



## USER MANUAL

**Explosion Proof Housing - Digital**

Model 2110EX-12 and Model 2110EX-24  
Standard and HLS Versions

© 2022 Electrolab, Inc. ALL RIGHTS RESERVED.

This document may not be reproduced, copied (except for a single archive copy), used, disclosed, transferred (including sold, leased, or rented) adapted or modified except in accordance with the terms and conditions of the License Agreement between the user and Electrolab, Inc.

Electrolab, Inc. makes no representations of warranties with respect to the contents hereof and specifically disclaims any implied warranties of merchantability of fitness for any particular purpose. Electrolab, Inc. reserves the right to revise this publication and to make changes from time to time in its content without the obligation to notify any person or organization of such revision or changes.

## Model 2110EX Explosion Proof Housing

### CHARACTERISTICS

#### General Description:

The Model 2110EX is NRTL certified explosion proof for use in hazardous locations/environments (Class I, Division 1, Group D) in accordance with UL1203, UL61010-1, CSA C22.2 No. 30, and CSA C22.2 No. 61010-1. The device is also certified to provide Intrinsically Safe output for use in hazardous locations (Class I, Division 1, Group D) in accordance with ANSI/UL 913, CSA C22.2 No. 60079-0 and CSA C22.2 No. 60079-11. The Barrier Unit actively limits the current and voltage to protect intrinsically safe equipment from power spikes and to maintain the intrinsic safety. The barrier provides intrinsically safe power and intrinsically safe communication or I/O lines for devices located in Hazardous Areas.

#### Functions:

The 2110EX is capable of delivering safe levels of supply power, 2-wire RS485 digital signals or any other digital I/O lines, and also two emulated dry contact circuits.

### SPECIAL WARNINGS

- **Use only NRTL – listed limited power supply. Voltage should not exceed 12VDC for model 2110EX-12 and 24VDC for model 2110EX-24**
- **Use only with certified Explosion Proof conduit or certified Explosion Proof cable and connector (eg. CLX and TMCX products).**
- **Always attach the cables to the connector strain relief plate with cable ties. This will ensure that cables do not migrate in the enclosure if they are disconnected from connector by accident.**
- **Always lock the cover by fastening its hex screw with a hex socket; use a hex spanner of 1.5mm.**

### AVERTISSEMENTS SPÉCIAUX

- **N'utilisez que des blocs d'alimentation limités NEC class 2 répertoriés d'une Laboratoire d'essai reconnu à l'échelle nationale. La tension ne doit pas dépasser 12VDC pour le modèle 2110EX-12 et 24VDC pour le modèle 2110EX-24**
- **Utilisez uniquement des conduits certifiés antidéflagrants ou des câbles et connecteurs certifiés antidéflagrants (par exemple, les produits CLX et TMCX).**
- **Fixez toujours les câbles à la plaque de décharge de traction du connecteur avec des colliers de serrage. Cela garantira que les câbles ne migreront pas dans le boîtier s'ils sont déconnectés du connecteur par accident.**
- **Verrouillez toujours le couvercle à l'aide d'une vis à six pans creux à l'aide d'une clé hexagonale de 1,5 mm de diamètre.**

### TECHNICAL DATA

#### Supply (X1-1):

**Voltage:** 10 to 12 VDC max for Model 2110EX-12  
22 to 24 VDC max for Model 2110EX-24

**Maximum input current:** 50 mA

**Current consumption:** 40 mA

#### Communication (I/O) lines input (X1-3 and X1-4):

# USER MANUAL



**Voltage:** 5 VDC nom / 6 VDC max  
**Maximum input current** 50 mA

**Dry contact circuits input (X2-1 to X2-2 and X2-3 to X2-4):**

**Voltage:** 10 to 12 VDC max for Model 2110EX-12  
22 to 24 VDC max for Model 2110EX-24

**Maximum input current** 50 mA  
**Internal minimum ON resistance:** 65.5  $\Omega$

**Um:**

12 VDC Model 2110EX-12 (Should be supplied only from NRTL-listed limited power supply)  
24 VDC Model 2110EX-24 (Should be supplied only from NRTL-listed limited power supply)

**Environmental Conditions:**

**Temperature:**  
**Operating** -40 to 70 °C  
**Storage** -40 to 85 °C  
**Atmospheric conditions:**  
**Pressure** 1 atm.  
**Oxygen concentration** not greater than 21%

**Approvals:**

UL1203 Explosion-Proof and Dust-Ignition-Proof Electrical Equipment for Use in Hazardous (Classified) Locations  
UL61010-1 Standard for Safety Electrical Equipment For Measurement, Control, and Laboratory Use  
CSA C22.2 No. 30 Explosion-proof enclosures for use in Class I hazardous locations  
CSA C22.2 No. 61010-1 Safety requirements for electrical equipment for measurement, control, and laboratory use  
UL 913, Standard for Intrinsically Safe Apparatus and Associated Apparatus for Hazard (Classified) Locations  
UL 60079-11 (Intrinsic Safety "i" Zones 0 and 1)  
CSA C22.2 No. 60079-0 Explosive atmospheres - Part 0: Equipment - General requirements  
CSA C22.2 No. 60079-11 Explosive atmospheres - Part 11: Equipment protection by intrinsic safety "i"

**Mounting:**

**Weight:** approx. – 1.8Kg (4 Lbs.)  
**Connection:** WAGO polarized plug-in disconnect/connect cage clamp connection terminal blocks to accommodate terminations up to 1.5mm<sup>2</sup>  
**Location:** Class I Div 1 Group D Temperature code T4  
**Dimensions:**  
PCB: 3.17" x 3.17"  
Enclosure: 4.2"x5.7"x 5" (HxLxW)

## TERMINAL CONNECTIONS

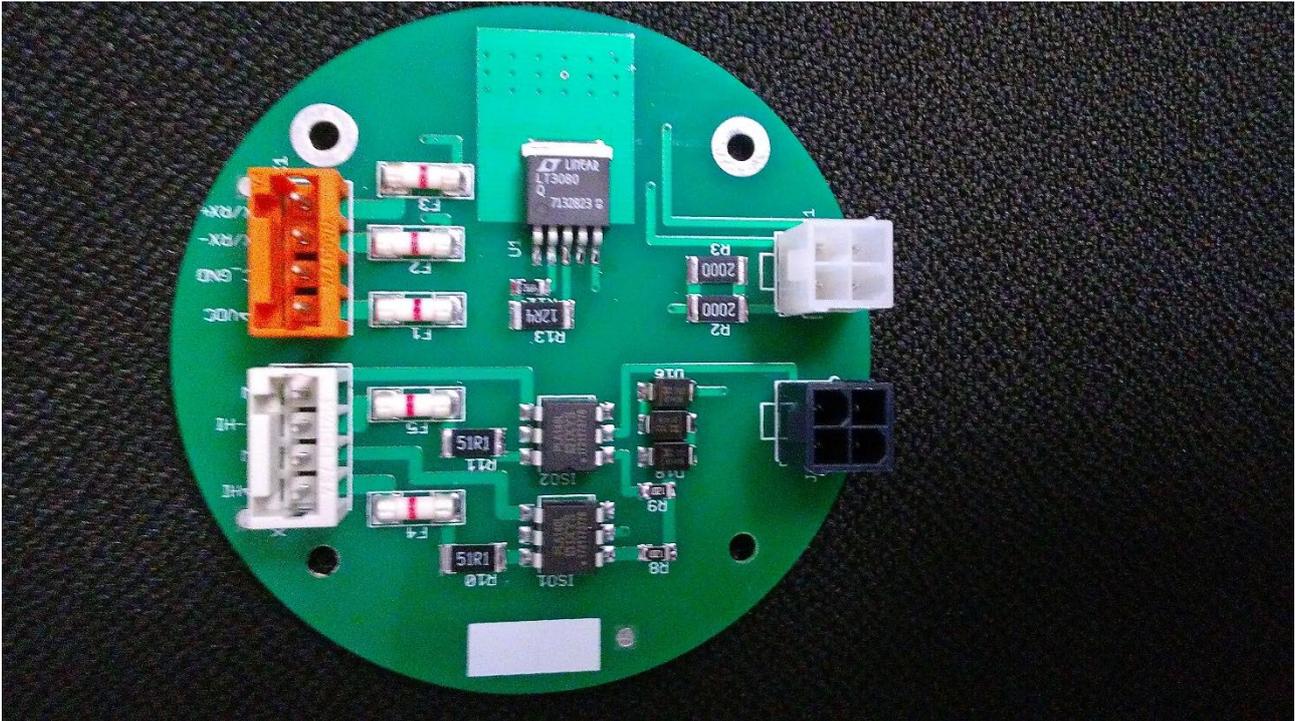


Table 1.

EXPLOSION PROOF CONNECTION	INTRINSICALLY SAFE CONNECTION
X1-L1 → VDC	J1-1 → Tx/Rx+
X1-L2 → DC_GND	J1-2 → DC_GND
X1-L3 → Tx/Rx-	J1-3 → Tx/Rx-
X1-L4 → Tx/Rx+	J1-4 → VDC
X2-L1 → HI	J2-1 → DC_GND
X2-L2 → SW	J2-2 → DC_GND
X2-L3 → HI-HI	J2-3 → HI-HI
X2-L4 → SW	J2-4 → HI

## ENTITY PARAMETERS TABLE

Table 2.

Terminals	2110EX Parameter	Must be	Hazardous Area Device Parameters
J1-4	$U_o/V_{oc} = 10.71 \text{ V}$	$\leq$	$U_i / V_{max}$
J1-1 thru J1-4;	$I_o/I_{sc} = 239.7 \text{ mA}$	$\leq$	$I_i / I_{max}$
J1-1 thru J1-4;	$P_o = 0.5037 \text{ W}$	$\leq$	$P_i / P_{max}$
J1-1 thru J1-4;	$C_o/C_a = 66 \mu\text{F}$	$\geq$	$C_i/C_i \text{ device} + C \text{ cable}$
J1-1 thru J1-4;	$L_o/L_a = 4 \text{ mH}$	$\geq$	$L_i/L_i \text{ device} + L \text{ cable}$
J2-4	$U_o/V_{oc} = 10.71 \text{ V}$	$\leq$	$U_i / V_{max}$
J3-3	$U_o/V_{oc} = 10.71 \text{ V}$	$\leq$	$U_i / V_{max}$
J2-1 thru J2-4;	$I_o/I_{sc} = 18.03 \text{ mA}$	$\leq$	$I_i / I_{max}$
J2-1 thru J2-4;	$P_o = 0.048 \text{ W}$	$\leq$	$P_i / P_{max}$
J2-1 thru J2-4;	$C_o/C_a = 66 \mu\text{F}$	$\geq$	$C_i/C_i \text{ device} + C \text{ cable}$
J2-1 thru J2-4;	$L_o/L_a = 4 \text{ mH}$	$\geq$	$L_i/L_i \text{ device} + L \text{ cable}$

For installation in which both  $C_i$  and  $L_i$  of the Intrinsically Safe Apparatus exceed 1% of the  $C_o$  and  $L_o$  parameters of the Associated Apparatus (excluding cable), then 50% of  $C_o$  and  $L_o$  parameters are applicable and shall not be exceeded.

If cable parameters are unknown, the following values may be used: Capacitance 60pF per foot (180pF per meter), inductance 0.20uH per foot (0.60uH per meter).

## WARNINGS

- Not to be connected to control equipment that uses or generates more than 12VDC for Model 2110EX-12 or 24VDC for Model 2110EX-24 with respect to earth ground.
- The 2110EX must be installed, operated, and maintained only by qualified personnel, in accordance to relevant national/international installation standards (National Electric Code (NFPA, Article 504) and ANSI/ISA – RP12.6).
- Particular care shall be given to segregation and clear identification of IS conductors from non-IS conductors.
- De-energized power source (turn off power supply voltage) before installing or removing the connections when installed in Hazardous Area/Hazardous Locations or unless area is known to be non-hazardous.
- **Warning: substitution of components may impair Intrinsic Safety.**
- **Explosion Hazard: to prevent ignition of flammable or combustible atmospheres, disconnect power before servicing or unless area is known to be non-hazardous.**
- The unit cannot be repaired by the end user and must be returned to the manufacturer or authorized representative. Any unauthorized modification must be avoided and will void any warranty.

Note: X1-L3 and X1-L4 inputs are not reverse polarity protected. If reverse polarity occurs the unit will fail-safe by blowing the fuses. To avoid this situation, special care is required at installation.

## AVERTISSEMENTS

- Ne doit pas être connecté à un équipement de contrôle qui utilise ou génère plus de 12 VCC pour le modèle 2110EX-12 ou 24 VCC pour le modèle 2110EX-24 par rapport à la terre.
- Le 2110EX doit être installé, utilisé et entretenu uniquement par du personnel qualifié, conformément aux normes d'installation nationales / internationales (National Electric Code (NFPA, Article 504) et ANSI / ISA - RP12.6).
- Une attention particulière doit être accordée à la séparation et à l'identification claire des conducteurs IS des conducteurs non IS
- Source d'alimentation hors tension (couper la tension d'alimentation) avant d'installer ou de retirer les connexions lorsqu'elles sont installées dans des zones dangereuses / endroits dangereux ou à moins que la zone ne soit reconnue comme non dangereuse.
- **Avertissement: la substitution de composants peut compromettre la sécurité intrinsèque.**
- **Risque d'explosion: pour éviter l'inflammation des atmosphères inflammables ou combustibles, déconnectez l'alimentation avant l'entretien ou à moins que la zone ne soit reconnue comme non dangereuse.**
- L'appareil ne peut pas être réparé par l'utilisateur final et doit être renvoyé au fabricant ou à un représentant autorisé. Toute modification non autorisée doit être évitée.

Remarque: Les entrées X1-L3 et X1-L4 ne sont pas protégées contre l'inversion de polarité. Si l'inversion de polarité se produit, l'unité sera en sécurité en soufflant les fusibles. Pour éviter cette situation, une attention particulière est requise lors de l'installation.

## MARKING

### Labels:

The Model 2110EX will be clearly marked on the label attached to the enclosure, label drawing number is 2110EX-12V-00/2110EX-24V-00.

### Serial Number:

For each PCB board a unique serial number will be generated after factory testing. The serial number consists of five digits followed by letter *A* or *B* (e.g. SN: 00101A) and will be clearly printed with black permanent marker on a white rectangle located on the front side of the PCB. Letter *A* is used to specify the 12VDC model and letter *B* to specify the 24VDC model.

For each unit a unique serial number will be generated after factory testing. The serial number consists of 12 alphanumeric characters as below:

*UMxMMYYnnnnn*

where:

*UM* – 12 for 12V model and 24 for 24V model;

*x* – S for standard version and H for HLS option;

*MM* – manufacturing month;

*YY* – manufacturing year;

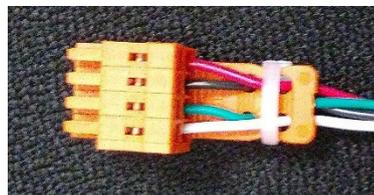
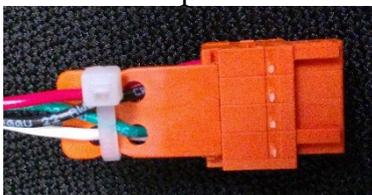
*nnnnn* – 5 digit incremental number;

*12S021800101* represents a 12VDC model device with standard sensor option manufactured in February 2018 and having the assigned order number 00101.

The serial number will be clearly printed on the enclosure label.

## INSTALLATION

1. The unit can be mounted with any orientation over the entire ambient temperature range.
2. Use only explosion proof conduit or explosion proof cable to connect to the enclosure in accordance with relevant national/international standards (National Electric Code (NFPA, Article 504)).
3. Conduit seal is required within 18 inches of enclosure.
4. Electrical connection of conductors up to 1.5 mm<sup>2</sup> are accommodated by polarized plug-in removable WAGO disconnect/connect cage clamp.
5. Connection to earth ground should use at least one wire with a minimum of 4 mm<sup>2</sup> copper or at least two wires each with a minimum 1.5 mm<sup>2</sup> copper. The resistance path from device to the point of connection should be less than 1 Ω.
6. Identify the function and location of each connection terminal using the wiring diagram/control drawing (Drawing No. 2110EX-002).
7. Intrinsically safe conductors must be identified and segregated from non intrinsically safe conductor and wired in accordance with relevant national/international standards (National Electric Code (NFPA, Article 504) and ANSI/ISA – RP12.6).
8. Always attach the cables to the connector strain relief plate with cable ties. This will ensure that cables do not migrate in the enclosure if they are disconnected from the connector by accident. See pictures below.



9. The enclosure provides an IP54 minimum degree of mechanical protection for indoor and outdoor installation.

10. Lock the cover by fastening its hex screw with a hex socket; use a hex spanner of 1.5mm.
11. Any unauthorized modification must be avoided.
12. Fuses are not field replaceable and the entire Explosion Proof Housing must be returned to the manufacturer for repair.
13. Never change jumpers setting while device power is on.

## STEP BY STEP INSTALLATION INSTRUCTIONS

1. Check device for proper model and voltage
  - a. Review the model number on the attached label and compare to the site power requirements.



*Example of a 24v Label*

- b. Open the enclosure and observe the voltage marked on the label placed on the inside wall of the enclosure base.. Make sure the voltage matches the model number and the location voltage requirements.



*Example of a 24v Label*

2. Loosen the nut on the top part of the 1-inch union, until it is almost removed.
3. Ensure the number of sensor connector pins match the number of 2110EX connector pins.

# USER MANUAL



2110EX-xxH connector with 13 pins



HLS sensor connector with 13 pins



2110EX-xx Connector with 6 pins



Standard sensor connector with 6 pins

4. Apply thread sealant to the 1-inch NPT connector on the sensor.
5. Hold the 2110EX above the sensor flange connector with one hand; insert and tighten up the connector to the sensor with the other hand. Sensor with HLS connections shown at left; standard sensor connections shown at right.



Tighten connector

6. Unscrew the bottom part of the union from the 2110EX. Then screw the bottom part of the union's 1-inch FNPT onto the sensor's 1-inch MNPT flange until hand tight. Make sure the connector cable is not caught in the threads or joint. Tighten the union using a 1.5" wrench but do not overtighten.



Ensure cable is not caught in threads or joint

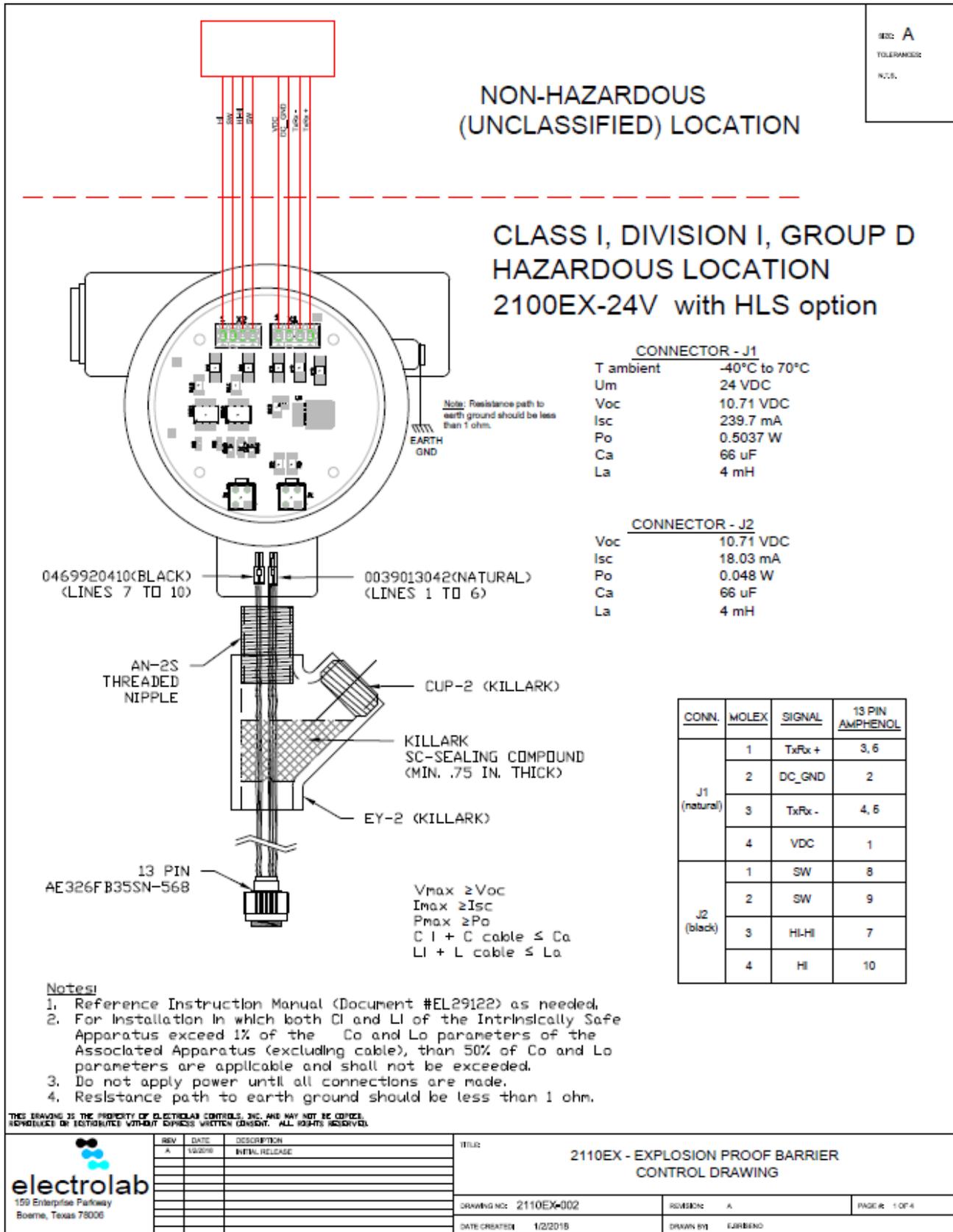
7. Screw together the union parts until hand tight. **Make sure the thread are straight to avoid thread damage.** Use a 1.5" wrench to hold the threaded adapter (bottom part of the union) and a 2-1/16" torque wrench to tighten the union nut to 125 ft.\*lbs.

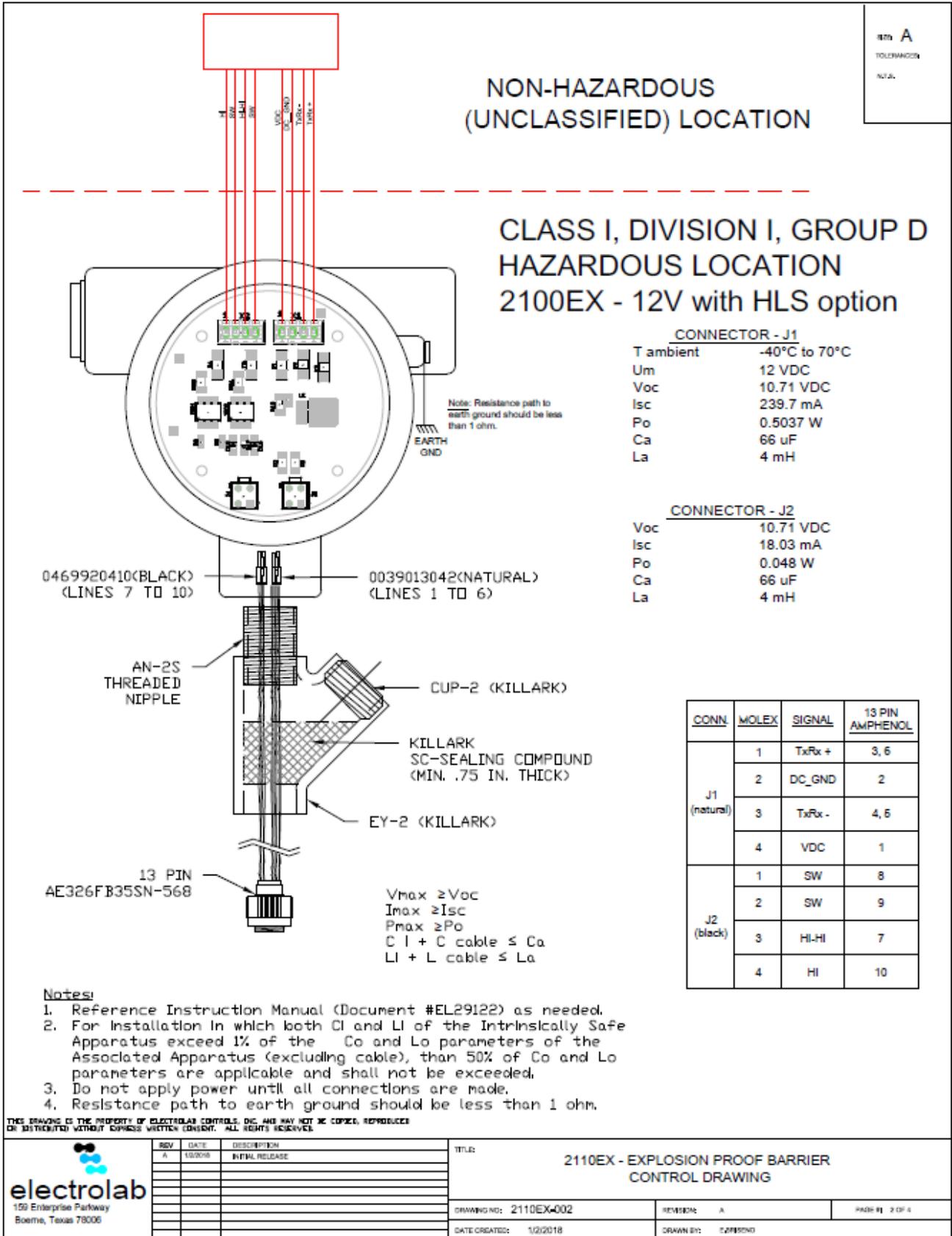


Tighten connector

8. Connect the external RS485 communication and power wires to the orange connector X1 according to the control drawing 2110EX-002\_RevA, following the pinout that is marked on the circuit board. The wire size should be in the range 14 to 28 AWG. Secure the wires on the pull tab using a cable tie.
9. Repeat step 8 for the gray HLS switch connector X2, **if the 2110EX has the HLS option.**
10. Seal the incoming conduit with a certified EX fitting within 18 inches from the 2110EX enclosure.

## Control Drawing

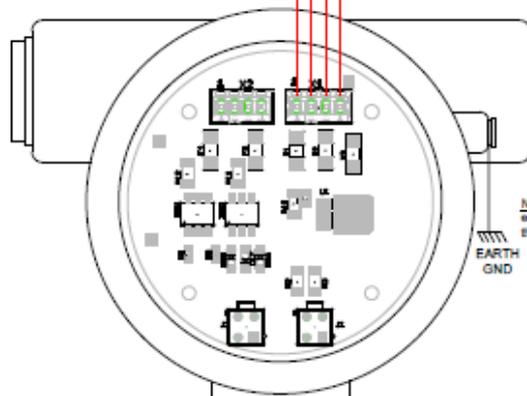




Rev A  
TOLERANCES  
N/A.

NON-HAZARDOUS  
(UNCLASSIFIED) LOCATION

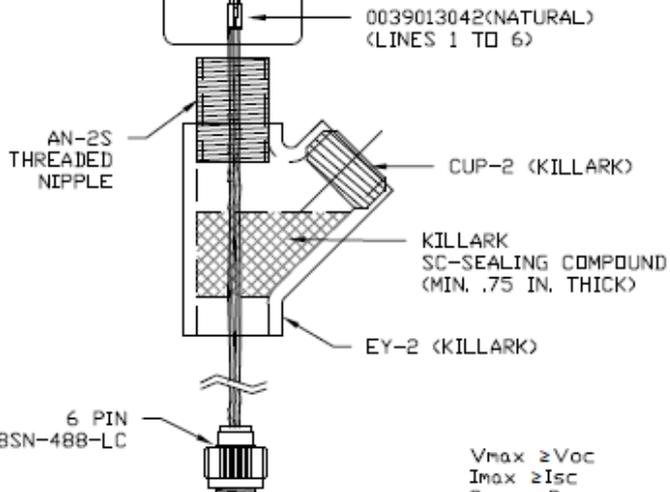
CLASS I, DIVISION I, GROUP D  
HAZARDOUS LOCATION  
2100EX - 24V STANDARD



Note: Resistance path to earth ground should be less than 1 ohm.

**CONNECTOR - J1**

T ambient	-40°C to 70°C
Um	24 VDC
Voc	10.71 VDC
Isc	239.7 mA
Po	0.5037 W
Ca	66 uF
La	4 mH



$V_{max} \geq V_{oc}$   
 $I_{max} \geq I_{sc}$   
 $P_{max} \geq P_o$   
 $C_l + C_{cable} \leq C_a$   
 $L_l + L_{cable} \leq L_a$

CONN.	MOLEX	SIGNAL	6 PIN AMPHENOL
J1 (natural)	1	TxRx +	D, E
	2	DC_GND	B
	3	TxRx -	C, F
	4	VDC	A

**Notes:**

1. Reference Instruction Manual (Document #EL29122) as needed.
2. For installation in which both CI and LI of the Intrinsically Safe Apparatus exceed 1% of the Co and Lo parameters of the Associated Apparatus (excluding cable), then 50% of Co and Lo parameters are applicable and shall not be exceeded.
3. Do not apply power until all connections are made.
4. Resistance path to earth ground should be less than 1 ohm.

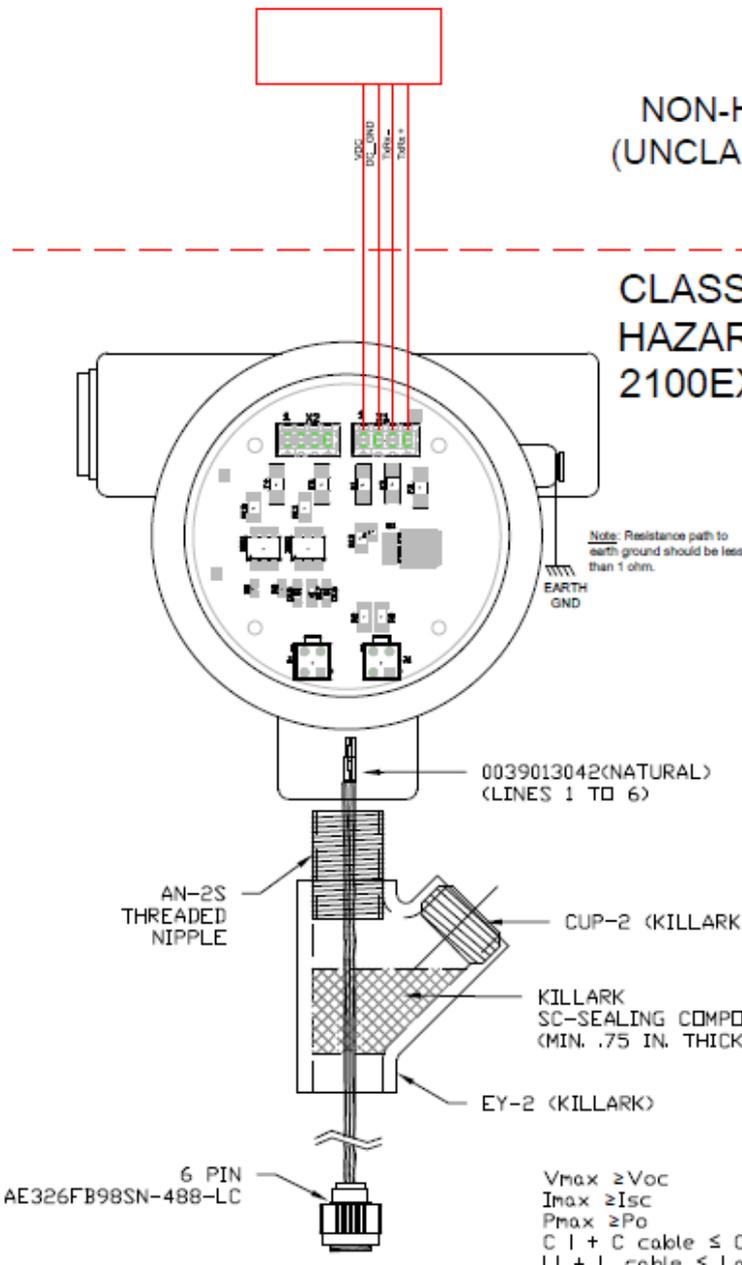
THIS DRAWING IS THE PROPERTY OF ELECTROLAB CONTROLS, INC. AND MAY NOT BE COPIED, REPRODUCED OR DISTRIBUTED WITHOUT EXPRESS WRITTEN CONSENT. ALL RIGHTS RESERVED.

 159 Enterprise Parkway Boerne, Texas 78006	REV	DATE	DESCRIPTION	TITLE	2110EX - EXPLOSION PROOF BARRIER CONTROL DRAWING				
	A	1/20/18	INITIAL RELEASE						
				DRAWING NO:	2110EX-002	REVISION:	A	PAGE #:	3 OF 4
				DATE CREATED:	1/2/2018	DRAWN BY:	CAIRNSD		

Rev A  
TOLERANCES  
N/A.

NON-HAZARDOUS  
(UNCLASSIFIED) LOCATION

CLASS I, DIVISION I, GROUP D  
HAZARDOUS LOCATION  
2100EX - 12V STANDARD



**CONNECTOR - J1**

T ambient	-40°C to 70°C
Um	12 VDC
Voc	10.71 VDC
Isc	239.7 mA
Po	0.5037 W
Ca	66 uF
La	4 mH

CONN.	MOLEX	SIGNAL	6 PIN AMPHENOL
J1 (natural)	1	TxRx +	D, E
	2	DC_GND	B
	3	TxRx -	C, F
	4	VDC	A

$V_{max} \geq V_{oc}$   
 $I_{max} \geq I_{sc}$   
 $P_{max} \geq P_o$   
 $C_l + C_{cable} \leq C_a$   
 $L_l + L_{cable} \leq L_a$

- Notes:**
1. Reference Instruction Manual (Document #EL29122) as needed.
  2. For Installation in which both  $C_l$  and  $L_l$  of the Intrinsically Safe Apparatus exceed 1% of the  $C_a$  and  $L_a$  parameters of the Associated Apparatus (excluding cable), then 50% of  $C_a$  and  $L_a$  parameters are applicable and shall not be exceeded.
  3. Do not apply power until all connections are made.
  4. Resistance path to earth ground should be less than 1 ohm.

THIS DRAWING IS THE PROPERTY OF ELECTROLAB CONTROLS, INC. AND MAY NOT BE COPIED, REPRODUCED OR DISTRIBUTED WITHOUT EXPRESS WRITTEN CONSENT. ALL RIGHTS RESERVED.

 159 Enterprise Parkway Boerne, Texas 78006	REV	DATE	DESCRIPTION	TITLE: <b>2110EX - EXPLOSION PROOF BARRIER CONTROL DRAWING</b>		
	A	1/20/18	INITIAL RELEASE			
				DRAWING NO: 2110EX-002	REVISION: A	PAGE # 4 OF 4
				DATE CREATED: 1/20/18	DRAWN BY: CAMBOND	

# USER MANUAL



For more information contact Electrolab:



electrolab®  
Electrolab, Inc.  
159 Enterprise Parkway  
Boerne, Texas  
888-301-2400  
[www.electrolabcontrols.com](http://www.electrolabcontrols.com)