CONNECTION TECHNOLOGY CENTER, INC.

INTRINSICALLY SAFE CLASS 1, DIVISION 1 SENSORS

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DOCUMENT & REVISION

Product Manual MNX10127
Rev A

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Introduction

This document contains information on the installation, operation, and maintenance of the Intrinsically Safe Vibrations Sensor.

Intrinsic Safety (IS) is based on the principle that the electrical energy in hazardous-area circuits is deliberately restricted such that any electrical sparks or hot spots that may occur are too weak to cause ignition. This is achieved by inserting an energy limiting interface in the wiring between safe and hazardous areas. The interface passes signals in either direction as required but limits the voltage and current that can reach the hazardous area under fault conditions. It may be integral with the safe-area equipment or separate for greater flexibility.

Description
Vibration sensors which are used for acceleration measurement by means of piezo-electric device. The piezoelectric is subjected to compression pressure from a mass which produce a voltage in proportion to the acceleration. The voltage is then amplified by internal electronic circuitry. This can also be integrated within the amplifier board to produce a velocity output, referred to with a VE prefix.

For the Loop Power and Premium Loop Power series (LP/LPH prefix), the output is converted to a 4-20 mA. These sensors can be used in conjunction with a temperature board to provide the temperature of the environment the sensor is contained within this configuration is referred to with a TA prefix. The sensors are mounted to the surface of the desired surface via a threaded bolt or by other means to be approved of by the authority having jurisdiction.

Compliance with the following standards:

CSA C22.2 No. 25-17 (R2022)
CAN/CSA C22.2 No. 60079-0:19
CAN/CSA C22.2 No. 60079-11:14 (R2023)
CAN/CSA C22.2 No. 61010-1-12 +UPD1:2015, UPD2:2016, AMD 1-18 (R2022), UPD3:2023
ANSI/UL 1203-2009 Fourth Edition
ANSI/UL 60079-0-2020 Seventh Edition
ANSI/UL 60079-11-2018 (R2023) Sixth Edition
ANSI/UL 61010-1-2023 Third Edition

Related Nameplate Markings



Figure 1. Nameplate Marking

The following is an example recreation of nameplate markings. The customer should refer to INS10187 for the complete recapitulation of a sensor's specific entity parameters:

All LP, LPH, TA, VE Series Sensors and All AC Series Sensors Except AC970 and AC971

INTRINSICALLY SAFE
SECURITE INTRINSEQUE
CSA 26CA80263367X
CLI, DIV 1, GRP A, B, C and D
CLII, DIV 1, GRP E, F and G;
CLIII Ex ia IIC T3-T4 Ga
Ex ib IIIC T135°C...T147°C Db
CLI, ZN 0, AEx ia IIC T3-T4 Ga
ZN 21, AEx ib IIIC T135°C...T147°C Db
T3: Ta = –40°C to +121°C
T4: Ta = –40°C to +80°C
T147°C: Ta = – 40°C to +121°C
T135°C: Ta = – 40°C to +80°C
Ui = 28VDC Ii = 120mA
Ci = 0nF Li = 0uH Pi = 1W
Install per drawing INS10187
Installation selon le schéma INS10187
Refer to product manual MNX10127
Veuillez vous référer au manuel du produit MNX10127
(Year of Manufacture)

AC970 and AC971

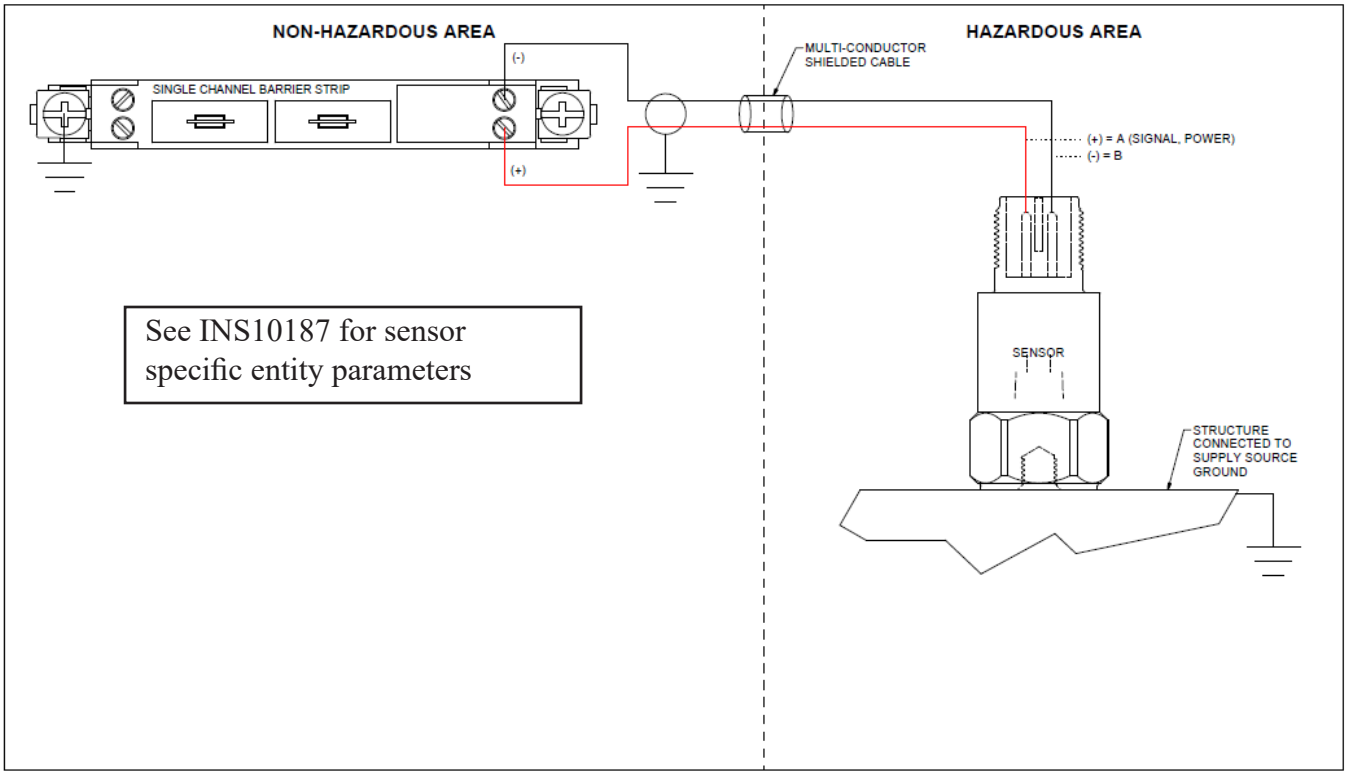
INTRINSICALLY SAFE
SECURITE INTRINSEQUE
CSA 26CA80263367X
CLI, DIV 1, GRP A, B, C and D
CLII, DIV 1, GRP E, F and G; CLIII
Ex ia IIC T3-T4 Ga
Ex ib IIIC T135°C...T156°C Db
CLI, ZN 0, AEx ia IIC T3-T4 Ga
ZN 21, AEx ib IIIC T135°C...T156°C Db
T3: Ta = –40°C to +121°C
T4: Ta = –40°C to +80°C
T156°C: Ta = – 40°C to +121°C
T135°C: Ta = – 40°C to +80°C
Ui = 28VDC Ii = 120mA
Ci = 40nF Li = 40.2uH Pi = 1W
Install per drawing INS10187
Installation selon le schéma INS10187
Refer to product manual MNX10127
Veuillez vous référer au manuel du produit MNX10127
(Year of Manufacture)

Installation

Installation Procedure

The Intrinsic Safety Control Drawing INS10187 shows the installation requirements for CTC IS Sensors. As shown, properly installed barriers are required to limit the energy the sensor can receive. Cabling brings the signal from the sensor to the Zener diode barrier or galvanic isolator, which is the energy-limiting interface. The signal is transferred through the barrier (which is located in a non-hazardous area to measurement equipment, such as a data collector or junction box) for further processing. Sensors must be used with the cables offered and sold by the manufacturer.

Operation





A fully-assembled non-integral sensor and cable assembly

Standards
Each sensor that is approved for Intrinsically Safe must meet or exceed the requirements for standards recognized by the countries that would use the sensors.

Specific Conditions of Use
WARNING: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY

AVERTISSEMENT : LA SUBSTITUTION DE COMPOSANTS PEUT COMPROMETTRE LA SECURITE INTRINSEQUE

KEEP CONNECTOR TIGHT WHILE CIRCUITS ARE ENERGIZED

GARDER LE COUVERCLE BIEN FERMÉ PENDANT QUE LES CIRCUITS SONT SOUS TENSION

Specific Ambient Conditions of Use include:

1. T147°C: Ta = – 40°C to +121°C (All models besides AC970 and AC971)
2. T156°C: Ta = – 40°C to +121°C (For model AC970 and AC971)
3. T135°C: Ta = – 40°C to +80°C (All models)

All models of the assessed equipment are required to be connected to a properly rated Intrinsically Safe barrier as per DWG INS10187. The Ui & Ii parameters are the worst case voltage and current from the combination of these barriers, but they cannot appear at the same time. It is the end-users' responsibility to ensure that the combined voltage and current of the connected barriers does not exceed the values of Table A.1 of IEC 60079-11:2011 Ed6. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

Cables of the following part numbers are restricted only for use with sensors of a maximum ambient temperature of +80°C. The manufacturer shall ensure that the product is marked accordingly:

1. CB103
2. CB190
3. CB191
4. CB192
5. CB193

Maximum Integral Cable lengths are specified and these maximum values shall not be exceeded as per the following list:

Models with Integral Cables	Maximum Integral Cable Length
AC970-XR THROUGH AC979-XR AC980-XR THROUGH AC989-XR	200 ft (61 m)
AC911-XR, AC912-XR, AC913-XR, AC914-XR, AC915-XR, AC916-XR, AC917-XR, AC918-XR	1600 ft (488 m)
AC961-XR, AC952-XR, AC963-XR, AC964-XR, AC965-XR, AC966-XR, AC967-XR, AC968-XR	1600 ft (488 m)
TA91*-XR	1600 ft (488 m)
LP80*-XR, LP90*-XR,	1600 ft (488 m)
LPH8**-XR, LPH9**-XR	1600 ft (488 m)
VE901-XR, VE902-XR	1600 ft (488 m)

Cable conductors range from 20 AWG - 26 AWG.

Part Number	Max Capacitance	Min Resistance	Max Inductance	Min Temperature
CB102	48.0 pF/ft	10.0Ω/1000ft	0.081µH/ft	150 °C
CB103*	49 pF/ft	9.7Ω/1000ft	0.047µH/ft	105 °C
CB193*	49 pF/ft	9.7Ω/1000ft	0.047µH/ft	105 °C
CB111	45.0 pF/ft	10.0Ω/1000ft	0.084µH/ft	150 °C
CB190*	36 pF/ft	9.5Ω/1000ft	0.19µH/ft	105 °C
CB206	48 pF/ft	42Ω/1000ft	0.062µH/ft	150 °C
CB296	35 pF/ft	42Ω/1000ft	0.062µH/ft	200 °C
CB212	41 pF/ft	13.0Ω/1000ft	0.092µH/ft	150 °C
CB191*	44.13 pF/ft	11.9Ω/1000ft	0.18µH/ft	105 °C
CB192*	37.15 pF/ft	16.41Ω/1000ft	0.20µH/ft	105 °C
CB298	27.9 pF/ft	15.4Ω/1000ft	0.21µH/ft	200 °C

The entity parameters of the vibration sensors and integrated cables shall not be exceeded as per the marked nameplates. Refer to the following controlled document for details:

1. INS10187

Special Conditions for Safe Use

1. Entity parameters listed for each sensor cannot be exceeded for safe use.
2. Maximum cable lengths are specified and these maximum values shall not be exceeded.
3. Specifications for the range of environmental conditions for which the equipment is designed including the following:
   - Specification of the Pollution Degree: 2.
   - Specification of the Overvoltage Category: II.
   - Specification for the maximum use altitude: 2000 m above sea level.
4. For sensors without Integral Cables, the field wiring cable operating temperature shall be rated above the sensor T-code and follow the following conditions.
   - Uo ≤ Ui
   - Io ≤ Ii
   - Po ≤ Pi
   - Co ≥ Ci + Ccable
   - Lo ≥ Li + Lcable

Maintenance

General

There are no customer replaceable parts. This product should provide trouble-free continuous service under normal operating conditions.

Warranty & Refund

Please visit www.ctconline.com to view a complete recapitulation of our warranty and refund policies.