



Inclinometers For Hazardous Locations

Current 0..24mA
Voltage 0..10V
Dual Axis
Up to 360°

2019

FLEX™ H6EX-A2 Installation Manual





H6EX-A2 Installation Manual

Rev B

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Sensor Description

The H6EX-A2 sensor is an Intrinsically Safe inclinometer that provides high accuracy, dual axis inclination over a range of $\pm 180^\circ$ for Hazardous Locations. It is ATEX/IECEX/MET (US)/CSA approved for use in Class 1, Division 1 and Zone 0 hazardous locations. The H6EX-A2 must be used with a certified isolation barrier.

This sensor incorporates MEMS accelerometers referenced to gravity with integrated temperature compensation over the full operating range of -40° to $+85^\circ\text{C}$ for absolute accuracy. It has both current and voltage analog output options available. Each output is linear with respect to the input angle directly.

The H6EX-A2 provides two continuous, fully configurable, analog outputs. These outputs are individually settable to current from 0mA to 24mA or voltage from 0V to 10V, are settable to either axis, and are factory configurable to match any angle range and min/max analog values.

Hazardous Location Information

Intrinsically safe equipment is defined as *“equipment which is incapable of releasing sufficient electrical or thermal energy under normal or abnormal conditions to cause ignition of a specific hazardous atmosphere mixture in its most easily ignited concentration.”*

The H6EX-A2 is ATEX and IECEX approved to:

Ex II 1G Ex ia IIC T4 Ga ($-40^\circ\text{C} \leq T_{\text{amb}} \leq +85^\circ\text{C}$)

Ex ia IIC T4 Ga ($-40^\circ\text{C} \leq T_{\text{amb}} \leq +85^\circ\text{C}$)

The H6EX-A2 is also US and Canada approved to:

Class I, Division 1, Groups A, B, C, D

Class I, Zone 0, AEx ia IIC T4 Ga ($-40^\circ\text{C} \leq T_{\text{amb}} \leq +85^\circ\text{C}$)

Certificate Numbers:

SEV 18 ATEX 0217

MET E114209

IECEX SEV 18.0042

The H6EX-A2 sensor is intrinsically safe and suitable for all areas except mining (Group II / Class 1), can be used in areas with continuous, long or frequent periods of exposure to hazardous gas (Zone 0 / Division 1), is suitable for explosive gas types Groups IIA to IIC and A to D, and has temperature group T4. It also has an extended operating temperature range of -40°C to $+85^\circ\text{C}$.

WARNING: If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

AVERTISSEMENT: Si l'équipement est utilisé de façon non spécifiée par le fabricant, la protection assurée par l'équipement peut être altérée.

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Applicable Standards

Normal Locations

- UL 61010 -1 3rd ed.-Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1
- CSA 61010-1 3rd ed. - Electrical Equipment For Measurement, Control, and Laboratory Use; Part 1
- IEC 61010-1:2017 ed. 3.1 - Safety requirements for electrical equipment for Measurement, Control, and Laboratory Use; Part 1

Hazardous Locations

- IEC60079-0:2011 - Electrical Apparatus for Explosive Gas Atmospheres Part 0: General Requirements
- EN60079-0:2012+A11:2013 - Electrical Apparatus for Explosive Gas Atmospheres Part 0: General Requirements
- CAN/CSA-C22.2 No. 60079-0:15 Explosive Atmospheres-Part 0: Equipment - General Requirements

Intrinsic Safety

- IEC60079-11:2011 - Electrical Apparatus for Explosive Gas Atmospheres Part 11: Intrinsic Safety "i"
- EN60079-11:2012- Electrical Apparatus for Explosive Gas Atmospheres Part 11: Intrinsic Safety "i"
- UL 913, 8th ed. - Intrinsically Safe Apparatus and Associated Apparatus for use in Class I, II, and III, Division 1, Hazardous (Classified) Locations.
- CAN/CSA-C22.2 No. 60079-11:14 Explosive Atmospheres Part 11: Equipment protection by Intrinsic Safety "i"

EMC

- EN 61326-1:2013 - Electrical equipment for measurement, control and laboratory use – EMC requirements
- 47 CFR Ch. 1 - FCC Part 15 Class A - Radio Frequency Devices - Subpart B - Unintentional Radiators
- ICES-003 - Issue 6 January 2016 Class A -Interference-Causing Equipment Standard - Digital Apparatus

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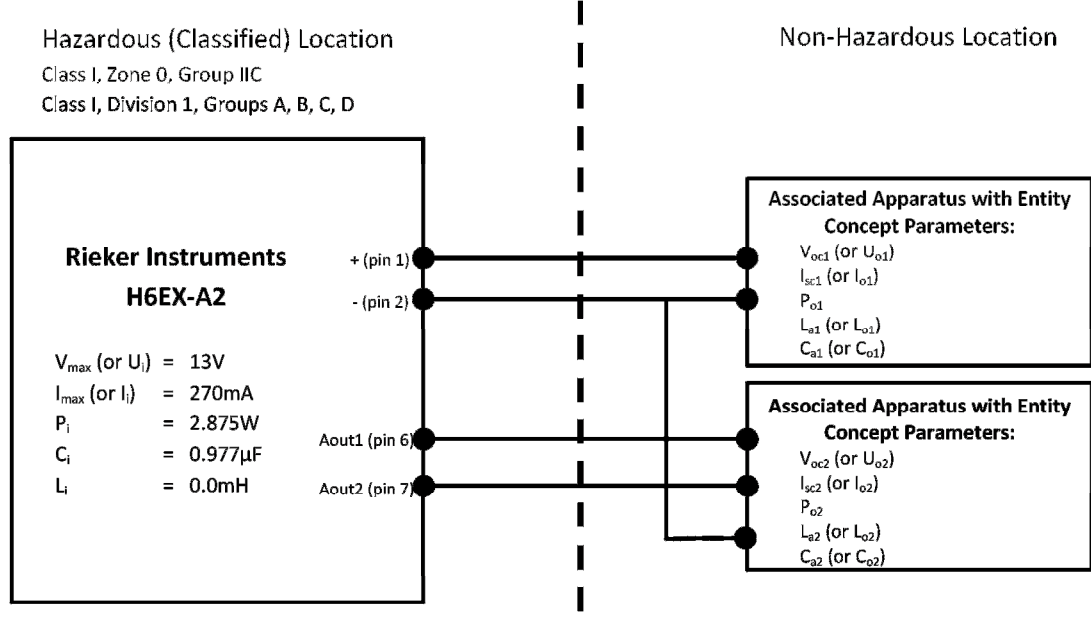
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H6EX-A2 Instructions for Safety

Putting into Service

The H6EX-A2 must be used with a certified Isolation Barrier to supply a nominal +12VDC. The H6EX-A2 has the following entity parameters:

FIGURE 1: H6EX-A2 Control Drawing



Notes:

- The H6EX-A2 requires two barriers for operation:
 - A barrier to supply a nominal 12VDC to the unit (pins 1 and 2).
 - A barrier to protect the two analog outputs (pins 6 and 7).
- $V_{oc1}, V_{oc2} \leq V_{max}$ (or U_i) (See note C)
 $I_{sc1} + I_{sc2} \leq I_{max}$ (or I_i)
 $P_{o1} + P_{o2} \leq P_i$
 $C_a \geq C_i + C_{cable}$
 $L_a \geq L_i + L_{cable}$
- The H6EX-A2 ground (pin 2) and all attached barrier grounds MUST be connected together so that V_{max} never exceeds its allowed voltage.
- I_{max} (or I_i) is the sum current of all attached barriers.
- All grounding path connections should be secure, permanent, visible, and accessible. The grounding path resistance from the farthest barrier to the grounding electrode should not exceed 1 ohm.
- The installation must be in accordance with the National Electrical Code, NFPA 70, Articles 504 and 505, Canadian Electrical Code C22.1 Section 18, and ANSI/ISA-RP12.06.01.

Use

The sensor is designed to measure dual-axis inclination and output an analog signal.

Assembling and Dismantling

The H6EX-A2 shall not be serviced, dismantled, or re-assembled by the user.

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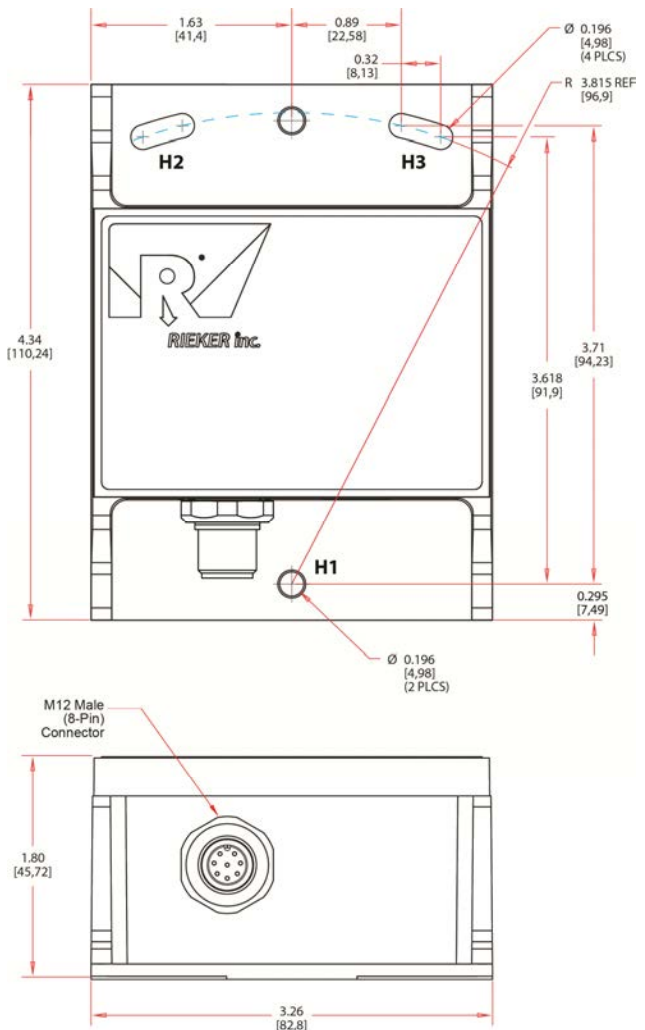
Maintenance

No maintenance is required.

Installation and Mounting

1. On the mounting plane, prepare surface with three tapped holes, H1-H3 for M4/M4.5 mounting screws. H2& H3 are 3.815" [96.9mm] from H1. See *Figure 2*. NOTE that the single hole on the side with the two slots is not meant to be used for mounting.
2. Mount inclinometer to mounting plane using M4/M4.5 mounting screws. Use the two slots for fine adjustments.

FIGURE 2: H6EX-A2 Dimensions and Mounting (Inches [Mm])



Default Horizontal Mount Option: Axis Orientation

The 0° orientation for the horizontal-mount option H6EX-A2 is a desktop, level position.

- For the X-axis, looking at the unit from the side with the connector facing to the right (top right of *Figure 3*), a clockwise rotation from the zero position is considered positive and a counter-clockwise rotation from the zero position is considered negative.
- For the Y-axis, looking at the unit from the front with the connector facing towards you (top left of *Figure 3*), a clockwise rotation from the zero position is considered positive and a counter-clockwise rotation from the zero position is considered negative.

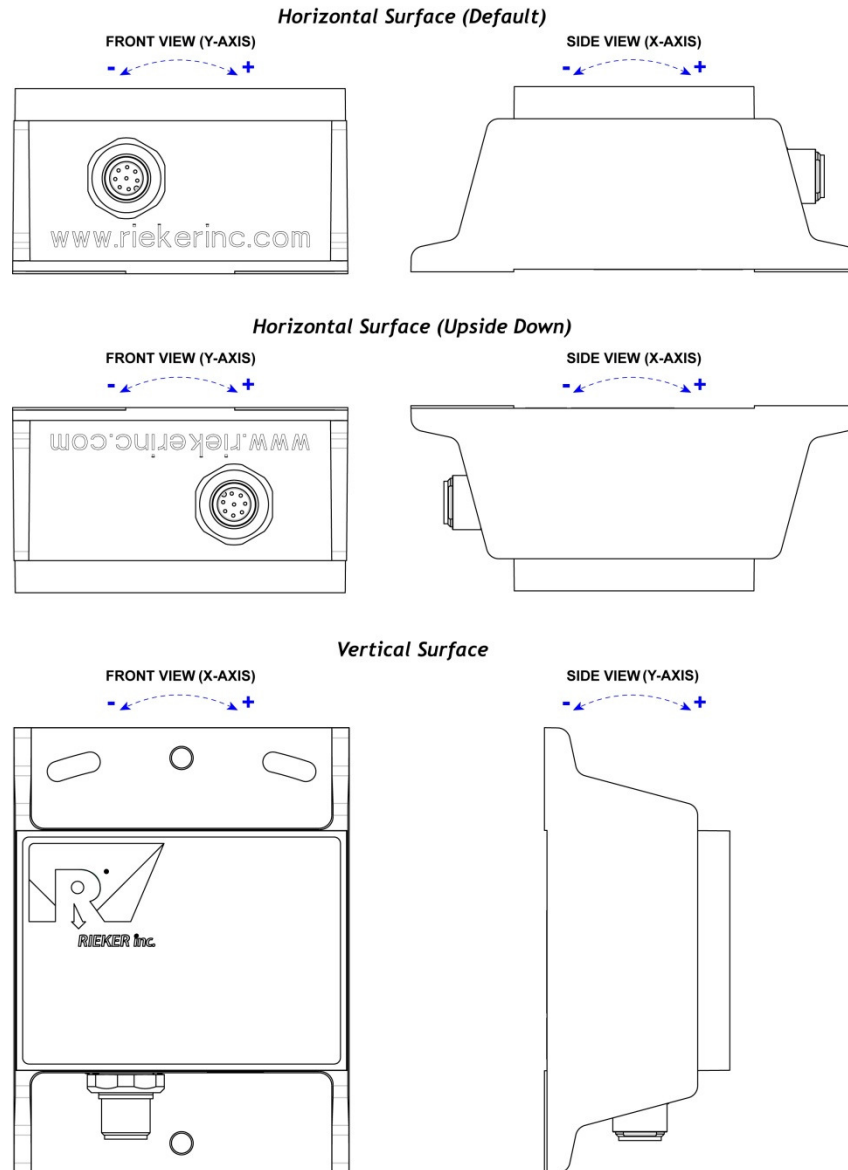
Alternate Vertical Mount Option: Axis Orientation

The 0° orientation for the vertical-mount option of the H6EX-A2 is a vertical position with the connector down.

- For the X-axis, looking at the unit from the top side with the connector facing down (bottom left of *Figure 3*), a clockwise rotation from the zero position is considered positive and a counter-clockwise rotation from the zero position is considered negative.
- For the Y-axis, looking at the unit from the side with the connector facing down and the mounting surface to the left (bottom right of *Figure 3*), a clockwise rotation from the zero position is considered positive and a counter-clockwise rotation from the zero position is considered negative.

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FIGURE 3: H6EX-A2 Axis Orientations



Adjustment

No mechanical adjustment is required.

No software adjustments of H6EX-A2 analog output parameters are permitted. Scaled analog parameters can be factory-set only and must be selected at time of purchase.

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Markings

The H6EX-A2 shall be marked with the following markings:

FIGURE 4: Top Surface Markings for Model and Hazardous Location Information

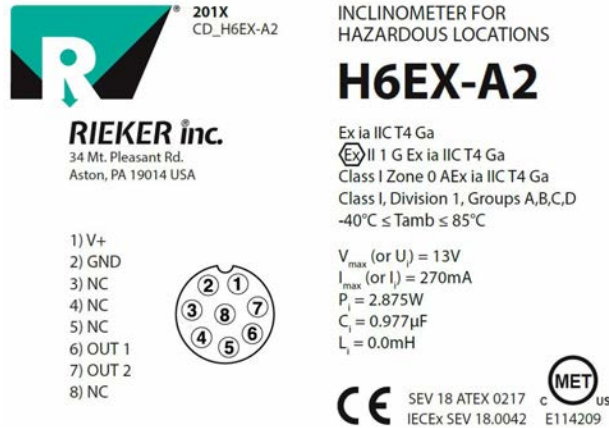
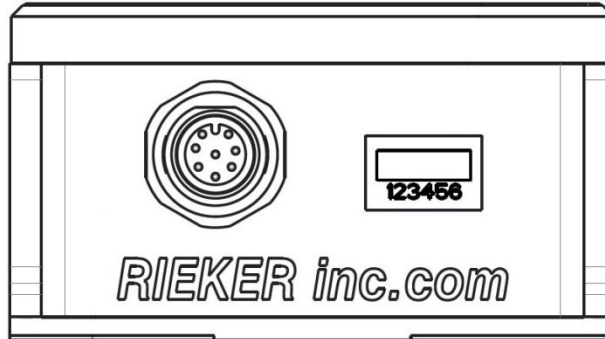
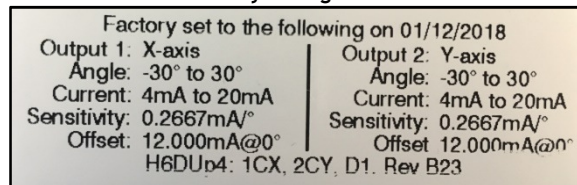


FIGURE 5: Front Surface Markings for Serial Number



In addition, the factory defaults label, located on the box of the H6EX-A2 sensor, provides the configured analog output parameters.

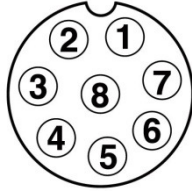
FIGURE 6: Factory Configured Defaults Label



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H6EX-A2 Connector Wiring Tables

| TABLE 1: H6EX-A2 MALE 8-PIN INPUT CONNECTOR WIRING | |
|--|-----------------------|
| PIN | FUNCTION |
| 1 | SUPPLY VOLTAGE +12VDC |
| 2 | POWER / SIGNAL COMMON |
| 3 | NO CONNECTION |
| 4 | NO CONNECTION |
| 5 | NO CONNECTION |
| 6 | ANALOG OUTPUT 1 |
| 7 | ANALOG OUTPUT 2 |
| 8 | NO CONNECTION |



M12 (male 8-pin)
Pin Assignment
FRONT VIEW

| TABLE 2: CURRENT SENSE | | |
|--|-----------------|----------------|
| <p>R_{sense} is dependent upon supply voltage and cable/wire resistance. Ensure the following equation is met:</p> $R_{sense} \leq \frac{V_{supply} - 2.5}{0.020} - R_{wire}$ | QUICK REFERENCE | |
| | SUPPLY VOLTAGE | SENSE RESISTOR |
| | 12V | 200-350 OHMS |

NOTE: The H6EX-A2 Sensor's Chassis Ground is NOT the same as the signal ground for the current output return. The analog output return must be connected to the POWER/SIGNAL COMMON (pin 2).

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