AVTRON™ ENCODERS

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ENCODER INSTRUCTIONS

XRB3 SMARTSafe™

INTRINSIC SAFETY ISOLATOR FOR HAZARDOUS APPLICATIONS

DESCRIPTION

The Avtron Model XRB3 is an associated apparatus, referred to as an isolator, providing intrinsically safe circuits to Avtron SMARTSafe™ encoders with model numbers XR_ _ _ which are intended for use in Hazardous locations when the encoders and isolators are installed in accordance with the appropriate installation drawings. The output of the isolator is limited by a triplicated crowbar safety circuit, current limiting resistor and two parallel connected shunt zener diodes. The return (output) lines from the encoders are galvanically isolated within the isolator via optically isolated inputs. The isolator PCB is potted inside a DIN-rail mountable housing.

INSTALLATION

The XRB3 isolator is intended to be installed in a safe area in an end-use enclosure with an enclosure rating suitable for the location. The maximum cabinet ambient temperature allowable is 80°C. The isolator contribution to thermal rise is 5W max in normal operation and 12W under short circuit fault conditions. Refer to the following attached drawings for isolator installation information including wiring, warnings and cautions. Use the drawing appropriate for the encoder installation location.

D53007: US and Canada
- Class I Division 1 Groups A, B, C or D
- Class I Zone 0 AEx ia IIC T4
- Class I Zone 0 Ex ia IIC T4X

D53008: ATEX and IECEx
- Group II Category 2 Zone 1 Gas Group IIC
- Group II Category 2 Zone 21 Dust Group IIIC

INSTALLATION HARDWARE

Installation hardware required is attached to each assembly.
Equipment needed for installation:

Supplied:
- Model XRB3 isolator
- DIN-rail mounting clip

Not Supplied:
- Screwdriver
- DIN-rail

WARNING:
Installation should be performed by qualified personnel. Safety precautions must be taken to ensure machinery cannot rotate and all sources of power are removed during installation.

WIRING INSTRUCTIONS

Refer to the attached installation drawings referenced above for wiring diagrams. Use the drawing appropriate for the encoder's installation location.

CAUTION
The XRB3 isolator requires an Intrinsic Safety ground to provide hazard protection (< 1Ω). Failure to connect this ground or providing an inadequate safety ground path could result in a spark/ignition hazard which can result in property damage, injury or even death. The intrinsic safety ground terminal is non-removable and non-replaceable. If the terminal is damaged replace the XRB3 isolator.

NOTE

V_0 in (safe area), V_0 out (hazardous area)and IS ground are all electrically connected within the isolator. Also the heat sink and DIN rail mounting bracket are electrically connected to the same circuit. If required, the mounting bracket can be isolated from cabinet ground and/or a galvanically isolated power supply may be used to power the isolator as long as the IS ground connection is made at the isolator IS ground terminal.

The maximum length of cable between the encoder and the isolator is determined by the system entity parameters. The maximum capacitance and inductance allowed by the isolator is identified as C_0 and L_0. The maximum internal encoder lump sum capacitance is identified as C_I and L_I. The following guide lines must be followed.

$C_I + C_{CABLE} \leq C_0$
$L_I + L_{CABLE} \leq L_0$

When the cable capacitance and inductance per foot are not known the following values shall be used

C_{CABLE} = 60pF/ft.
L_{CABLE} = .2uH/ft.

CAUTION
The Isolator output entity parameters are a function of the gas group the encoder is subject to. Refer to the installation drawings or the specification section of these instructions.

Typical interconnect cable is 4 twisted pair + overall shield. Recommended cable is Avtron B37178. Alternate recommended cables are Belden 1064A or Rockbestos O4P-18 I/S-OS. Cables should be chosen based on specific application requirements such as abrasion, temperature, tensile strength, solvents, etc. General electrical requirements are: stranded copper, 20 through 16 AWG (Industrial EPIC

style connector options such as “G” can use 14 AWG), twisted wire pairs, braid or foil individual shields or over-all shield with drain wire, .03uF of maximum total mutual or direct capacitance and outer sheath insulator. 20 AWG wire should not be used for DC power to the encoder for runs greater than 200 feet and 22AWG should not be used for runs greater than 100 ft. This is to minimize voltage drop between the encoder and the XRB3 isolator. The smaller conductors are acceptable for the signal lines. If 20 AWG is use with the “G” type connector option the wire ends should be tinned.

For bidirectional operation of encoders, proper phasing of the two output channels is important. For all Avtron SMARTSafe encoder models, see the wiring labels on the encoder or the encoder instruction sheets for phasing information.

CORRECTIVE ACTION FOR PHASE REVERSAL

1. Remove Power
2. Exchange wires on cable either at the XRB3 black output terminals or at the speed controller but not both. Refer to the wiring diagram on the installation drawing. Exchange either A with A\ in the phase A pair or B with B\ in the phase B pair but not both.
3. Apply power and verify the encoder feedback is correct.

MAINTENANCE

GENERAL

This section describes routine maintenance for the Avtron XRB3 Isolator. For support, contact Avtron’s field service department at 216-642-1230. For emergency after hours service contact us at: 216-641-8371.

WARNING
The XRB3 contains no user-serviceable internal parts. Disassembly or attempted repairs may result in a hazard which can result in property damage, injury or even death.

The XRB3 has a green power indicator. The green isolator LED will not illuminate if power is not applied to the isolator, power is applied to the wrong pins or backward on the correct pins. If power is applied backward on the correct pins no damage will be done. Simply correct the wiring and re-apply power. One indication that the power is wired backward at the correct pins is that all of the output signal lines (A, A\, B, B\, Z, Z\) will appear at logic “high” at the same time relative to power supply common. If the green LED power indicator does not illuminate always check the wiring first. See the installation drawing for correct wiring.

The XRB3 Isolator includes a non-replaceable fuse element. This fuse will not open because of a fault on the output such as a short circuit. It will only open if excessive voltage is applied to the Isolator input (> 30 VDC) and / or the internal voltage regulator has failed. This will cause the internal safety circuit to trip which will cause the fuse to open. If the internal fuse is blown, the isolator green LED power indicator will not illuminate. At this time the XRB3 isolator module must be replaced. The isolator module is not repairable. When replacing the XRB3 isolator it is not necessary to remove wires. The screw terminals are in a removable plug assembly. When removing the screw terminal plugs always replace them in the same position they were removed. A small screwdriver can be used between the isolator housing and the screw terminal plug to help remove them.

Normal operating voltage into the isolator is 12VDC to 24 VDC (black terminals V_S and 0_V). Um (maximum safe input voltage) is 30V.

The nominal (encoder power supply) output voltage from the Isolator at blue terminals VH and 0V to the encoder is 6.8 V (5V min., 7.14V max.). Up to 115mA can be drawn from the isolator before the output voltage begins to droop. The encoder can draw up to 140mA and the isolator output voltage will still be above 5V. Nominal encoder input current is 80mA. Load current between the encoder and the isolator (including cable switching current) can be expected to be less than 40mA. The minimum voltage into the encoder needs to be above 4.8VDC. That is why it is best that the power wires between the encoder and the isolator be at least 18AWG to minimize voltage drop.

Nominal input current to the isolator is approximately 150 mA. The encoder can draw up to 115 mA and the isolator input current will not change. The maximum encoder supply current can be expected to be < 130mA. Supply currents in addition to this are required for customer controller input loads and cable switching currents between the isolator and the customer controller. The maximum current the isolator can supply on the signal outputs is approximately 250 mA on each output. Under this condition the isolator would draw approximately 900 mA. Cable switching currents between the isolator and the user controller contribute to this load. These currents are a function of input voltage, cable capacitance (cable length) and operating frequency (PPR and RPM). Higher input voltages, higher cable capacitance and higher frequencies result in higher cable switching currents ($i = c\ dv/dt$).

The nominal output signal high voltage from the XR_ _ _ encoders (blue terminals) is 5V. Nominal output signal high voltage from the isolator (black terminals) is $V_S - 1V$.

WARNING
Do not trouble shoot at the encoder if power is applied and hazardous atmospheres are present.

If the encoder LED is Red or not illuminated at all refer to the maintenance section of the encoder instructions.

SPARE PARTS

316374 Black (safe area) screw terminal plugs
316373 Blue (hazardous area) screw terminal plugs
B35303 DIN rail mounting clip.

REPLACING XR ENCODER MODELS

If replacing an XR encoder, consult the installation drawing and ensure the replacement encoder is certified for use in the hazardous area.

If replacing an XR encoder in an ATEX/IECEx Zone 1/21 application utilizing an XRB1, XRB2 or XRB3 isolator, consult the installation drawing and ensure the encoder is certified for use with the isolator.

Encoders marked Ex II 2 GD + Ex ib IIC T4 Gb or Ex ib IIIC T200°C Db are approved for use with XRB1, XRB2 or XRB3 isolators.

Encoders marked Ex II 2 GD + Ex ia IIC T4 Gb or EX ia IIIC T200°C Db are approved for use with XRB2 or XRB3 isolators only.

REPLACING AN XRB1 OR XRB2 ISOLATOR

The XRB3 isolator is certified Ex II (2) GD [Ex ia IIC Gb], and can be used with encoders marked Ex II 2 GD + Ex ia IIC T4 Gb or EX ia IIIC T200°C Db as well as Ex II 2 GD + Ex ib IIC T4 Gb or Ex ib IIIC T200°C Db and installed in accordance with drawing D53007 & D53008.

An XRB1 isolator used with Ex II 2 GD + Ex ib IIC T4 Gb or Ex ib IIIC T200°C Db encoders can be replaced with an XRB3 isolator.

An XRB3 isolator **should never** be replaced with an XRB1 isolator.

SPECIFICATIONS

ELECTRICAL

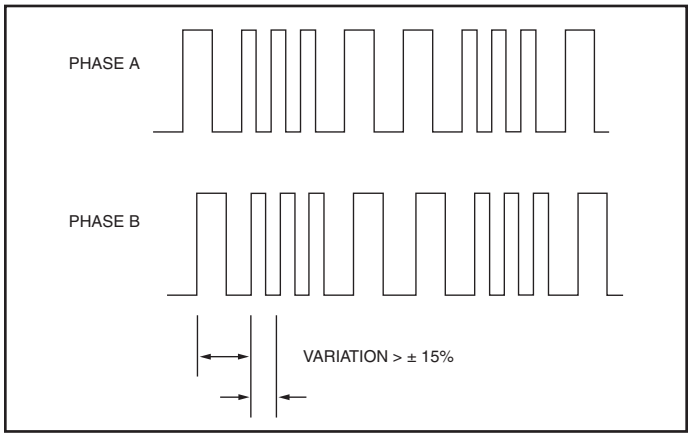
A. Output Signals
  a. Incremental Channels
    i. Two phase with compliments (A, A\, B, B\)
    ii. Square wave, cycles per revolution = PPR
    iii. Maximum Frequency = 165,000 Hz
    iv. Duty Cycle: per encoder specifications
    v. Transition Separation: per encoder specifications
  b. Marker
    i. Square wave (Z, Z\)
    ii. Once per revolution
    iii. Period: per encoder specifications

MECHANICAL

A. Weight: 1.1 lbs (.5 kg)

ENVIRONMENTAL

A. Ambient Temperature: -40°C to 80°C

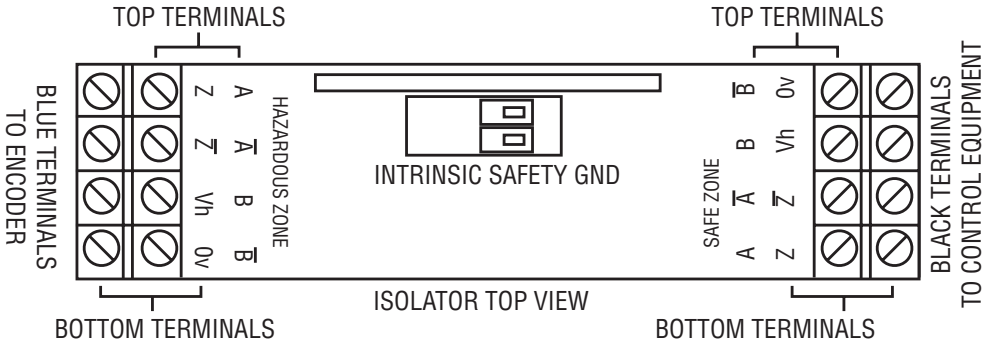


SPECIFICATIONS

SPECIFICATIONS					
Description		Symbol	Encoder	XRB3	Units
Input Voltage (Power)		V_{IN} / V_S	5-7	12-24	V_{DC}
Input Voltage Max. Safe (Power)		U_M	N/A	30	V
Input Current, no load (Power)		I_{IN} / I_S	80	150	mA
Input Current Typical Loads (Power)		I_{IN} / I_S	100	450	mA
Input Current Max. (Power)		I_{IN} / I_S	130	900	mA
Output Voltage Nominal (Power)		V_H	N/A	6.8	V_{DC}
Output Voltage Max. (Power)		V_H	N/A	7.14	V_{DC}
Output Voltage Min. @ 140mA load (Power)		V_H	N/A	5	V_{DC}
Output Current at Nominal Output Voltage		I_H	N/A	115	mA
Output Current at 5 volts out		I_H	N/A	140	mA
Output Current at Short Circuit		I_{HSC}	N/A	420	mA
Voltage Output High Nom. (Signal)		V_{OH}	5	V_S-1	V_{DC}
Voltage Output Low Nom. (Signal)		V_{OL}	.5	.4	V_{DC}
Current Output High Max. Continuous (Signal)		I_{OH}	100	250	mA
Current Output Low Max. Continuous (Signal)		I_{OL}	100	250	mA
Current Output High Max. Peak (Signal)		I_{OH}	1.5	3	A
Current Output Low Max. Peak (Signal)		I_{OL}	1.5	3	A
Output Resistance (Signal)		R_O	15	1.8	Ω
Protection	Reverse Voltage		Yes	Yes	
	Short Circuit		Yes	Yes	
	Transient		Yes	Yes	

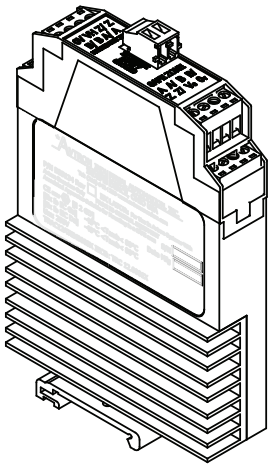
Isolator Output Entity Parameters			
Terminal ID	Gas Group	C_O (uF)	L_O (uH)
V_H & 0_V	A & B / IIC	11.89	2
	C & D / IIB	11.91	100

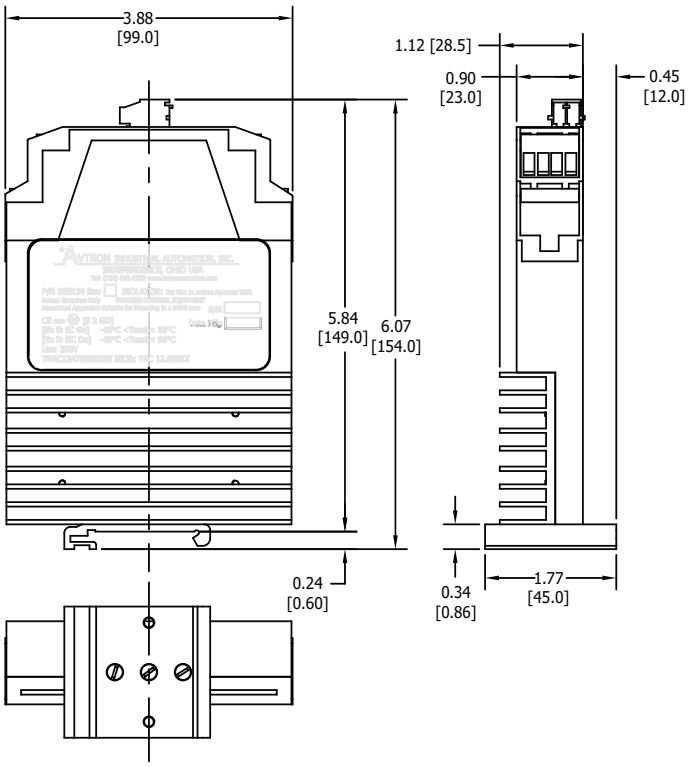
Encoder Input Entity Parameters		
Terminal ID	C_I (uF)	L_I (uH)
V_{IN} & Com	11.88	0

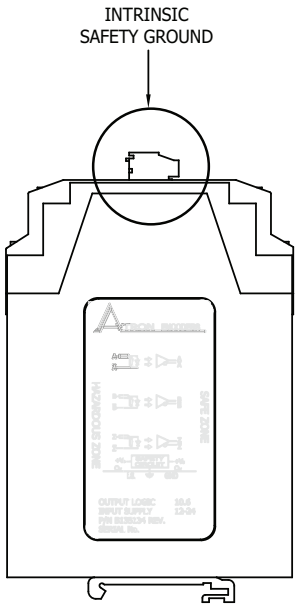


OUTLINE DIMENSIONS AND OPTION DETAILS

For additional wiring options see Figure 2







These instructions have been reviewed and the product evaluated as suitable for our application.

Company Name _____

Authorized Company Representative _____

Title _____ Date _____

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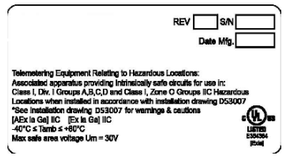
REVISIONS				
ECN NO.	REV	DESCRIPTION	DATE	APPROVED

THE AVTRON ISOLATOR MODEL XRB3 (P/N B38153) HAS BEEN EVALUATED AS ASSOCIATED APPARATUS / ASSOCIATED EQUIPMENT (APPAREILLAGE CONNEXE) PROVIDING INTRINSICALLY SAFE OUTPUTS AND COMPLIANT WITH:

UL913 8TH EDITION
UL 60079-0 6TH EDITION
UL 60079-11 6TH EDITION
UL508 17TH EDITION
CSA 22.2 No. 157-92 REAFFIRMED 2012
CSA 22.2 No. 60079-0:11
CSA 22.2 No. 60079-11:14
CSA 22.2 No. 14-13



1. THE XRB3 ISOLATOR HAS THE FOLLOWING OUTPUT ENTITY PARAMETERS:

TERMINAL IDs	GAS GROUP	Uo (V)	Io (mA)	Po (W)	Co (uF)	Lo (uH)
V_H & 0v	A & B/IIC	7.14	416	1.41	11.89	2
	C & D/IIB				11.91	100

THE XRB3 ISOLATOR HAS THE FOLLOWING OUTPUT ENTITY PARAMETERS:

TERMINAL NUMBERS	Ui (V)	Ii (mA)	Pi (W)	GAS GROUP	Ci (uF)	Li (uH)
A & A/ B & B/ Z & Z/	7.14	416	1.41	A,B,C&D (IIC)	0	0

2. SELECTED INTRINSICALLY SAFE EQUIPMENT MUST BE THIRD PARTY LISTED AS INTRINSICALLY SAFE FOR THE APPLICATION, AND HAVE INTRINSICALLY SAFE ENTITY PARAMETERS CONFORMING WITH TABLE 1 BELOW.

TABLE 1:

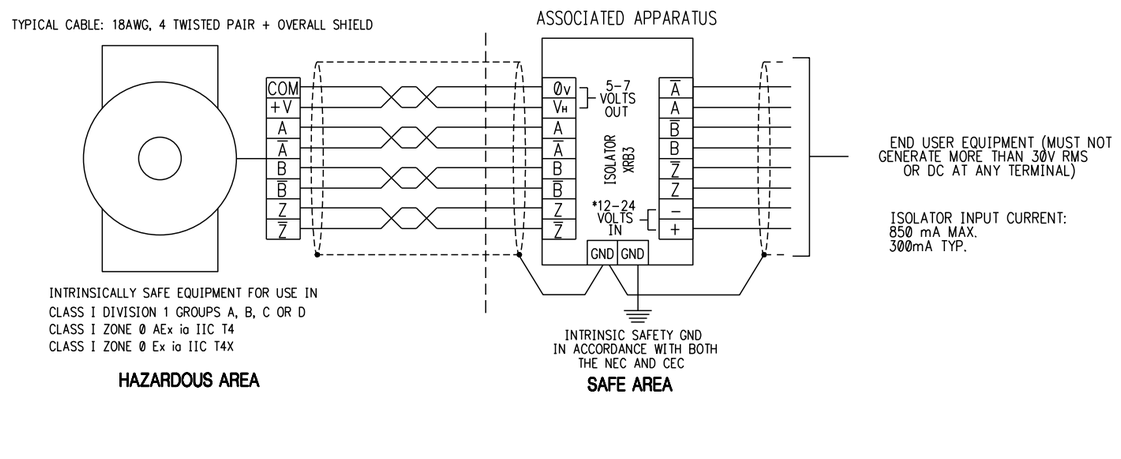
I.S. EQUIPMENT		ASSOCIATED APPARATUS
Ui	≥	Uo
Ii	≥	Io
Pi	≥	Po
Ci + Ccable	≤	Co
Li + Lcable	≤	Lo

3. THE ISOLATOR MUST BE INSTALLED IN AN ENCLOSURE SUITABLE FOR THE APPLICATION IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) FOR INSTALLATION IS THE UNITED STATES, THE CANADIAN ELECTRICAL CODE FOR INSTALLATIONS IN CANADA, OR OTHER LOCAL CODES, AS APPLICABLE.
4. THE ASSOCIATED APPARATUS MUST BE CONNECTED TO A SUITABLE GROUND ELECTRODE PER THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70), THE CANADIAN ELECTRICAL CODE OR OTHER LOCAL INSTALLATION CODES, AS APPLICABLE. THE RESISTANCE OF THE GROUND PATH MUST BE LESS THAN 1 OHM. CAUTION: GROUND THE CABLE SHIELD AT THE ISOLATOR GROUNDING. THE ENCODER GROUND LUG SHOULD NOT BE CONNECTED TO THE ISOLATOR INTRINSIC SAFETY GROUND CONNECTION.
5. WHERE MULTIPLE CIRCUITS EXTEND FROM THE SAME PIECE OF ASSOCIATED APPARATUS, THEY MUST BE INSTALLED ON SEPARATE CABLES OR IN ONE CABLE HAVING SUITABLE INSULATION. REFER TO ARTICLE 504.30(B) OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) AND INSTRUMENT SOCIETY OF AMERICA RECOMMENDED PRACTICE ISA RP12.6 FOR INSTALLING INTRINSICALLY SAFE EQUIPMENT.
6. INTRINSICALLY SAFE CIRCUITS MUST BE WIRED AND SEPARATED IN ACCORDANCE WITH ARTICLE 504.20 OF THE NATIONAL ELECTRICAL CODE (ANSI/NFPA 70) OR OTHER LOCAL CODES AS APPLICABLE.
7. THE ISOLATOR HAS NOT BEEN EVALUATED FOR USE IN COMBINATION WITH ANOTHER ASSOCIATED APPARATUS.
8. CONTROL EQUIPMENT MUST NOT USE OR GENERATE MORE THAN 30V RMS OR DC WITH RESPECT TO EARTH.
9. WARNING INSTALLATION SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL. SAFETY PRECAUTIONS MUST BE TAKEN TO ENSURE MACHINERY CANNOT ROTATE AND ALL SOURCES OF POWER ARE REMOVED DURING INSTALLATION.

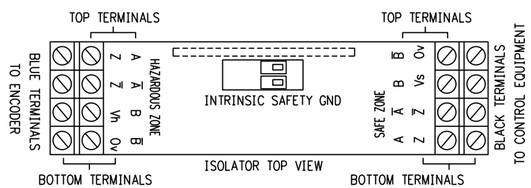
THIS DRAWING IDENTIFIES CHARACTERISTICS REQUIRED FOR EQUIPMENT USED IN HAZARDOUS LOCATIONS AND MAY NOT BE CHANGED WITHOUT THIRD PARTY APPROVAL. THIRD PARTIES MUST BE IDENTIFIED FROM ID LABELS.

UNLESS OTHERWISE SPECIFIED THE ABOVE NOTES APPLY

TYPICAL CABLE: 18AWG, 4 TWISTED PAIR + OVERALL SHIELD



10. MULTIPLE ISOLATORS (ASSOCIATED APPARATUS) SHALL NOT BE CONNECTED TO A SINGLE ENCODER OUTPUT.
11. WARNING – EXPLOSION HAZARD: SUBSTITUTION OF COMPONENTS MAY IMPAIR INTRINSIC SAFETY.
AVERTISSEMENT – RISQUE D'EXPLOSION Le substitution de composants peut altérer l'aptitude de Securite Intrinseque.
12. THIS EQUIPMENT HAS BEEN EVALUATED FOR USE IN A MAXIMUM AMBIENT TEMPERATURE OF 80°C. CONSIDERATION MUST BE GIVEN TO ENSURE FIELD WIRING IS SUITABLY RATED.
Cet équipement a été évalué pour une utilisation dans une température ambiante maximale de 80° C.
IL faut tenir compte pour assurer le câblage est convenablement évalué.
13. INTERCONNECTION CABLES SPECIFIED ABOVE ARE BASED ON TYPICAL APPLICATIONS. CABLE MUST BE SELECTED AND INSTALLED IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND CANADIAN ELECTRICAL CODE. PHYSICAL PROPERTIES OF CABLE SUCH AS ABRASION, TEMPERATURE, TENSILE STRENGTH, SOLVENTS, ETC ARE DICTATED BY THE SPECIFIC APPLICATION. GENERAL ELECTRICAL REQUIREMENTS ARE: STRANDED COPPER, 22 THROUGH 16 AWG (CONNECTOR OPTIONS "P" AND "G" CAN USE 14 AWG), TWISTED WIRE PAIRS, BRAID OR FOIL INDIVIDUAL SHIELDS OR OVERALL SHIELD WITH DRAIN WIRE, 0.03uF OF MAXIMUM TOTAL MUTUAL OR DIRECT CAPACITANCE, OUTER SHEATH INSULATOR (JACKET THICKNESS 0.035 MINIMUM). 22 AWG SHOULD NOT BE USED FOR CABLE RUNS OVER 100' AND 20 AWG SHOULD NOT BE USED FOR CABLE RUNS OVER 200'. IF 22 AWG OR 20 AWG IS USED WITH CONNECTOR OPTIONS "P" OR "G" THE WIRE ENDS SHOULD BE TINNED.



Vs = 12 TO 24 VOLTS DC
Is = 850mA MAX., 300mA TYP.

NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES±1° DECIMALS .XX± .03 .XXX± .015
FINISH
PAINT PER PS
PLATE PER
COAT PER PS
ANODIZED PER
OTHER

		DATE
DRAWN	ZIVKOVIC	7/21/20
CHECKED	SIRACKI	7/21/20
ENG APVD	WOLFF	7/21/20
APVD PROD		

Nidec Industrial Solutions
243 TUXEDO AVENUE
BROOKLYN HEIGHTS, OH 44131

DIVISION 1 / ZONE 0
INSTALLATION DRAWING

IMF ☒ PSF ☐

SIZE	CAGE NO.	DWG. NO.	REV
D	0FMV7	D53007	–

SCALE 1/1 | MODEL N/A | SHEET 1 OF 1

REVISIONS				
ECN NO.	REV	DESCRIPTION	DATE	APPROVED

XRYYY XXXX5XXX XXX

- LINE DRIVER OPTION CODE FOR: XR850, XR125, XR485, XR685 (5 = ib, H = ia)
- CONNECTOR OPTION CODE LOCATION FOR: XR56A, XR56S XR67A, XR85A, XR115, XR850, XR125, XR485, XR685
- CONNECTOR OPTION CODE LOCATION FOR: XR45, XR47, XR4F
- LINE DRIVER OPTION CODE LOCATION FOR: XR56A, XR56S XR67A, XR85A, XR115, XR45, XR47, XR4F, (5 = ib, H = ia)
- MODEL # CODES: 56A, 56S, 67A, 85A, 115, 45, 47, 4F, 850, 125, 485, 685
- HAZARDOUS LOCATION CODE

CONNECTOR OPTION CODES = A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, T, U, V, W, Y, Z, 2, 3, 4, 5, 6, 7, 8
LINE DRIVER OPTION CODE = H FOR ZONE I & 21 (ia) 5 FOR ZONE 1 & 21 (ib)

XRYY 5 X X XXX

- CONNECTOR OPTION CODE LOCATION FOR: XR5, XR12, XR97
- LINE DRIVER OPTION CODE LOCATION FOR: XR5, XR12, XR97
- MODEL # CODES: 5, 12, 97
- HAZARDOUS LOCATION CODE

CONNECTOR OPTION CODES = A, B, C, D, E, F, G, H, J, K, L, M, N, P, R, S, T, U, V, W, Y, Z, 2, 3, 4, 5, 6, 7, 8
LINE DRIVER OPTION CODE = H FOR ZONE I & 21 (ia) 5 FOR ZONE 1 & 21 (ib)
ALL OTHER CODE LOCATIONS ARE NOT RELEVANT TO INTRINSIC SAFETY. SEE INSTRUCTION SHEETS FOR DEFINITIONS

THE XR____ FAMILY OF ENCODERS HAS BEEN EVALUATED TO BE COMPLIANT WITH:

IEC60079-0:2011
EN60079-0:2012/A11:2013
IEC60079-11:2011
EN60079-11:2012
BSEN61000-6-4:2007 AND BSEN61000-6-2:2005
CERTIFICATES OF CONFORMITY ExVeritas 20ATEX0676X, IECEx EXV 20.0029X

THE XR____ FAMILY OF ENCODERS IS CERTIFIED FOR USE IN:

GROUP II, CATEGORY 2 (ZONE 1) GAS GROUP IIC WHEN MARKED CE 0539 ⟨Ex⟩ II 2 GD Ex ia IIC T4 Gb AND USED WITH AN ISOLATOR XRB3 MARKED CE 0539 ⟨Ex⟩ II (2) GD [Ex ia IIC Gb]

GROUP II, CATEGORY 2 (ZONE 21) DUST GROUP IIIC WHEN MARKED CE 0539 ⟨Ex⟩ II 2 GD Ex ia IIIC T200°C Db AND USED WITH AN ISOLATOR XRB3 MARKED CE 0539 ⟨Ex⟩ II (2) GD [Ex ia IIIC Db]

GROUP II, CATEGORY 2 (ZONE 1) GAS GROUP IIC WHEN MARKED CE 0539 ⟨Ex⟩ II 2 GD Ex ib IIC T4 Gb AND USED WITH AN ISOLATOR XRB3 MARKED CE 0539 ⟨Ex⟩ II (2) GD [Ex ia IIC Gb]

GROUP II, CATEGORY 2 (ZONE 21) DUST GROUP IIIC WHEN MARKED CE 0539 ⟨Ex⟩ II 2 GD Ex ib IIIC T200°C Db AND USED WITH AN ISOLATOR XRB3 MARKED CE 0539 ⟨Ex⟩ II (2) GD [Ex ia IIIC Db]

MAXIMUM SAFE AREA VOLTAGE = 30V, $-40°C \leq Tamb \leq +80°C$

WARNING: INSTALLATION SHOULD BE PERFORMED ONLY BY QUALIFIED PERSONNEL. SAFETY PRECAUTIONS MUST BE TAKEN TO ENSURE MACHINERY CANNOT ROTATE AND ALL SOURCES OF POWER ARE REMOVED DURING INSTALLATION. EQUIPMENT AVAILABLE AS A SYSTEM ONLY INCLUDING: XR___ ENCODER WITH LINE DRIVER OPTION "H" OR "5" AND AN AVTRON ISOLATOR MODULE AS LISTED ABOVE. THE ISOLATOR IS SUPPLIED AS A SEPARATE MODULE FOR LOCATION IN A SAFE AREA AND MUST BE INSTALLED IN AN ENCLOSURE.

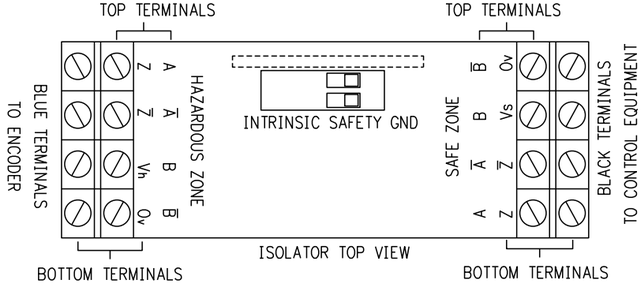
SYSTEM PARAMETERS ARE:

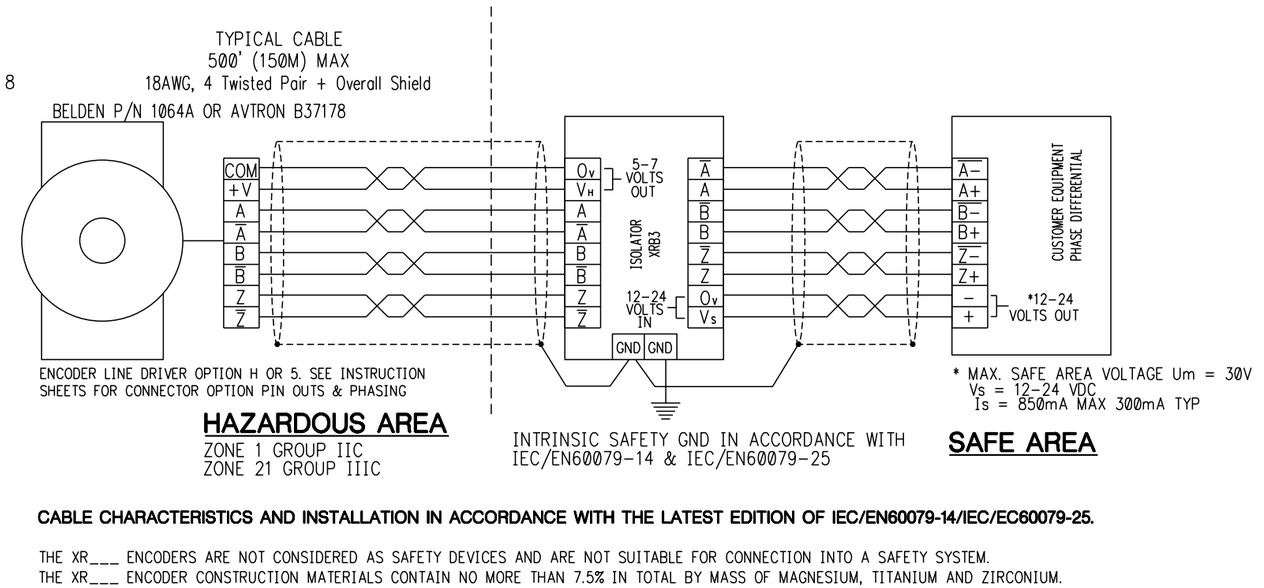
Um (MAXIMUM SAFE AREA VOLTAGE) = 30V
Uo (OPEN CIRCUIT VOLTAGE) = 7.14 VDC
Io (SHORT CIRCUIT CURRENT) = 420 mA
Co (SYSTEM CAPACITANCE) = 13.5 uF MAX.
Lo (SYSTEM INDUCTANCE) = .15 mH MAX.

PARAMETER	ISOLATOR	ENCODER
Um	30V	–
Ui	–	7.14V
Ii	–	420mA
Pi	–	1.4W
Ci	–	11.9uF
Li	–	0mH
Uo	7.14V	–
Io	420mA	–
Po	1.4W	–
Lo	.15mH	
Co	13.5uF	
Lo/Ro	–	
ZONE 1 TABLE OF ENTITY PARAMETERS		

UNLESS OTHERWISE SPECIFIED THE ABOVE NOTES APPLY

THIS DRAWING IDENTIFIES CHARACTERISTICS REQUIRED FOR EQUIPMENT USED IN HAZARDOUS LOCATIONS AND MAY NOT BE CHANGED WITHOUT THIRD PARTY APPROVAL. THIRD PARTIES MUST BE IDENTIFIED FROM EQUIPMENT ID LABELS





CABLE CHARACTERISTICS AND INSTALLATION IN ACCORDANCE WITH THE LATEST EDITION OF IEC/EN60079-14/IEC/EC60079-25.

THE XR___ ENCODERS ARE NOT CONSIDERED AS SAFETY DEVICES AND ARE NOT SUITABLE FOR CONNECTION INTO A SAFETY SYSTEM.
THE XR___ ENCODER CONSTRUCTION MATERIALS CONTAIN NO MORE THAN 7.5% IN TOTAL BY MASS OF MAGNESIUM, TITANIUM AND ZIRCONIUM.
THE CONSTRUCTION MATERIALS ARE NOT CONSIDERED AS ABLE TO TRIGGER AN EXPLOSION IN NORMAL OPERATING MODES. THESE MATERIALS ARE KNOWN TO REACT WITH EXPLOSIVE ATMOSPHERES TO WHICH THE ENCODERS MAY BE SUBJECT. THE CONSTRUCTION MATERIALS DO INCLUDE ALUMINUM. AS SUCH, CARE SHOULD BE TAKEN TO AVOID THE POSSIBILITY OF IGNITION FROM IMPACT OR FRICTION. IT IS THE RESPONSIBILITY OF THE END USER TO ENSURE THAT THE ENCODER IS SELECTED CORRECTLY FOR THE POTENTIALLY EXPLOSIVE ATMOSPHERE IN WHICH THE EQUIPMENT IS TO BE PUT IN SERVICE.

SPECIAL CONDITIONS FOR SAFE USE:

ENCODER:

1. WHEN ENCODER IS MARKED AS "ia Gb" OR "ib Gb" IT MUST ONLY BE USED WITH THE CORRESPONDING ISOLATORS LISTED IN THIS CERTIFICATE. THE ISOLATORS, ENCODERS AND CABLE MUST BE SELECTED AND INSTALLED IN ACCORDANCE WITH IEC/EN 60079-14 AND IEC/EN 60079-25.
2. WHEN THE ENCODER IS MARKED AS "ic" THE POWER SUPPLY SITUATED IN THE SAFE AREA MUST BE LIMITED TO THE LEVELS LISTED ON THIS CERTIFICATE AND CABLE MUST BE SELECTED AND INSTALLED IN ACCORDANCE WITH IEC/EN 60079-14 AND IEC/EN 60079-25
3. THE EQUIPMENT SHOULD BE MOUNTED SO AS TO AVOID ELECTROSTATIC CHARGING.

ISOLATORS: MUST BE INSTALLED INSIDE OF AN ENCLOSURE WITH AN APPROPRIATE MECHANICAL STRENGTH AND MINIMUM DEGREE OF PROTECTION, IP20 FOR INDOOR LOCATIONS AND IP54 FOR OUTDOOR LOCATIONS OR INDOOR WET LOCATIONS.

MAINTENANCE: CONTACT NIDEC INDUSTRIAL SOLUTIONS, CLEVELAND, OH, USA.

CAUTION: BE SURE TO REMOVE POWER BEFORE WIRING THE ENCODER. GROUND THE CABLE SHIELD AT THE ISOLATOR. THE CABLE SHOULD NOT BE GROUNDED MULTIPLE PLACES. AN INTRINSIC SAFETY GROUND IS REQUIRED AT THE XRB1 OR XRB2 ISOLATOR MODULE. ENCODERS INCLUDE A LOCAL GROUND LUG FOR CUSTOMER CONVENIENCE AND ENCODER FRAME GROUNDING IF REQUIRED TO MEET LOCAL ELECTRIC CODE FOR SITE OPERATOR PROTECTION STANDARDS. THIS IS NOT THE REQUIRED FOR INTRINSIC SAFETY GROUND CONNECTION REQUIRED FOR HAZARD PROTECTION AGAINST IGNITION OF EXPLOSIVE ATMOSPHERES.

INTERCONNECTION CABLES SPECIFIED ABOVE ARE BASED ON TYPICAL APPLICATIONS. PHYSICAL PROPERTIES OF CABLE SUCH AS ABRASION, TEMPERATURE, TENSILE STRENGTH, SOLVENTS, ETC., ARE DICTATED BY THE SPECIFIC APPLICATION. GENERAL ELECTRICAL REQUIREMENTS ARE: STRANDED COPPER, 20 THROUGH 16 AWG (INDUSTRIAL EPIC CONNECTOR TYPE OPTIONS CAN USE 14 AWG), TWISTED WIRE PAIRS, BRAID OR FOIL INDIVIDUAL SHIELDS OR OVER ALL SHIELD WITH DRAIN WIRE, 0.03uF OF MAXIMUM TOTAL MUTUAL OR DIRECT CAPACITANCE, OUTER SHEATH INSULATOR, MAXIMUM CABLE LENGTH = 500 FT.. 20 AWG WIRE SHOULD NOT BE USED FOR CABLE RUNS GREATER THAN 61 METERS. IF 20 AWG IS USED WITH EPIC TYPE CONNECTORS THEN THE WIRE ENDS SHOULD BE TINNED.

REFER TO THE WIRING DIAGRAMS ON THE ENCODER AND IN THE SPECIFIC MODEL INSTRUCTION SHEETS FOR SPECIFIC CONNECTOR PIN OUTS AND PHASING TABLES FOR EACH CONNECTOR STYLE OPTION.

XXXXXX	XXXXXX
NEXT ASSY	USED ON
APPLICATION	

UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES
TOLERANCES: ANGLES±1° DECIMALS .XX± .03 .XXX± .015
FINISH
PAINT PER PS
PLATE PER
COAT PER PS
ANODIZED PER
OTHER

DRAWN	ZIVKOVIC	7/21/20
CHECKED	SIRACKI	7/21/20
ENG APVD	WOLFF	7/21/20
APVD PROD		

Nidec Industrial Solutions
243 TUXEDO AVENUE
BROOKLYN HEIGHTS, OH 44131

ATEX / IECEx, ZONE 1 & 21 INSTALLATION DRAWING

IMF ☒ PSF ☐

SIZE	CAGE NO.	DWG. NO.	REV
D	0FMV7	D53008	–

SCALE 1/1 | MODEL N/A | SHEET 1 OF 1