



RST INSTRUMENTS LTD.

ICEX360A Tilt Transmitter
Instruction Manual

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ICEX360A Tilt Transmitter Instruction Manual

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TABLE OF CONTENTS

1	PRODUCT DESCRIPTION	1
2	SPECIFICATIONS	2
3	TILT TRANSMITTER MOUNTING	3
4	ANALYZING THE DATA.....	4
5	ELECTRICAL CONNECTION.....	6
6	SEALED OPERATION.....	6
7	SAMPLE CALIBRATION.....	7

LIST OF FIGURES

Figure 1: ICEX360A Tilt Transmitter Overview	1
Figure 2: Mounting Details	3
Figure 3: Ordering Details	4
Figure 4: Rotation Details in XZ Plane	4
Figure 5: Rotation Details in YZ Plane	5
Figure 6: Electrical Connection	6

1 PRODUCT DESCRIPTION

The ICEX360A Tilt Transmitter is intended to provide tilt measurements in environments including Class1 Div. 1, Groups B, C, D and wet environments to IP66/68. It is based on a triaxial MEMS accelerometer, whose data is sampled by a microcontroller and transformed into plane tilt using full circle arctangent method. The resulting tilt information is mapped to a 4-20 mA current output using a 16 bit DAC.

The alignment of the 4 mA point and the sensing polarity can be set either in the XZ plane or YZ plane at time of order.

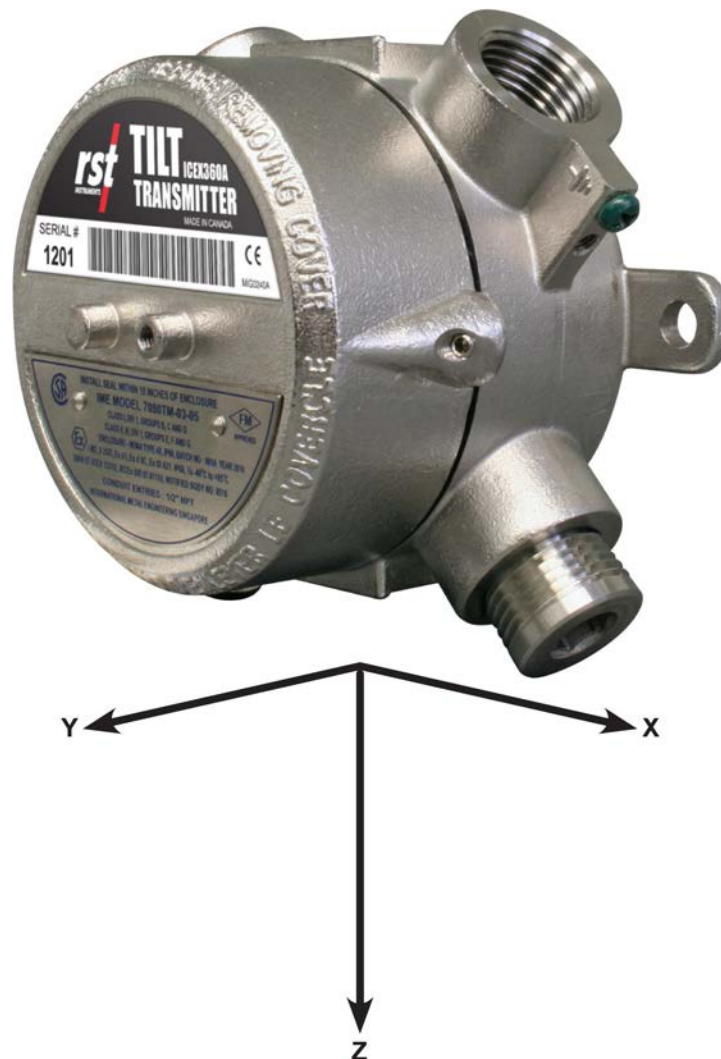


Figure 1: ICEX360A Tilt Transmitter Overview

2 SPECIFICATIONS

Range F.S.	0-359° maximum, customer specified sub-range
Output	4-20mA – 2 wire loop powered
Minimum Terminal Voltage	8.5VDC
Maximum Terminal Voltage	28VDC
Accuracy	0.30°
Resolution	0.15°
Temperature Drift	0.02° per °C typ
Enclosure	Stainless Steel NEMA Type 4X, IP68
Sensor	MEMS Triaxial Accelerometer
Operating Temperature	-20 to 50°C (-4 to 122°F)

3 TILT TRANSMITTER MOUNTING

A typical application for the Tilt Transmitter is to be installed on the downstream face of a top-hinged vertical gate, with the mounting screws on a horizontal line, and the conduit entry at the top right. However, several other applications involving vertical or horizontal mounting of the Tilt Transmitter are possible.

The sensor in the Tilt Transmitter is an accelerometer, which is intended to respond to a component of gravity due to tilt. To minimize undesirable response to rotary acceleration/deceleration, the Tilt Transmitter should be mounted as close as practical to the top hinge. This will also reduce the occurrence of immersion.

It is suggested that the conduit be routed along the hinge line as far as possible to accommodate the flex due to gate rotation.

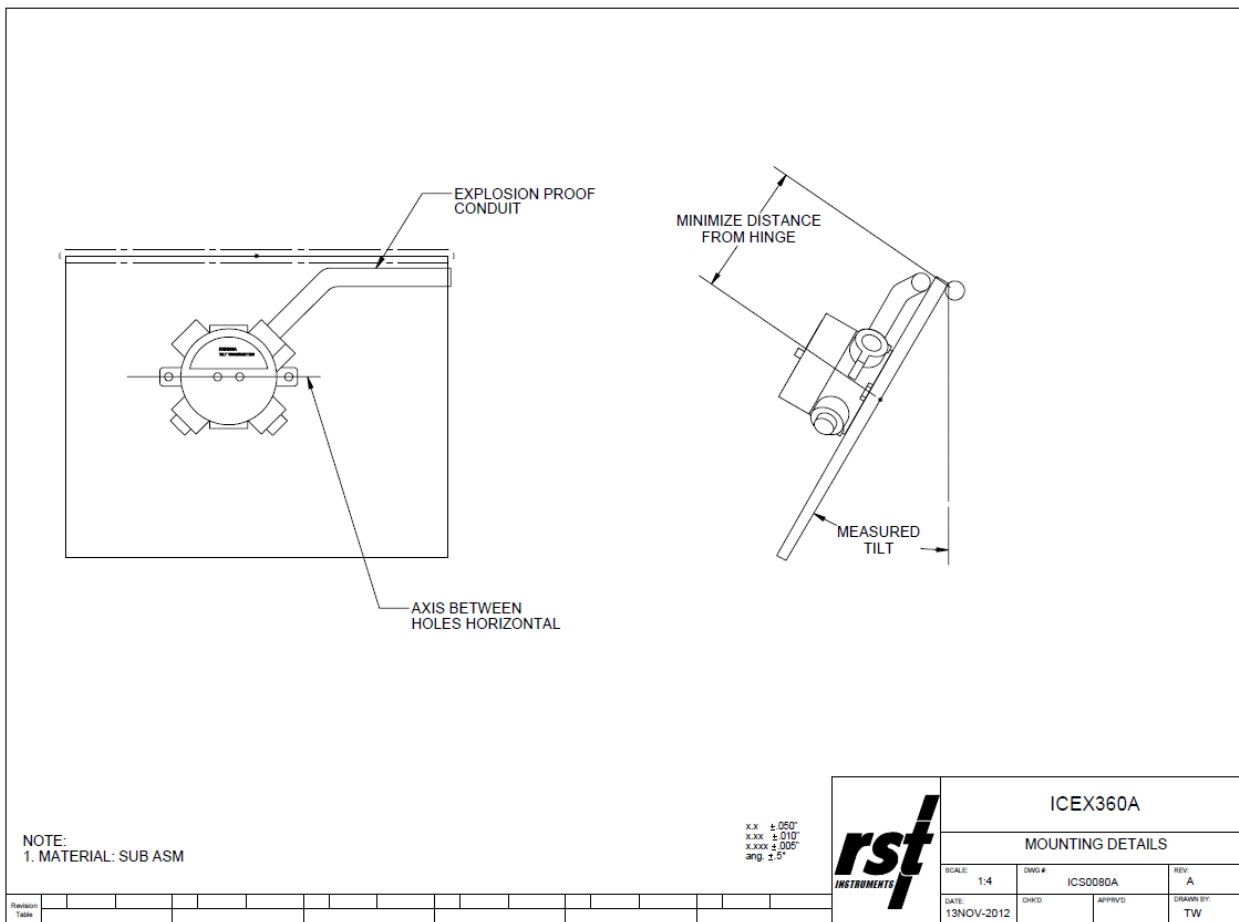


Figure 2: Mounting Details

4 ANALYZING THE DATA

The alignment of the 4mA point (minimum range), 20mA (maximum range), and the sensing polarity can be set either in the XZ plane or YZ plane at time of order. The range can be specified at time of order to any value between 0° to $+359^\circ$ (clockwise) or 0° to -359° (counterclockwise), provided that the sum of the two does not exceed 359° .

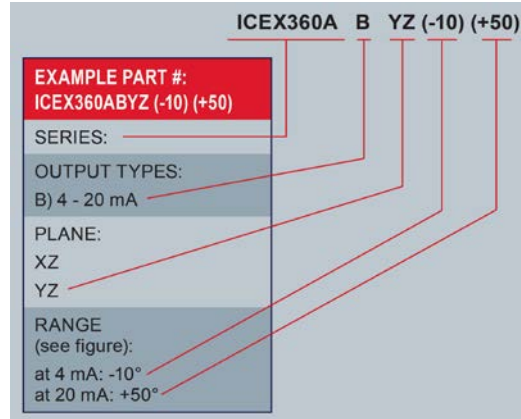


Figure 3: Ordering Details

In XZ plane, the Tilt Transmitter will read 4mA when the Tilt Transmitter is rotated counter-clockwise to its maximum range and will read 20mA when the Tilt Transmitter is rotated clockwise to its maximum range. The corresponding rotated angle can be determined from the supplied calibration certification.

For example, if the Tilt Transmitter is set to determine -10° to $+50^\circ$ at the time of order; the Tilt Transmitter will read 4mA when it is rotated counter-clockwise to -10° , and will read 20mA when it is rotated clockwise to $+50^\circ$ (see figure 3).

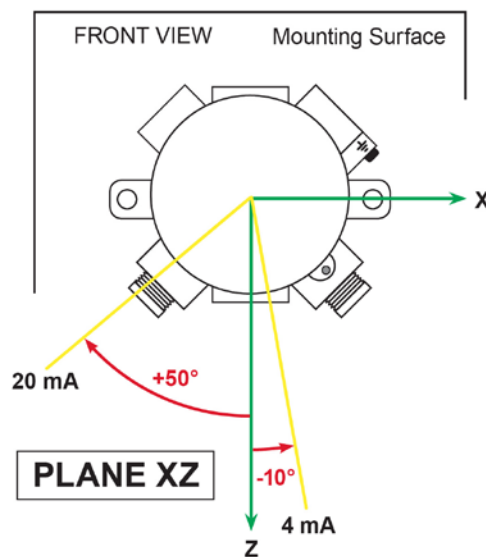


Figure 4: Rotation Details in XZ Plane

In YZ plane, the Tilt Transmitter will read 4mA when the Tilt Transmitter is tilted toward you to its maximum range and will read 20mA when the Tilt Transmitter is tilted away from you to its maximum range.

For example, if the Tilt Transmitter is set to determine -10° to $+50^{\circ}$ at the time of order; the Tilt Transmitter will read 4mA when it is tilted towards you -10° , and will read 20mA when it is tilted away from you $+50^{\circ}$ (see figure 4).

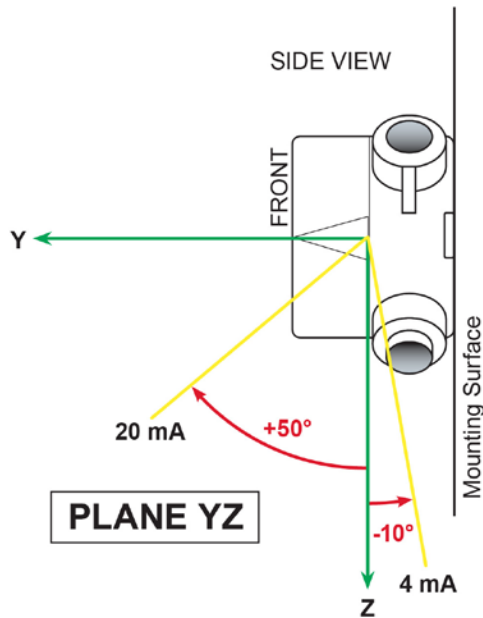


Figure 5: Rotation Details in YZ Plane

The output has minimum 5 degrees over/under range proportional compliance, and minimum 90 degrees over/under range clipped response i.e. the over range behavior is defined.

5 ELECTRICAL CONNECTION

The ICEX360A Tilt Transmitter is a 2-wire loop-powered current transmitter. It is designed to be inserted into a 24 VDC circuit. The Tilt Transmitter circuitry is isolated from the case to avoid current errors; the earth terminals are for convenient termination of the shield and conduit to the case.

The A and B terminals are interchangeable; reversal of their connections does not affect the operation of the device.

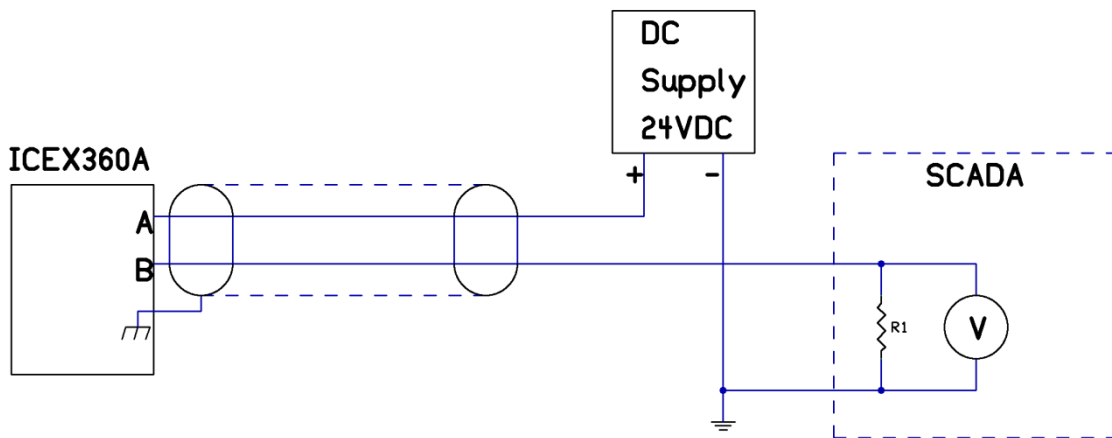


Figure 6: Electrical Connection

6 SEALED OPERATION

The Tilt Transmitter housing must be tightly sealed at the conduit entry, auxiliary connection ports, and cover, to meet explosion-proof and IP ratings. It is suggested that the conduit and entry and auxiliary port threads be sealed with Teflon tape to improve sealing and prevent galling/seizing.

7 SAMPLE CALIBRATION



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Calibration Record

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Hazardous Area Tilt Transmitter 4-20 mA

Customer: RST Instruments Ltd.
Order Number: xxxxx
Model Number: ICEX360A
Serial Number: xxxxx
Calibration Date: 28-Mar-13
Cable Length: 30 m
Cable Type: EL380004

Wiring:	Colour	Pin#	Function
	Red	A	Supply (9-24 V Input)
	Black	B	Current (4-20 mA Output)

References: Inclinator Frame RST-07
Digital Multimeter HP34401A s/n: US36053118
Referenced Annually To National Standards.

Applied Degrees θ	Expected Output (mA)	Measured Output (mA)
0	4.00	3.99
45	12.00	12.00
90	20.00	20.00

Calibrated By: W. Mok

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