

# LIMIT SWITCH

## Hawkeye - HX

Magnetic Solid State Proximity Sensors

Installation, Maintenance and  
Operating Instructions

(HX\_\_\_\_\_)



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**READ THESE INSTRUCTIONS FIRST!**

These instructions provide information about safe handling and operation of the limit switch.  
If you require additional assistance, please contact the manufacturer or manufacturer’s representative.  
Address and phone numbers are printed on the back cover.

**SAVE THESE INSTRUCTIONS!**

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# Model Guide

## SERIES

**HX** Explosionproof

## SENSOR TYPE

- XX** Special
- 35** SST (8-25VDC/20-250VAC)
- 44** NAMUR (IS; EN 60947-5-6)

## ENCLOSURE

- X** Special
- S** Stainless Steel

## CONDUIT ENTRY

- XX** Special
- 01** (1) 1/2"-14 NPT
- 02** (1) M20 x 1.5

## FEATURES

- X** Special
- S** Standard

## BRANDING

- A** StoneL
- M** Metso

### MODEL NUMBER

### Partnership ID\*

\*Some models may include 5-digit suffix for partnership identification

#### Model number example

**HX 35 S 01 S M - (optional)**

## **WARNINGS**



1. **Never remove enclosure cover or make/break electrical connections with power connected to unit.**
2. **Perform all wiring in accordance with site and local codes, as well as with the National Electric Code ANSI-NFPA-70 (US) or the Canadian Electric Code Part I (Canada) for the appropriate area classifications.**
3. **Confirm that the HX model being installed is approved for the hazardous area (found on unit identification label).**
4. **Confirm that supply power to switches is within rated specifications listed on the unit identification label.**
5. **Protect the unit from exposure to aggressive substances or atmospheres to ensure that hazard rating is not compromised.**

## **Description and Principles of Operation**

### **Description**

The StoneL Hawkeye HX models are magnetic solid state sensors encapsulated in a 316 stainless steel casing sealed with epoxy resin and shock absorbent potting compound. The Hawkeye HX models feature an integral 3-conductor cable, conduit entry, and externally threaded casing for ease of mounting and position adjustment. They are supplied with threaded, encapsulated magnetic triggering bolts that facilitate adjustment of the gap between the HX unit and the triggering mechanism.

### **Principles of Operation**

The StoneL Hawkeye HX models operate on the principle of magnetic solid state technology, reacting to ferromagnetic actuators as they come within range of the sensor's sensing range. All HX sensors, when actuated by the presence of a ferromagnetic trigger, change the state of the electrical circuit output .

## **IECEX/ATEX Conditions of Safe Use**

1. Encapsulating compound must be protected from UV radiation.
2. Cable entry thread is either M20 x 1.5 or 1/2-14 NPT.
3. Only suitably approved cable glands may be used.
4. The integral supply cable must be mechanically protected and terminated in a suitable terminal or junction facility.
5. An external earth bonding connection may be maintained by either the external mounting thread and/or the grounding wire of the integral cable.
6. **WARNING: DO NOT OPEN PRODUCT IN HAZARDOUS AREA**

## **Installation**

1. Sensor and trigger may be mounted in any position. Individually, side-by-side, at 90° from each other, or facing each other at a minimum of 3" apart.
2. Locate sensor and/or trigger to assure that the trigger comes within sensor's sensing range.
3. Avoid contact between sensor and trigger, as this may damage the unit.
4. Keep all magnetic material at least 1 inch away from sensor.
5. For best results, use the ferromagnetic trigger supplied with each sensor.

## **Field Wiring**

1. Attach conduit or cable correctly.
2. All conduit connected electrical devices must be sealed against water intrusion through the conduit system. Properly installed conduit will have a drip loop with provision for water to escape. Additional protection against water ingress can be obtained by carefully filling the HX conduit entry with electrical grade RTV.
3. When using long runs of conduit or cable, place supports close to the switch to avoid pulling switch out of position.
4. For installation in hazardous locations, check local electrical codes.

## General Specifications

**General specifications**

Conduit Connection: 1/2-14 NPT or M20x1.5  
 Integral Cable: 72" (1.8 meters) length, three conductor  
 18AWG multi-strand, PVC jacket,  
 -50C to 105C rated

Sensing Distance: 0.236" (6mm) with supplied trigger  
 Operating Temperature: -40° C to 80° C (-40° F to 176° F)  
 Enclosure Protection: 4, 4X & 6  
 Ingress Protection : IP66 / IP68 (3m / 48h)  
 Operating Life: Unlimited  
 Warranty: Five years

**Materials of construction**

Housing and Fasteners: 316 Stainless Steel  
 Trigger: Permanent magnet epoxied into 316 a  
 stainless steel bolt

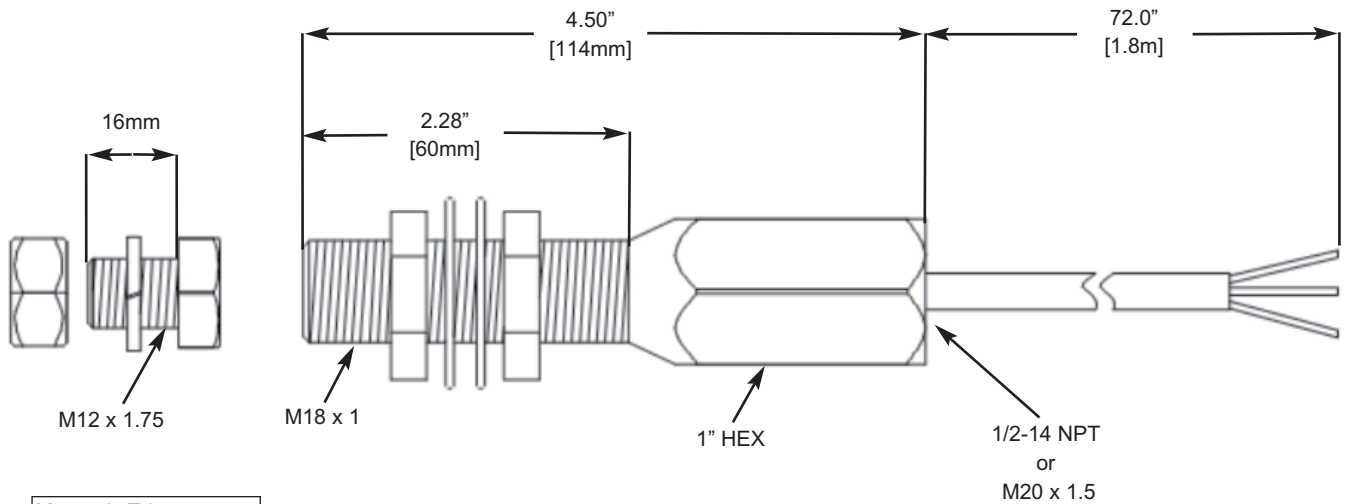
**Ratings**

Explosionproof: All switch models  
 Nonincendive: All switch models  
 Intrinsically safe: HX44 models only

**Approvals\***

See StoneL.com/approvals  
 \*Only models listed on StoneL's official website are approved for specific  
 hazardous locations/ratings.

## Dimensions Inches [mm]



Magnetic Trigger, nuts,  
 and washers provided  
 with each sensor.

## HX35 Specifications and Wiring Schematic

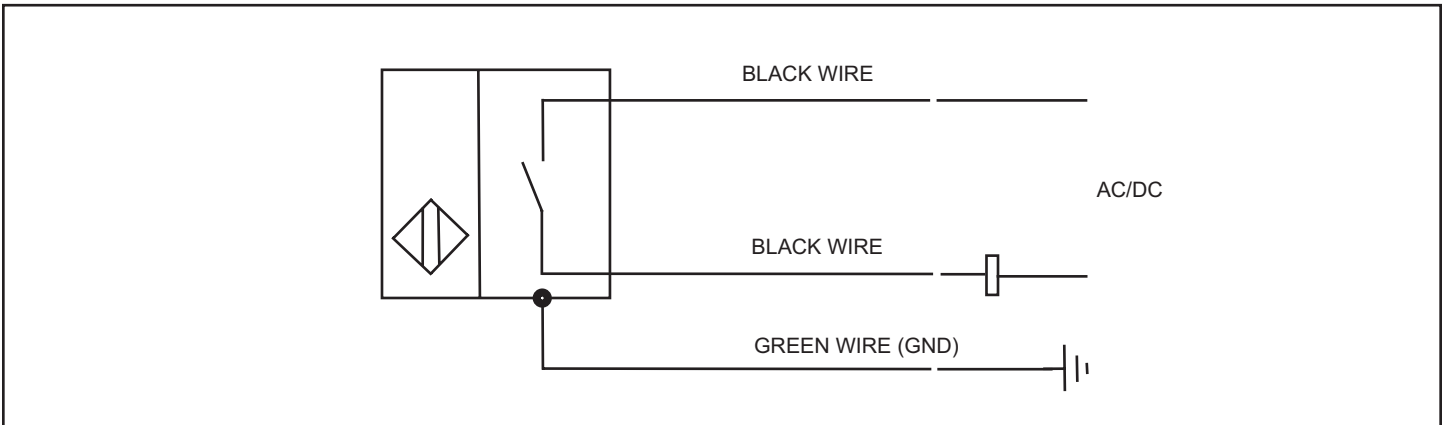
### HX35\_\_ Sensor Ratings

Configuration:	2-wire AC/DC solid state NO	Maximum Current:	300mA (sustained)
Voltage Range:		Max Inrush Current:	1A
AC	20-250VAC	Voltage Drop (max):	6.5 volt @ 10mA
DC	8-250VDC		7.2 volt @ 100mA
Minimum Current:	0.5mA	Switching Frequency:	20Hz
Leakage Current:		Sensing Range:	0.236" (6mm) with supplied trigger
AC	0.12mA (nominal)	Repeatability:	0.005" (0.127mm)
DC	0.01mA (nominal)	Hysteresis:	6mm target distance 0.04" (1.02mm)

**To Bench Test a HX35 Sensor:** Use a 24VDC power supply with series load resistor (2K - 6K  $\Omega$ ) and a multi-meter set to read DC mA. Sensors are not polarity sensitive. Max current flow = sensor triggered; Minimum current flow (<0.2mA) = sensor not triggered; No current flow = sensor faulty.

**WARNING:**

**FAILURE TO USE A SERIES LOAD RESISTOR WHEN BENCH TESTING SENSOR WILL RESULT IN PERMANENT DAMAGE TO THE UNIT**

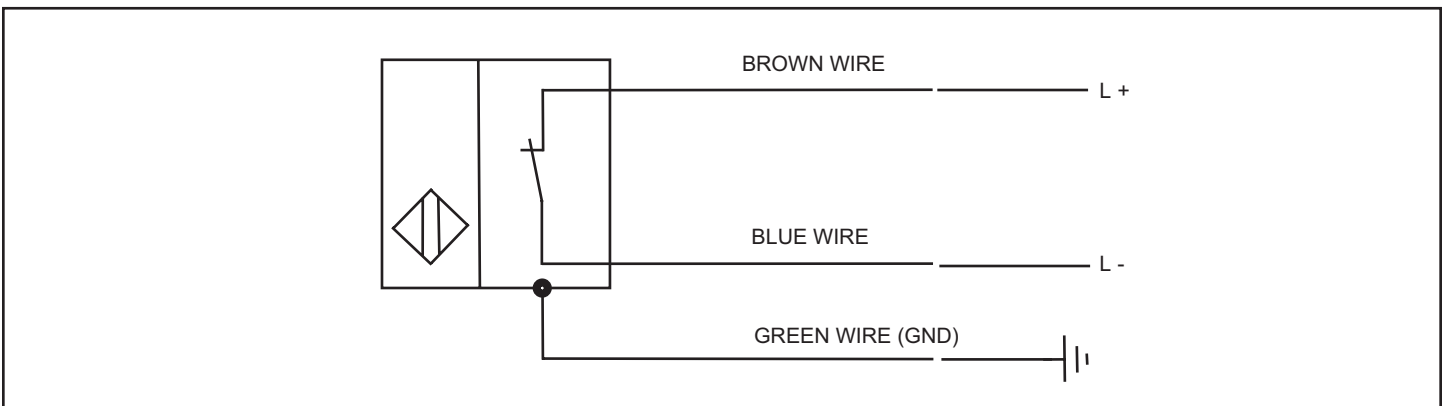


## HX44 Specifications Wiring Schematic

### HX44\_\_ Sensor Ratings

Configuration:	Namur NC (EN 60947-5-6)	Switching Frequency:	20Hz
Voltage Range:	5-29VDC	Sensing Range:	0.236" (6mm) with supplied trigger
Current Consumption:		Repeatability:	0.005" (0.127mm)
Trigger not present	>3.0mA	Hysteresis:	6mm target distance 0.04" (1.02mm)
Trigger present	<1.0mA		
See pages 7 and 8 for Entity Parameters			

**To Bench Test a HX44 Sensor:** Use a 24VDC power supply and a multi-meter set to read DC mA. Sensors are polarity sensitive. No series load resistor required. Sensor not triggered = >3.0mA; Sensor triggered; = <1.0mA; No current flow = sensor faulty.

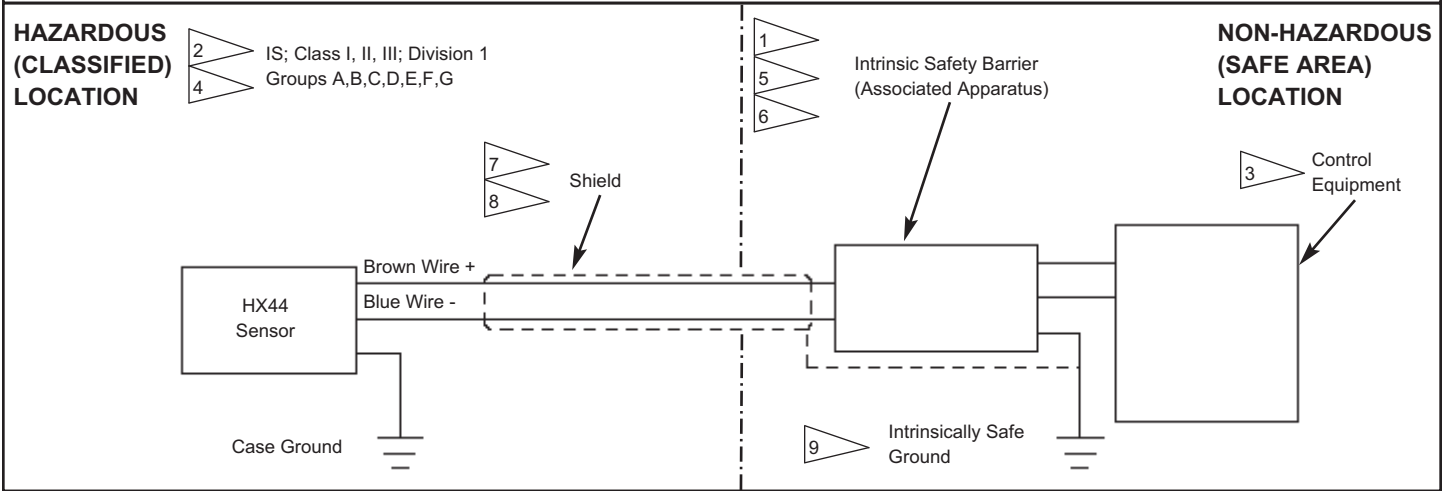


## HX44 Intrinsic Safety Hazardous Location Installation Diagram (NEC/CEC)

### Hawkeye HX44 models approved for Intrinsically Safe Installations:

(Class I, II, III; Division 1; Gas Groups A, B, C, D, E, F, G)

HX44S01SA; HX44S02SA; HX44S01SM; HX44S02SM



### FM (US) INSTALLATION NOTES:

**HX44 Entity Parameters:**  $U_i = 22 \text{ Vdc}$ ;  $i_i = 120 \text{ mA}$ ;  $C_i = 5.0 \text{ nF}$ ;  $L_i = 4.0 \text{ mH}$ ;  $P_i = 2.0 \text{ W}$

1.  $V_{oc}$  or  $V_t \leq V_{max}$ ,  $I_{sc}$  or  $I_t \leq I_{max}$ ,  $C_a \geq C_i + C_{cable}$ ,  $L_a \geq L_i + L_{cable}$ .
2. For Class II and III, Division 1 installations, where conduit is not used, use Listed dust-tight cable-gland fittings.
3. Control equipment connected to intrinsic safety barrier must not use or generate more than 250 Vrms or Vdc.
4. Installation should be in accordance with ANSI/ISA RPA12.6 "Installation of Intrinsically Safe Systems for Hazardous (Classified) Locations" and the National Electrical Code (ANSI/NFPA 70).
5. The configuration of the intrinsic safety barrier for each Hawkeye sensor must be FMRC Approved.
6. Intrinsic safety barrier manufacturer's installation drawing must be followed when installing this equipment.
7. To maintain intrinsic safety, wiring associated with each Hawkeye sensor must be run in separate cables or separate shields connected to intrinsically safe (associated apparatus) ground.
8. Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
9. Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.

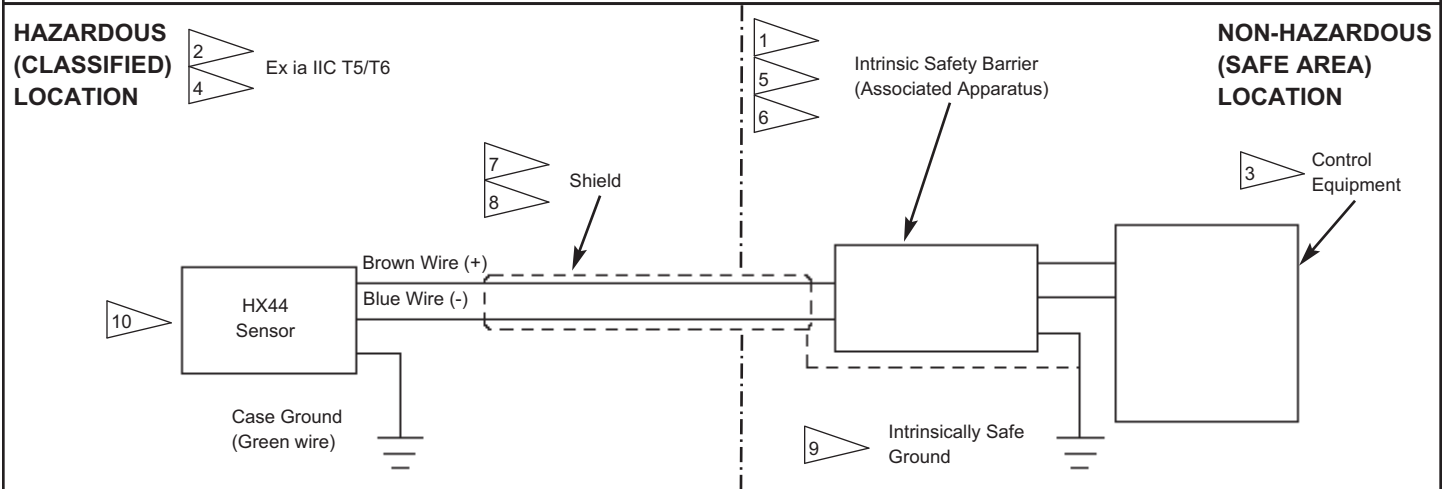
### CANADIAN INSTALLATION NOTES:

1. Barrier must be a Canadian Certified, Single Channel grounded Shunt Diode Zener Barrier or a Single Channel Isolating Barrier, or; One dual-channel or two single-channel barriers may be used where both channels have been Certified for use together with combined entity parameters.
2. For Class II and III, Division 1 installations, where conduit is not used, use Canadian Certified dust-tight cable gland fittings.
3. Control equipment connected to Intrinsic Safety barriers must not use or generate more than 250 VRMS or VDC.
4. Install in accordance with the Canadian Electrical Code.
5. The configuration of intrinsic safety barriers for each Hawkeye sensor must be Canadian Certified.
6. Intrinsic safety barrier manufacturer's installation drawing must be followed when installing this equipment.
7. To maintain intrinsic safety, wiring associated with each Hawkeye sensor must be run in separate cables or separate shields connected to intrinsically safe (associated apparatus) ground.
8. Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
9. Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.

## HX44 Intrinsic Safety Hazardous Location Installation Diagram (IEC)

### Hawkeye HX44 models approved for Intrinsically Safe Installations: (Ex ia IIC T5/T6)

HX44S01SA; HX44S02SA; HX44S01SM; HX44S02SM



### INSTALLATION NOTES (Ex ia IIC T5/T6):

**HX44 Entity Parameters:**  $U_i = 22 \text{ Vdc}$ ;  $I_i = 120 \text{ mA}$ ;  $C_i = 5.0 \text{ nF}$ ;  $L_i = 4.0 \text{ mH}$ ;  $P_i = 2.0 \text{ W}$

1.  $V_{oc}$  or  $V_t \leq U_i$ ,  $I_{sc}$  or  $I_t \leq I_i$ ,  $C_a \geq C_i + C_{cable}$ ,  $L_a \geq L_i + L_{cable}$ .
2. Dust-tight conduit seal must be used when installed in Zone 20, Zone 21, and Zone 22 environments or where Ingress Protection of IP67 is required.
3. Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc.
4. Installation should be in accordance with appropriate local code or practice.
5. The configuration of associated apparatus for each sensor wiring pair or solenoid wiring pair must be approved.
6. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
7. To maintain intrinsic safety, wiring associated with each sensor or solenoid coil wiring must be run in separate cables or separate shields connected to intrinsically safe (associated apparatus) ground.
8. Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
9. Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.
10. Parts of the enclosure are non-conducting and may generate an ignition-capable level of electrostatic charge under certain extreme conditions. The user should ensure that the equipment is not installed in location where it may be subjected to external conditions (such as high-pressure steam) which might cause a build-up of electrostatic charge on non-conducting surfaces. Additionally, cleaning of the equipment should only be done with a damp cloth.
11. Substitution of components may impair hazardous location safety.

#### Specific Conditions of Use:

1. When used within a Zone 0 location, the stainless steel enclosure shall be installed in such manner as to prevent the possibility of sparks resulting from friction or impact.
2. To prevent the risk of electrostatic sparking, the equipment enclosure shall be cleaned only with a damp cloth.