

Hawkeye™ HX by StoneL

Magnetic solid state proximity sensors

Installation, Maintenance and
Operating instructions



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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!

Subject to change without notice.
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Model Guide

SERIES	
HX	Explosionproof
SENSOR TYPE	
XX	Special
35	SST (8-25VDC/20-250VAC)
45	NAMUR (IS; EN 60947-5-6)
ENCLOSURE	
X	Special
S	Stainless Steel North American Approvals (NEC/CEC)
T	Stainless Steel International Approvals (ATEX/IECEX)
CONDUIT ENTRY	
XX	Special
01	(1) 1/2"-14 NPT
02	(1) M20 x 1.5
03	Cable Gland (Ex d) (required with T enclosure)
FEATURES	
X	Special
S	Standard
BRANDING	
A	StoneL
M	Neles

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
 Cable Diameter: 0.350" (8.9mm)
 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 316ss bolt

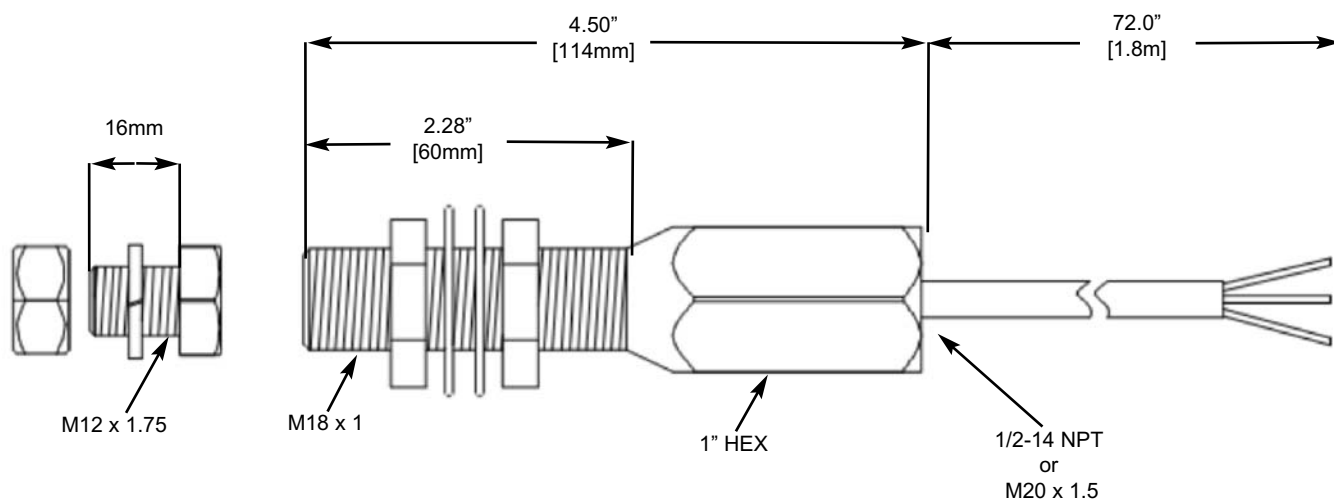
Ratings

Explosionproof: All switch models
 Nonincendive: All switch models
 Intrinsically safe: HX45 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.

Note:
Conduit/Connector option 03 units
come with Ex d cable gland installed.

HX35 Specifications and Wiring Schematic

HX35__ Sensor Ratings

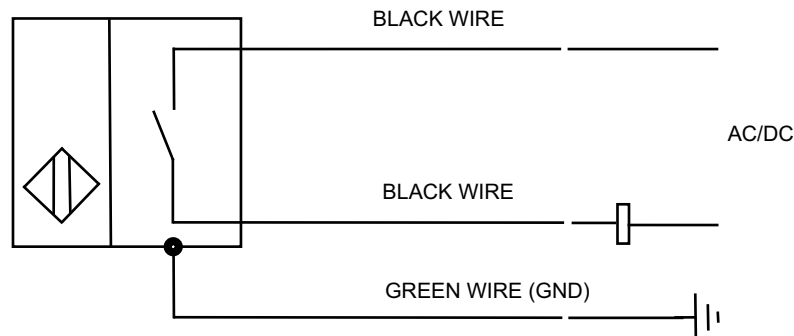
Configuration:	2-wire AC/DC solid state NO
Voltage Range:	
AC	20-250VAC
DC	8-250VDC
Minimum Current:	0.5mA
Leakage Current:	
AC	0.12mA (nominal)
DC	0.01mA (nominal)

Maximum Current:	100mA (sustained)
Max Inrush Current:	1A
Voltage Drop (max):	6.5 volt @ 10mA
	7.2 volt @ 100mA
Switching Frequency:	20Hz
Sensing Range:	0.236" (6mm) with supplied trigger
Repeatability:	0.005" (0.127mm)
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 Ω) 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



HX45 Specifications Wiring Schematic

HX45__ Sensor Ratings

Configuration:	Namur NC (EN 60947-5-6)
Voltage Range:	5-29VDC
Current Consumption:	
Trigger not present	>3.0mA
Trigger present	<1.0mA

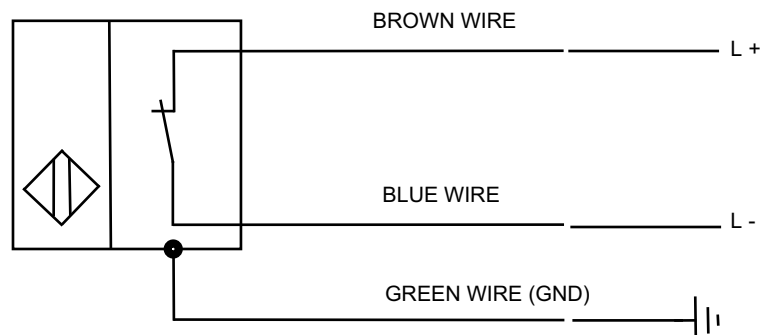
Switching Frequency:	20Hz
Sensing Range:	0.236" (6mm) with supplied trigger
Repeatability:	0.005" (0.127mm)
Hysteresis:	6mm target distance 0.04" (1.02mm)

See pages 7 and 8 for the Controlled Installation Drawings and Entity Parameters

NOTE

The HX45 is a Namur intrinsic safety sensor, it must be used with either a Namur sensor compatible intrinsic safety barrier or a PLC/DCS input designed specifically for Namur sensors. Namur sensors are not compatible with conventional discrete input cards.

To Bench Test a HX45 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.

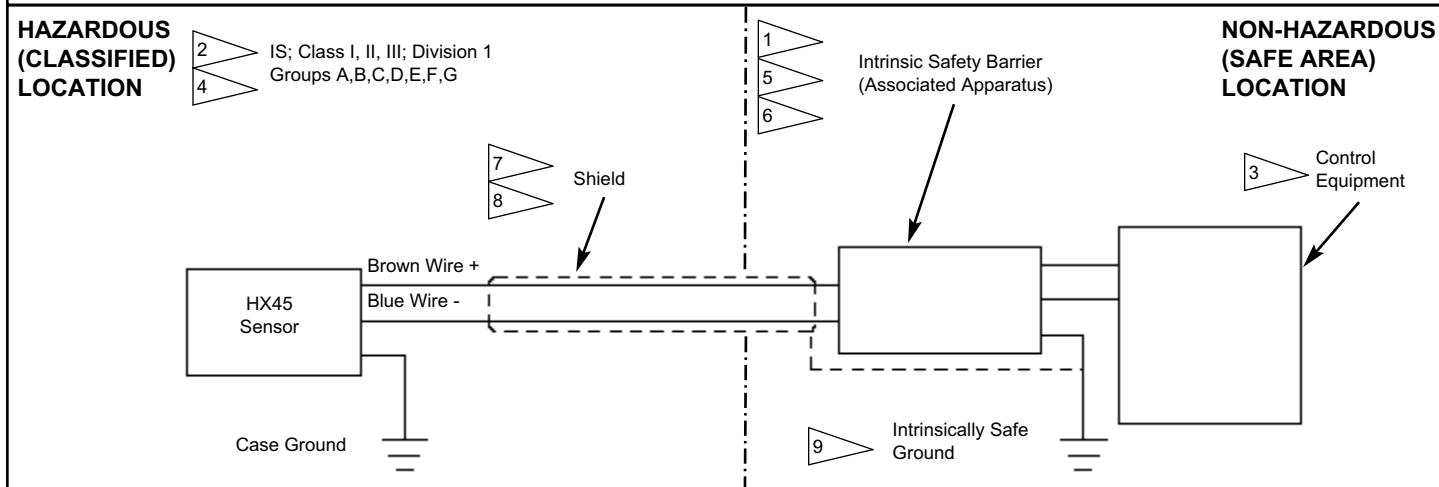


HX45 Intrinsic Safety Hazardous Location Installation Diagram (NEC/CEC)

Hawkeye HX45 models approved for Intrinsically Safe Installations:

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

HX45S01SA; HX45S02SA; HX45S01SM; HX45S02SM



FM (US) INSTALLATION NOTES:

HX45 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.

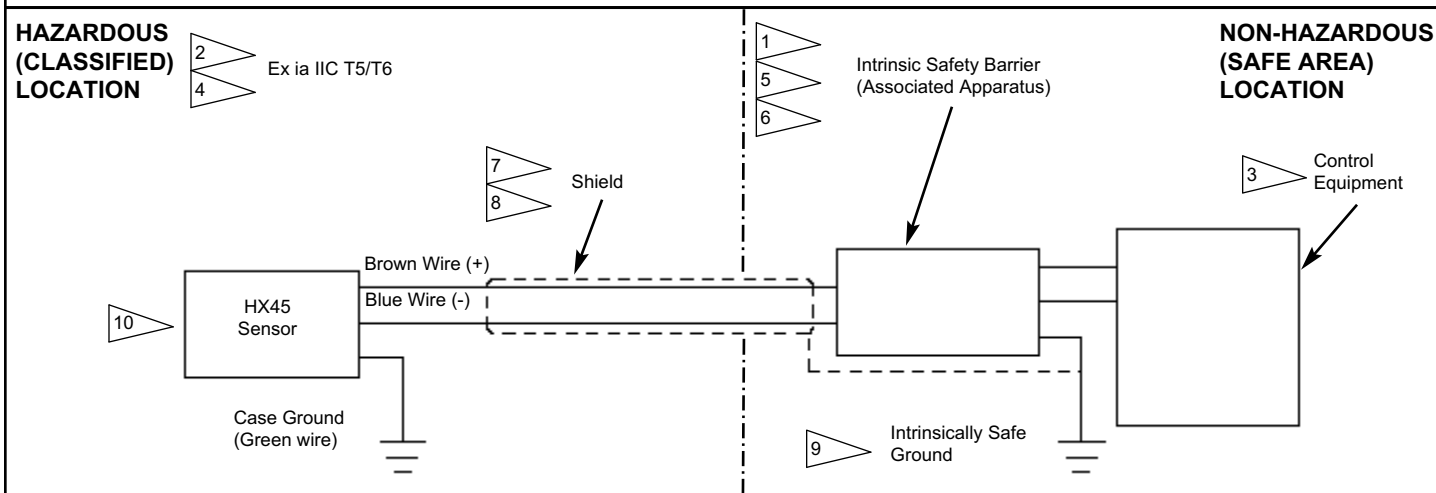
CANADIAN INSTALLATION NOTES:

- 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.

HX45 Intrinsic Safety Hazardous Location Installation Diagram (IEC)

Hawkeye HX45 models approved for Intrinsically Safe Installations: (Ex ia IIC T5/T6)

HX45T01SA; HX45T02SA, HX45ST03SA; HX45T01SM; HX45T02SM; HX45T03SM



INSTALLATION NOTES (Ex ia IIC T5/T6):

HX45 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** 1. $V_{oc} \text{ or } V_t \leq U_i$, $I_{sc} \text{ or } I_t \leq I_i$, $C_a \geq C_i + C_{cable}$, $L_a \geq L_i + L_{cable}$.
- 2** 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** 3. Control equipment connected to barrier must not use or generate more than 250 Vrms or Vdc.
- 4** 4. Installation should be in accordance with appropriate local code or practice.
- 5** 5. The configuration of associated apparatus for each sensor wiring pair or solenoid wiring pair must be approved.
- 6** 6. Associated apparatus manufacturer's installation drawing must be followed when installing this equipment.
- 7** 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** 8. Conduit Grounding - Upon installation verify electrical continuity between conduit and ground terminal.
- 9** 9. Resistance between Intrinsic Safe Ground and earth ground must be less than one ohm.
- 10** 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.

DECLARATION OF CONFORMITY

Manufacturer:

Neles USA Inc. dba StoneL
26271 US Highway 59
Fergus Falls, Minnesota 56537 USA

Products:

Hawkeye HX Series – Valve Position Sensor

Model - Type	Certificates / Directives / Standards	Marking
HX Series	EU Type Examination Certificate FM15ATEX0038X ATEX 2014/34/EU EN IEC 60079-0:2018, EN 60079-1:2014, EN 60079-31:2014 EMC 2014/30/EU EN 60947-5-2:2007/A1:2012	 2809 ATEX II 2 G Ex db IIC T6...T5 Gb ATEX II 2 D Ex tb IIIC T100°C Db
HX Series	EU Type Examination Certificate FM15ATEX0045X ATEX 2014/34/EU EN IEC 60079-0:2018, EN 60079-11:2012 EMC 2014/30/EU EN 60947-5-2:2007/A1:2012	 2809 ATEX II 1 G Ex ia IIC T6...T5 Ga ATEX II 1 D Ex ia IIIC T135°C Da
HX Series	IECEx Certificate of Conformity IECEx FMG 13.0007X IEC 60079-0:2017, IEC 60079-1:2014-06, IEC 60079-11:2011, IEC 60079-31:2013	Ex db IIC T6...T5 Gb Ex tb IIIC T100°C Db Ex ia IIC T6...T5 Ga Ex ia IIIC T135°C Da
HX Series	EMC 2014/30/EU EN 60947-5-2:2007/A1:2012	

ATEX Notified Bodies for EU Type Examination Certificates:

FM Approvals Europe Ltd., Dublin, Ireland (Notified Body Number 2809)

We declare under our sole responsibility that the products, as described, are in conformity with the listed standards and directives.

Fergus Falls, 1st January 2022



Bryan Beckman, Quality Manager
Authorized Person of the Manufacturer

SPECIFIC CONDITIONS OF USE / MARKING

For HX Series – FM15ATEX0038X	
Specific Conditions of Use	Marking
1. The integral supply cable shall be mechanically protected and terminated in a suitable terminal or junction facility. 2. Using the box provided on the HX45T03 nameplate, the user shall permanently mark the Type of Protection chosen for the specific installation. Once the Type of Protection has been marked it shall not be changed. 3. The earth bonding connection shall be maintained by either the external mounting thread and/or the earthing wire of the integral cable.	ATEX II 2 G Ex db IIC T5 Gb Ta = -40°C to +80°C ATEX II 2 G Ex db IIC T6 Gb Ta = -40°C to +65°C ATEX II 2 D Ex tb IIIC T100°C Db Ta = -40°C to +80°C
For HX Series – FM15ATEX0045X	
Specific Conditions of Use - Notes	Marking
1. The integral supply cable shall be mechanically protected and terminated in a suitable terminal or junction facility. 2. Using the box provided on the HX45T03S nameplate, the user shall permanently mark the Type of Protection chosen for the specific installation. Once the Type of Protection has been marked it shall not be changed. 3. The earth bonding connection shall be maintained by either the external mounting thread and/or the earthing wire of the integral cable.	ATEX II 1 G Ex ia IIC T5 Ga Ta=-40°C to +80°C ATEX II 1 G Ex ia IIC T6 Ga Ta=-40°C to +65°C ATEX II 1 D Ex ia IIIC Da T135 °C Ta=-40°C to +80°C
For HX Series -- IECEx FMG 13.0007X	
Specific Conditions of Use	Marking
1. The integral supply cable shall be mechanically protected and terminated in a suitable terminal or junction facility. 2. Using the box provided on the HX45T03S nameplate, the user shall permanently mark the Type of Protection chosen for the specific installation. Once the Type of Protection has been marked it shall not be changed. 3. The earth bonding connection shall be maintained by either the external mounting thread and/or the earthing wire of the integral cable.	Ex db IIC T5 Gb Ta = -40°C to +80°C Ex db IIC T6 Gb Ta = -40°C to +65°C Ex tb IIIC T100°C Db Ta = -40°C to +80°C Ex ia IIC T5 Ga Ta=-40°C to +80°C Ex ia IIC T6 Ga Ta=-40°C to +65°C Ex ia IIIC T135 °C Da Ta=-40°C to +80°C

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