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-12V and 24VDC for model 2110EX-24V
- Use only with certified Explosion Proof conduit or certified Explosion Proof cable and connector (eg. CLX and TM CX 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.

TECHNICAL DATA

Supply (X1-1):
- Voltage: 10 to 12 VDC max for Model 2110EX-12V
- 22 to 24 VDC max for Model 2110EX-24V
- Maximum input current: 50 mA
- Current consumption: 40 mA

Communication (I/O) lines input (X1-3 and X1-4):
- 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-12V
- 22 to 24 VDC max for Model 2110EX-24V
- Maximum input current: 50 mA
- Internal minimum ON resistance: 65.5 Ω

Um: 12 VDC Model 2110EX-12V (Should be supplied only from NRTL-listed limited power)
Environment 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 1.5mm²
- Location: Class I Div 1 Group D Temperature code T4
- Protection class:
- Dimensions:
  - PCB: 3.17“ x 3.17“
  - Enclosure: 4.2“x5.7“x 5“ (HxLxW)
## TERMINAL CONNECTIONS

### EXPLOSION PROOF CONNECTION

<table>
<thead>
<tr>
<th>X1-L1 → VDC</th>
<th>J1-1 → Tx/Rx+</th>
</tr>
</thead>
<tbody>
<tr>
<td>X1-L2 → DC_GND</td>
<td>J1-2 → DC_GND</td>
</tr>
<tr>
<td>X1-L3 → Tx/Rx-</td>
<td>J1-3 → Tx/Rx-</td>
</tr>
<tr>
<td>X1-L4 → Tx/Rx+</td>
<td>J1-4 → VDC</td>
</tr>
<tr>
<td>X2-L1 → HI</td>
<td>J2-1 → DC_GND</td>
</tr>
<tr>
<td>X2-L2 → SW</td>
<td>J2-2 → DC_GND</td>
</tr>
<tr>
<td>X2-L3 → HI-HI</td>
<td>J2-3 → HI-HI</td>
</tr>
<tr>
<td>X2-L4 → SW</td>
<td>J2-4 → HI</td>
</tr>
</tbody>
</table>
ENTITY PARAMETERS TABLE

<table>
<thead>
<tr>
<th>Terminals</th>
<th>2110EX Parameter</th>
<th>Must be</th>
<th>Hazardous Area Device Parameters</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1-4</td>
<td>$U_o/V_{oc} = 10.71, V$</td>
<td>$\leq$</td>
<td>$U_1/V_{max}$</td>
</tr>
<tr>
<td>J1-1 thru J1-4;</td>
<td>$I_o/I_{sc} = 239.7, mA$</td>
<td>$\leq$</td>
<td>$I_i/I_{max}$</td>
</tr>
<tr>
<td>J1-1 thru J1-4;</td>
<td>$P_o = 0.5037, W$</td>
<td>$\leq$</td>
<td>$P_i/P_{max}$</td>
</tr>
<tr>
<td>J1-1 thru J1-4;</td>
<td>$C_o/C_a = 66, \mu F$</td>
<td>$\geq$</td>
<td>$C_i/C_i\ device + C\ cable$</td>
</tr>
<tr>
<td>J1-1 thru J1-4;</td>
<td>$L_o/L_a = 4, mH$</td>
<td>$\geq$</td>
<td>$L_i/L_i\ device + L\ cable$</td>
</tr>
<tr>
<td>J2-4</td>
<td>$U_o/V_{oc} = 10.71, V$</td>
<td>$\leq$</td>
<td>$U_1/V_{max}$</td>
</tr>
<tr>
<td>J3-3</td>
<td>$U_o/V_{oc} = 10.71, V$</td>
<td>$\leq$</td>
<td>$U_1/V_{max}$</td>
</tr>
<tr>
<td>J2-1 thru J2-4;</td>
<td>$I_o/I_{sc} = 18.03, mA$</td>
<td>$\leq$</td>
<td>$I_i/I_{max}$</td>
</tr>
<tr>
<td>J2-1 thru J2-4;</td>
<td>$P_o = 0.048, W$</td>
<td>$\leq$</td>
<td>$P_i/P_{max}$</td>
</tr>
<tr>
<td>J2-1 thru J2-4;</td>
<td>$C_o/C_a = 66, \mu F$</td>
<td>$\geq$</td>
<td>$C_i/C_i\ device + C\ cable$</td>
</tr>
<tr>
<td>J2-1 thru J2-4;</td>
<td>$L_o/L_a = 4, mH$</td>
<td>$\geq$</td>
<td>$L_i/L_i\ device + L\ cable$</td>
</tr>
</tbody>
</table>

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 (0.60µH per meter).
WARNINGS

- Not to be connected to control equipment that uses or generates more than 12VDC for Model 2110EX-12V or 24VDC for Model 2110EX-24V 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.

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.

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;
- **nnnn** – 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 mm² are accomodated 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 mm² copper or at least two wires each with a minimum 1.5 mm² 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.

**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.

4. Apply thread sealant/Teflon tape 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.

6. Unscrew the bottom part of the union from the 2110EX and screw the bottom part of the union 1-inchFNPT onto the sensor 1-inch MNPT flange. Make sure the connector cable is not caught in the threads or joint.
7. Screw together and tighten up the union parts.

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.
For more information contact Electrolab:

Electrolab, Inc.
159 Enterprise Parkway
Boerne, Texas
888-301-2400
www.electrolabcontrols.com
NON-HAZARDOUS (UNCLASSIFIED) LOCATION

CLASS I, DIVISION I, GROUP D HAZARDOUS LOCATION
2100EX-24V with HLS option

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

CONNECTOR - J2
- Voc: 10.71 VDC
- Isc: 18.03 mA
- Po: 0.048 W
- Ca: 66 uF
- La: 4 mH

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

Notes:
1. Reference Instruction Manual (Document #EL29122) as needed.
2. For Installation in which both Cl and Ll of the Intrinsically Safe Apparatus exceed 1% of the Co and La parameters of the Associated Apparatus (excluding cable), then 50% of Co and La 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.
NON-HAZARDOUS (UNCLASSIFIED) LOCATION

CLASS I, DIVISION I, GROUP D
HAZARDOUS LOCATION
2100EX - 12V with HLS option

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

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

CONNECTOR - J2
- Voc: 10.71 VDC
- Isc: 18.03 mA
- Po: 0.048 W
- Ca: 66 uF
- La: 4 mH

<table>
<thead>
<tr>
<th>CONN</th>
<th>MOLEX</th>
<th>SIGNAL</th>
<th>13 PIN AMPHENOL</th>
</tr>
</thead>
<tbody>
<tr>
<td>J1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>TxE+</td>
<td>3, 6</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>DCGN</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>TxE-</td>
<td>4, 5</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>VDC</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>J2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>SW</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>SW</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>HI-HI</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>HI</td>
<td>10</td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. Reference Instruction Manual (Document #EL29122) as needed.
2. For installation in which both Cl and LI of the Intrinsically Safe Apparatus exceed 1% of the Co and Lo parameters of the Associated Apparatus (excluding cable), than 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.

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

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

CONNECTOR - J1

- Vmax ≥ Voc
- Imax ≥ Isc
- Pmax ≥ Po
- Cl + C cable ≤ Ca
- Li + L cable ≤ La

Note:
1. Reference Instruction Manual (Document #EL29122) as needed.
2. For installation in which both Cl and Li of the Intrinsically Safe Apparatus exceed 1% of the Ca and La parameters of the Associated Apparatus (excluding cable), than 50% of Ca and La 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.

CONN. | MOLEX | SIGNAL | 6 PIN AMPHENOL
--- | --- | --- | ---
1 | TxE | D, E | AE326FB98SN-488-LC
2 | DC_GND | B | AN-2S THREADED NIPPLE
3 | TxE | C, F | CUP-2 (KILLARK)
4 | VDC | A | KILLARK SC-SEALING COMPOUND (MIN. .75 IN. THICK)

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

Connector - J1

- T ambient: -40°C to 70°C
- U_m: 12 VDC
- V_oc: 10.71 VDC
- I_sc: 239.7 mA
- P_o: 0.5037 W
- C_a: 66 uF
- L_a: 4 mH

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_o and L_o parameters of the associated Apparatus (excluding cable), than 50% of C_o and L_o 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.