. Always 0
23:16	Data content (PF). Always set to 0xFF for priority B
15:8	Data content (PS). (0x52 = Sensor serial number, 0x53 = Sensor Data, 0x54 = Ground Control Command to the sensor
7:0	Source address (SA). Indicates which device sent the message (0xC0 = SA unassigned, 0x80 – 0xF7 = Chassis Tilt Sensor)

Source Addresses

The tilt sensor sends a onetime address claim message 500 ms after startup and upon request by the host:

Module	Source Address
Master (MA)	Various (except tilt sensor source address)
Tilt sensor (SA) P/N G-NSDOG2-702	Uninitialized 0xC0 Settable range 0x80…0xF7

Tilt Angle

Priority:	4	Source Address:	Tilt sensor
Data Content (PF):	0xFF (Proprietary B)		
Data Content (PS):	0x53	Repetition Rate:	10 ms

Data	Byte	Function
X	0	X-Axis Tilt Reading x100 (Signed Word, LSB)
X	1	X-Axis Tilt Reading x100 (Signed Word, MSB)
X	2	Y-Axis Tilt Reading x100 (Signed Word, LSB)
X	3	Y-Axis Tilt Reading x100 (Signed Word, MSB)
X	4	Internal Temperature (Signed Byte)
X	5	Software Version (Major, Minor upper and lower nibble)
X	6	Data Status and Time Stamp
X	7	Error Codes x

Description of Operation:

The tilt sensor broadcasts this message periodically to update the host module.

Data Definition

Data Bytes 0-1 X-Axis Tilt Reading in hundredths of a degree
+/- 90.00° range *example:*
Data Bytes 0, 1 are 0xD8, 0xDC for -90.00 deg
Data Bytes 0, 1 are 0x64, 0x19 for +65.00 deg

Data Bytes 2-3 Y-Axis Tilt Reading in hundredths of a degree
+/- 180.00° range *example:*
Data Bytes 2, 3 are 0xB0, 0xB9 for -180.00 deg
Data Bytes 2, 3 are 0x10, 0x27 for +100.00 deg

Data Byte 4 Internal Temperature in degrees Celsius
Example:
Data Byte 4 is 0x55 for +85 °C
Data Byte 4 is 0xD8 for -40 °C

Data Byte 5 *Software Version (Major bits 4-7; Minor bits 0-3 in hexadecimal; 0x3C for version 3.12 – decimal implied)*

Data Byte 6 Data Status → lower nibble, bits 0-3
0x0000$_b$ During power up or when data is invalid
0x0001$_b$ Data available and valid
0x0011$_b$ Error (see Byte 7 error code for definitions)
0xXX10$_b$ Undefined Positional data in Bytes 0-5 are set to 0xFF, if status is invalid or undefined, but may be valid in error per Byte 7
Time Stamp → upper nibble, bits 4-7
0xXXXX$_b$ this number is incremented for every transmission to prevent a stagnant transmission, when 0x1111$_b$ is reached, value rolls over to 0x0000$_b$

Data Byte 7 Error Codes (bit set = 1 when fault exists; cleared = 0 when no fault present).
For error codes refer to Table below.

Error Codes

Fault Topic	Bit	= 0	=1
EEPROM Error	0	Checksum Ok	Checksum Failure Byte 6 status = 11b Positional and temperature data transmitted
Sensor Element Error (X-axis)	1	Normal Operation	Fault detected Byte 6 status = 11b X-axis positional data set = 0xFFFF; remaining positional and temperature data transmitted
Sensor Element Error (Y-axis)	2	Normal Operation	Fault detected Byte 6 status = 11b Y-axis positional data set = 0xFFFF; remaining positional and temperature data transmitted
Supply Voltage Detection	3	Supply Voltage ≥ 8V	Supply Voltage < 8 V Byte 6 status = 11b Positional and temperature data transmitted
Overvoltage Error	4	Supply voltage ≤ 36V	Supply Voltage > 36 V Byte 6 status = 11b Positional and temperature data transmitted
Overtemperature Error	5	PCBA temperature ≤ 90°C	Temperature > 90 °C Byte 6 status = 11b Positional and temperature data transmitted
Not defined	6	Not defined	Not defined
Not defined	7	Not defined	Not defined

Tilt Sensor Address Claim

Priority:	6	Source Address:	Tilt Sensor
Data Content (PF):	0xEE		
Data Content (PS):	0xFF	Repetition Rate:	Once 500 ms after startup On Request

Data	Byte	Function
X	0	Serial Number (LSB)
X	1	Serial Number
X	2	Serial Number (MSB), Manufacture Code (LSB)
X	3	Manufacture Code (MSB)
00	4	ECU Instance, Function Instance
88	5	Function
00	6	Reserved
30	7	Vehicle System Instance, Industry Group, Arbitrary Address Claim

Description of Operation:

The tilt sensor broadcasts this message per J1939-81, 4.2.2.1 with byte definitions as follows:

Data Definition	
Data Byte 0	Serial Number, Bits 0 - 7
Data Byte 1	Serial Number, Bits 8 - 15
Data Byte 2, Bits 0-4	Serial Number, Bits 16 - 20
Data Byte 2, Bits 5-7	Manufacturer Code, Bits 0 - 2
Data Byte 3	Manufacturer Code, Bits 3 - 10
Data Byte 4, Bits 0-2	ECU Instance = 0
Data Byte 4, Bits 3-7	Function Instance = 0
Data Byte 5	Function = 136 (Slope Sensor)
Data Byte 6, Bit 0	Reserved = 0
Data Byte 6, Bits 1-7	Vehicle System = 0 (Non-Specific System)
Data Byte 7, Bits 0-3	Vehicle System Instance = 0
Data Byte 7, Bits 4-6	Industry Group = 3 (Construction equipment)
Data Byte 7, Bit 7	Arbitrary Address Claim = 0 (Not Arbitrary)

Tilt Sensor Address Claim Request

Priority:	6	Source Address:	Master
Data Content (PF):	0xEA		
Data Content (PS):	Tilt Sensor	Repetition Rate:	On Request

Data	Byte	Function
00	0	PGN (LSB)
EA	1	PGN
X	2	PGN (MSB)

Description of Operation:

The tilt sensor broadcasts the “Tilt Sensor Address Claim” message upon receiving this message per J1939-21, 5.4.2 with byte definitions as follows:

Data Definition
Data Byte 0 PGN – Requestor Source Address
Data Byte 1 PGN (PF) – 0xEA (Address Claim)
Data Byte 2 PGN (PS) – 0xXX (Source Address of the Tilt Sensor)

Master Control Commands – Chassis Tilt Sensor

Priority:	4	Source Address:	Master
Data Content (PF):	0xFF (Proprietary B)	CAN ID	0x10FF54XX XX = Source Address of Master
Data Content (PS):	0x54	Repetition Rate:	On request

Data Byte	Function
0	Command Byte
1	Depends on Command Byte, see explanation below
2	Depends on Command Byte, see explanation below
3	Depends on Command Byte, see explanation below
4	Depends on Command Byte, see explanation below
5	Depends on Command Byte, see explanation below
6	Depends on Command Byte, see explanation below
7	Depends on Command Byte, see explanation below

Description of Operation

The master shall request the unique S/N of the Tilt Sensor. The intent is to assign different source addresses to the Chassis Tilt Sensor so that multiple sensors can operate on one CAN Bus. The first byte is the Command Byte specifying the meaning for the rest of the message. The rest of the data depends on the Command Byte as detailed below.

Request for Sensor S/N

Data Byte	0	0x00 (commands sensor to respond with Sensor Serial Number message)
Data Bytes	1-7	0xFF; not used

Request for Source Address Change

Data Byte	0	0x01 (commands sensor with specified S/N to change SA to given value; stored in the sensor non-volatile memory)
Data Bytes	1	New Source Address in hexadecimal
Data Bytes	2-7	Serial Number in BCD

Request for Wait
Data Byte 0 0x02 (Stop all sensor responses and broadcast. This includes no response to a subsequent request for serial number commands or address claim)
Data Bytes 1-7 Not used

Request for Repetitive Transmission of Data
Data Byte 0 0x03 (Start sensor data broadcast and enable answering to requests)
Data Bytes 1-7 Not used

Request for Transmission Rate Change
Data Byte 0 0x04 (changes the CAN broadcast transmission rate)
Data Byte 1 New Transmission Period

Options	Resulting transmission rate
0x05	5 ms
0x0A	10 ms (default)
0x0F	15 ms
0x14	20 ms
0x3C	60 ms

Data Bytes 1-7 Serial Number in BCD

Request for Return to Uninitialized Source Address
Data Byte 0 0x09 (commands sensor with specified SA and S/N to change its SA currently stored in the sensor non-volatile memory to the uninitialized SA = 0xC0)
Data Byte 1 Current Source Address in hexadecimal of target sensor
Data Bytes 1-7 Serial Number in BCD of target sensor

Sensor Serial Number

Priority:	4	Source Address:	Tilt Sensor
Data Content (PF):	0xFF (Proprietary B)		
Data Content (PS):	0x52	Repetition Rate:	On request

Data	Byte	Function
X	0	Serial Number in BCD (set = 00); populate extra positions with zero
X	1	Serial Number in BCD (set upper nibble=0; upper digit year of production→lower nibble; year of production; ex. 14 for 2014; AA)
X	2	Serial Number in BCD (set upper nibble=0; upper digit year of production→lower nibble; year of production; ex. 14 for 2014; AA)
X	3	Serial Number in BCD (lower digit of calendar week→upper nibble; reserved X→lower nibble)
X	4	Serial Number in BCD (most significant sequence digits; upper CC)
X	5	Serial Number in BCD (least significant sequence digits; lower CC)
X	6	Software Revision Major Number in BCD
X	7	Software Revision Minor Number in BCD

Example

Initial Inclination sensor sources address = 0xC0 (uninitialized), 0xE8 after change and 0xC0 again

Inclination sensor serial number = 174700286

Master source address = 0xC3

Data packet #	Timestamp in ms	Time delta in ms	In/Out	CAN Id	Number of Bytes	CAN Data	Comment
1	0	0	Rx	18EEFFC0	8	00 00 20 66 00 88 00 30	Address claim of tilt sensor
2	57.6	57.6	Rx	10FF53C0	8	28 23 94 11 19 13 01 00	Tilt angle broadcast, sensor SA = 0xC0, X Angle = 0x2328 = 90°, Y Angle = 0x1194 = 45°, Temper. = 0x19 = 25 °C Softw. Ver. = 0x13 = 1.3x Data timest. = 0x0 = 0 Data status = 0x1 = valid Error code = 0x00 = no err transm. period = 10 ms
3	67.5	9.9	Rx	10FF53C0	8	28 23 94 11 19 13 **1**1 00	…
4	77.4	9.9	Rx	10FF53C0	8	28 23 94 11 19 13 **2**1 00	…
5	87.2	9.8	Rx	10FF53C0	8	28 23 94 11 19 13 31 00	…

6	97.1	9.9	Rx	10FF53C0	8	28 23 94 11 19 13 **4**1 00	…
17	205.8	9.9	Rx	10FF53C0	8	28 23 94 11 19 13 **F**1 00	Maximum timestamp reached (0xF)
18	215.6	9.8	Rx	10FF53C0	8	28 23 94 11 19 13 **0**1 00	Timestamp rollover (0x0)
19	225.5	9.9	Rx	10FF53C0	8	28 23 28 23 19 13 **1**1 00	Continue with tilt angle broadcast
2688	26577.8	6.2	Tx	10FF54C3	8	00 00 00 00 00 00 00 00	Serial number command request
2689	26579.4	1.6	Rx	10FF52C0	8	00 01 74 70 02 86 01 36	Serial number answer in BCD = 174700286, Software Ver = 1.36
2690	26582	2.6	Rx	10FF53C0	8	9A 23 B1 22 19 13 E1 00	Tilt angle broadcast, X = 0x239A = 91.14°, Y = 0x22B1 = 88.81°
2691	26591.9	9.9	Rx	10FF53C0	8	9A 23 B1 22 19 13 F1 00	…
7957	249957	2	Tx	10FF54C3	8	01 E8 00 01 74 70 02 86	Change source address of sensor 174700286 s/n to 0xE8
7958	250148.2	191.2	Rx	10FF53E8	8	92 23 B9 22 1E 13 A1 00	Tilt angle broadcast, source address has changed!
8872	259173.9	9.4	Tx	10FF54C3	8	02 00 00 01 74 70 02 86	Stop transmission
8874	262689.8	3515.5	Tx	10FF54C3	8	03 00 00 01 74 70 02 86	Start transmission again (3.515 seconds no answer)
8875	262695.6	5.8	Rx	10FF53E8	8	93 23 B8 22 1E 13 D1 00	Tilt angle broadcast
9247	266369.7	9.9	Tx	10FF54C3	8	04 04 00 01 74 70 02 86	Change transmission period to **0x04** = 40 ms
9250	266602.5	39.9	Rx	10FF53E8	8	91 23 B8 22 1E 13 31 00	Tilt angle broadcast with 40 ms transmission period
9251	266642.5	40	Rx	10FF53E8	8	90 23 B8 22 1E 13 41 00	…
9252	266682.5	40	Rx	10FF53E8	8	93 23 B8 22 1E 13 51 00	…
9661	283009.5	20.7	Tx	10FF54C3	8	09 E8 00 01 74 70 02 86	De-initialize sensor source address
9662	283089.6	80.1	Rx	10FF53C0	8	90 23 BA 22 1E 13 E1 00	Sensor's source address is 0xC0 again
9663	283129.5	39.9	Rx	10FF53C0	8	91 23 BB 22 1E 13 F1 00	…
9664	283169.5	40	Rx	10FF53C0	8	91 23 BB 22 1E 13 01 00	…
9805	288789.3	24.2	Tx	10FF54C3	8	00 00 00 00 00 00 00 00	Serial number command
9806	288790.9	1.6	Rx	10FF52C0	8	00 01 74 70 02 86 01 36	it's still 174700286
9807	288805.5	40	Rx	10FF53C0	8	90 23 BB 22 1E 13 D1 00	Tilt angle broadcast
9808	288845.5	40	Rx	10FF53C0	8	90 23 BA 22 1E 13 E1 00	…
9809	288885.5	40	Rx	10FF53C0	8	90 23 BA 22 1E 13 F1 00	End of trace

INSTALLATION AND MOUNTING INSTRUCTIONS

INTRODUCTION

This specification covers the requirements for mounting of inclination sensor modules from the AXISENSE Series. This series is mainly developed with focus on platform leveling, dynamic engine management, tip-over protection and tilt alarm. When corresponding with personnel, use the terminology provided in this specification to facilitate inquiries for information. Basic terms and features of this product are provided in Figure 5.

Figure 5. Sensor Terminologies

REFERENCE MATERIAL

Customer Assistance

Reference Product Type can be found on the label of the sensor starting with “AXISENSE-G”. Use of this name will identify the product type and help you to obtain product information. Such information can be obtained through a local Representative, by visiting our Website at www.te.com, or by calling PRODUCT INFORMATION at the numbers at the bottom of page 17.

Drawings

Customer Drawings for product part numbers are available from the service network. If there is a conflict between the information contained in the Customer Drawings and this specification or with any other technical documentation supplied, the information contained in the Customer Drawings takes priority.

Specifications

Reference documents which pertain to the products are available via www.te.com or your personal point of contact at TE Connectivity.

REQUIREMENTS

The sensor shall always be mounted according the specified mounting direction, which is floor mount (see Figure 6), “g” reflects the vector of gravity in zero position of both movement axes.

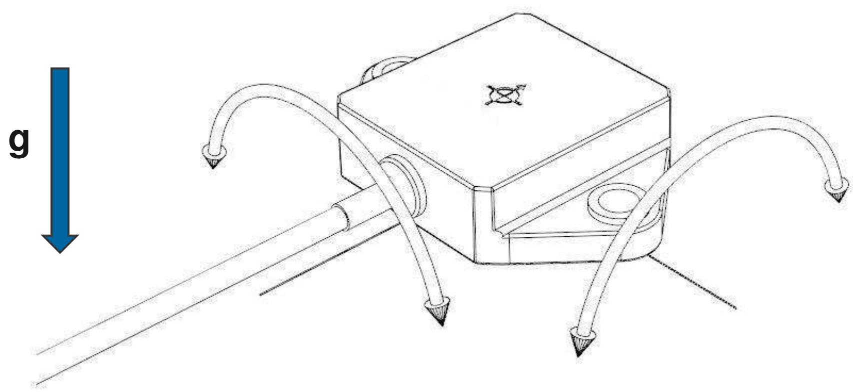

Figure 6. Mounting Reference to Gravity

To obtain the most accurate sensor outputs and prevent accelerated degradation over time, these items should be considered:

- Prevent from direct sunlight
- Avoid high relative humidity
- Avoid extreme temperatures close to the specified operational temperature limits
- Minimize number of temperature changes and temperature shift
- Select location with minimum acceleration from application (vibration, shock, centrifugal etc.)

A flat mounting area with a surface deviation of less than 0.15 mm must be chosen. No welding seams or surface bends should be present in the mounting footprint of the sensor housing. While installing the sensor do not exceed minimum bending radius of cable which (24 mm for static and 48 mm for use in dynamic application). The recommended mounting torque is 10 Nm, which is also depending on the property class of the used screws (e.g. 6.8 class screw limits torque to 7.5 Nm). The applied mounting torque must not exceed 15 Nm.

To achieve best accuracy of the output values, the reference edge of the housing, as highlighted in Figure 7, should be used. This edge complies with the alignment of the sensor module during the calibration process in factory. Figure 7 reflects these requirements and recommendations.

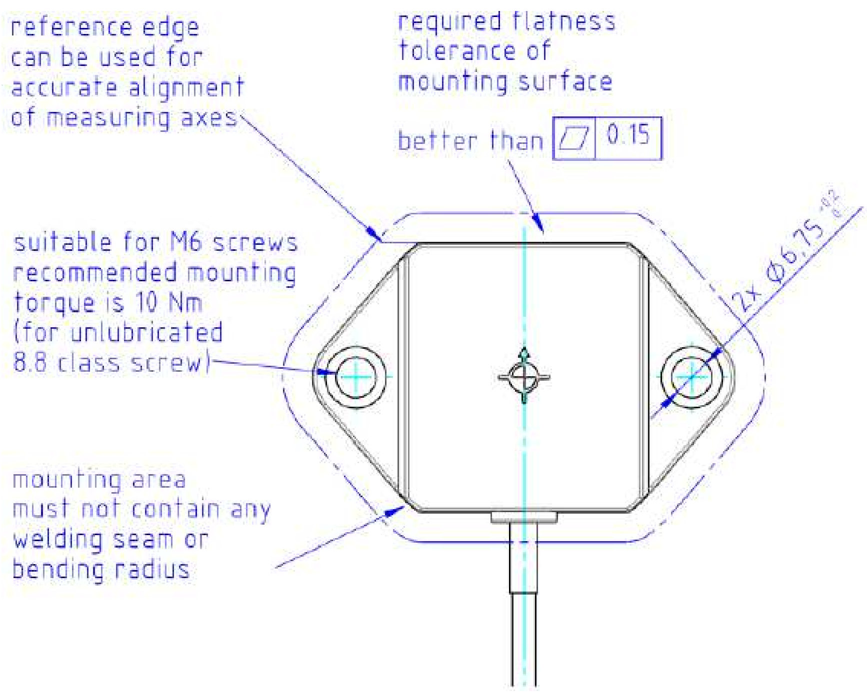

Figure 7. Mounting Detail

The sensor module should be mounted with screws onto a part already containing M6 size threaded holes separated by a distance of 56 ±0.25 mm. Mounting of the sensor module with M6 hexagon nuts and threaded pins fixed to the part is also recommended as long as the required flatness below the sensor module is guaranteed (see Figure 8). It is advised to use a washer with the screw or hexagon nut in any of those cases.

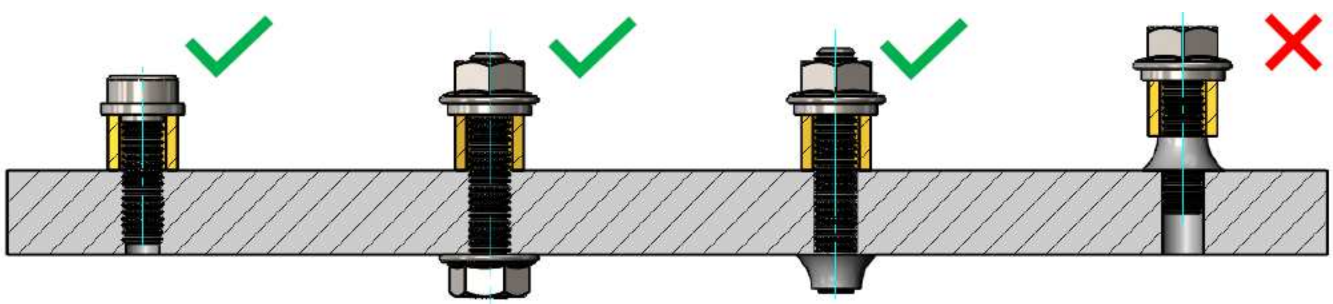

Figure 8. Mounting Screw Detail

When the counterpart in application contains through holes and the module is mounted with screws and hexagon nuts, it is recommended to use the through hole dimension and distance displayed in Figure 9.

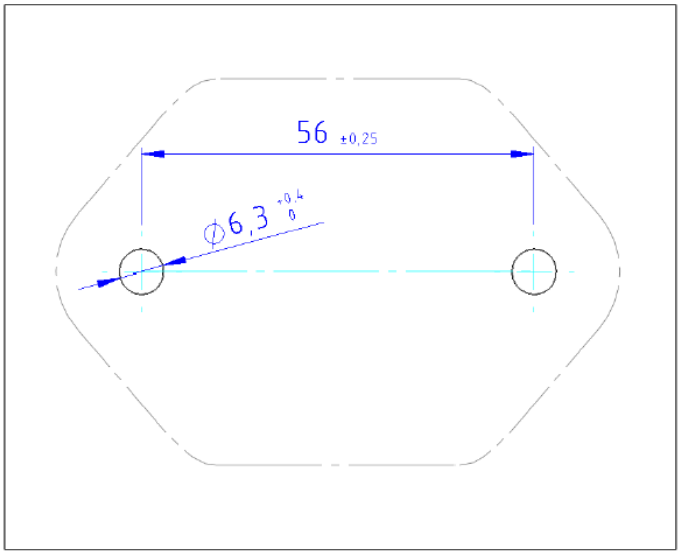

Figure 9. Mounting Hole Detail

In the case of an ideal alignment in application, the sensor axes would match exactly the axes to be measured. Using the minimum diameter for the through holes will reduce the possible deviation of the sensor module axes from ideal alignment. Thus, compared to the use of the maximum diameter, a better system accuracy can be achieved in application.

Beside limiting any undesired rotation, the maximum diameter of the through holes in the part shall be limited for another reason. Limiting the diameter to Ø6.7 mm will assure that the force onto the sensor housing emerged by the mounting torque of the screws applies only to the metal compression limiters of the sensor housing.

This is necessary, because it avoids the influence of mechanical stress caused by the mounting torque on other parts of the sensor module assembly. Otherwise it would have a negative effect on the performance and accuracy of the system.

NOTE

All numerical values are in metric units. Dimensions are in millimeters. Unless otherwise specified, dimensions have a tolerance according ISO 2768 -mK. Figures and illustrations are for identification only and are not drawn to scale.

Ordering Information

Description	Part Number
±75° Tilt sensor with shock suppression and fast response, CAN J1939 Interface	G-NSDOG2-700

NORTH AMERICA
Tel +1 800 745 8008
customercare.hmpt@te.com

EUROPE
Tel +49 231 9740 0
customercare.dtmd@te.com

ASIA
Tel +86 7553 330 5088
customercare.shzn@te.com

te.com/sensors

Version # 07/2020