INSTRUCTIONS

ISOLATOR/SURGE PROTECTOR

DAIRYLAND
ELECTRICAL INDUSTRIES
ALWAYS RUGGED. ALWAYS RELIABLE.

INTRODUCTION

The Isolator/Surge Protector (ISP) is a solid-state decoupler. The ISP provides DC blocking and AC continuity that benefits grounding in cathodically protected systems. The ISP is appropriate for applications that require greater than 15 kA_{RMS} fault currents.

ISP lightning impulse protection levels are 75kA or 100kA - similar to other Dairyland decoupler products.

PRODUCT ENVIRONMENTAL RATINGS

ISP ambient operating temperature is from -40 °C (-40 °F) to +65 °C (+150 °F)

GENERAL FEATURES

Weight

ISP with -FC (Fault Current) rating of rating 68 kA_{RMS} or less weighs 52 lbs. ISP rated 118 kA_{RMS} weighs 92 lbs.

Dimensions

See Fig. X (ISP drawing) for ISP with -FS (Fault Current) rating of 68 kA_{RMS} or less. See Fig. Y (ISP drawing) for ISP with rating of 118 kA_{RMS}.

External Power

No additional power input is required.

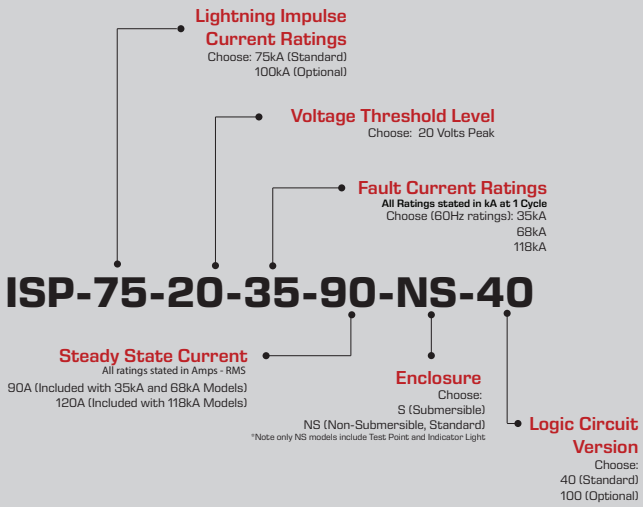
Hazardous Locations

The ISP is a sealed product that does not produce sparks in any mode of operation. It meets the intent of ANSI / NFPA 70 Classes 1, Division 2 hazardous locations for NEC (U.S. National Electric Code) and CSA (Canadian Standards Association.)

The ISP has not been submitted for listing for hazardous locations because it is seldom used in hazardous locations. For applications requiring a device listed for hazardous locations, consider Dairyland's PCR or PCRH decoupler products. Note that these products operate differently than ISP (see also technical literature.)

ISP Fail-Safe Operation

If ISP internal components fail, they will fail as a short-circuit. This condition no longer provides DC isolation. Use of ISP must ensure this is a safe failure condition for the application.



MODEL NUMBER

If you have any questions on which ISP variant will satisfy your application's technical requirements, please contact Dairyland. For more detailed description of the model number, see the ISP Technical Literature.

INSTALLATION SAFETY

NACE SP0177 specifies unsafe touch potentials to be greater than 15VAC between the structure and ground. Voltage measurements may confirm the presence of these steady-state voltages; if in doubt, the use of insulating gloves is advised.

Dairyland recommends a grounding jumper (for example, BCL-1/0 accessory from Dairyland's website) as a safety precaution in the event of a momentary electrical hazard during installation; these voltages may be much larger, but for very short durations. A momentary rise in voltage from the structure lead to ground is not protected until the ISP is fully installed. Always connect the grounding jumper first and disconnect it last.

⚠ WARNING

During installation, unsafe voltage may be present and/or sparking may occur. Please read and observe all safety precautions described in these installation instructions.

Legal Disclaimer: User must be responsible for safe installation. Dairyland provides supplemental guidance for safe installation and maintenance of its products but is not liable for safe installation or comprehensive instructions. Dairyland guidance does not include nor supersede other application safety considerations.

Please consult all necessary safety precautions pursuant to applicable industry and/or company required practices. To ensure safe installation, Dairyland guidance must be applied within the context of these requirements.

INSTALLATION CHECKLIST

Checklist 1: Environment Safety and PPE

(PPE – “Personal Protective Equipment”)

- ☐ 1. No Hazardous Gases or Vapors Present
  - ○ Non-combustible in presence of arcing or sparks
- ☐ 2. Grounding Jumper (product-to-structure connection)
  - ○ Connect first (prior to terminal connections)
  - ○ Disconnect last (after installation complete)
- ☐ 3. Electrically Insulated Gloves
  - ○ Structure >15 V_{AC}-to-ground, see NACE SP0177

Checklist 2: Test Equipment

Option **A**:

- ☐ 4. Multimeter (e.g. DMM)
  - ○ Resistance measurement (Range: 1 Ohm)
  - ○ Voltage measurement (Range: 100 V_{DC}, V_{RMS})
  - ○ Clamp-on current (Range varies: <100 A_{DC}, A_{RMS})
- ☐ 5. Shorting cable (terminal-to-terminal short connection)
  - ○ Insulated clamps on each end
  - ○ 3 feet (1 meter) in length
  - ○ 6 AWG or thicker (depends on application)

Option **B**:

- ☐ 6. ISP Tester (only if ISP contains a test point)
  - ○ For in-situ comprehensive test diagnostics

INSTALLATION CONSIDERATIONS

Mounting

See outline drawings at the conclusion of this document for detailed product dimensions. Two 0.56in (14mm) holes are provided, one per each short edge of the ISP. Dairyland recommends 0.5in (12mm) diameter bolts (user furnished) be used in these holes.

ISP mounting orientation and location must consider:

- Lead polarity
- Lead connection (wire) length
- Ease of access to “test point” and “red indicator” (if present)

Position and orient the ISP mounting so that each terminal reaches its intended destination with the shortest lead length possible.

For mounting to a round pole, accessory brackets are available on the Dairyland website.

Terminals and Polarity

Four 0.5in holes are available on each of the two terminals of the ISP. Neither terminal is internally bonded to the enclosure, so the enclosure must be bonded to the grounding system. The enclosure-to-station bond connection may be made through the uncoated mounting hole nearest the terminals.

Polarity designations are embossed on the enclosure above each terminal.

- Positive terminal (+) connects to ground.
- Negative terminal (-) connects to the cathodically protected structure.

Lead Connections

The ISP best protects the structure during lightning strikes when the lead connections (wires to its terminals) are short. Typically connecting wires add greater than 1,500V per foot of wire.

The ISP suppresses hazardous voltages at its terminals; any voltage difference along the lead connections presents greater risk to the protected structure. Lightning strike hazards develop the largest voltage along lead connections due to their fast rise and fall times (micro-seconds).

INSTALLATION PROCEDURE

1. Review “Installation Safety” to ensure familiarity with Dairyland safety precautions.

2. Review “Installation Considerations” in order to choose mounting location

3. Install top and bottom mounting screws

4. Attach safety **grounding jumper** (product to structure)

OPTION A PRE-INSTALLATION TEST PROCEDURE
(prior to connecting ISP terminals).

5. Execute the following steps:

   a. Set Multimeter (DMM) to ohmmeter.

   b. Briefly short ISP terminals with shorting cable.

   c. Measure across ISP terminals with DMM (any lead-to-terminal polarity is acceptable).

   ☐ Confirm ohmmeter measures low resistance (close to 0 Ohms) upon first contact with the ohmmeter.

   ☐ Confirm ohmmeter resistance measurement gradually increases over time (typically greater than 1,000 Ohm).

***NOTE:** if ISP ohmmeter reads a steady low resistance (does not gradually increase over time), contact Dairyland technical support before proceeding.

   d. Set Multimeter (DMM) to Volts AC.

   e. Measure **across the connection points** to which the ISP will later be connected (do not measure across the ISP terminals.)

   ☐ Record in table below as **Open-Circuit V_{RMS}**

   f. Set Multimeter (DMM) to Volts DC.

   g. Measure **across the connection points** to which the ISP will later be connected (do not measure across the ISP terminals.)

   ☐ Record in table below as **Open-Circuit V_{DC}**

   h. Attach the shorting cable **between the connection points** to which the ISP will later be connected (do not attach across ISP terminals.)

   i. Set Multimeter (DMM) to Current AC with clamp-on current sensing mechanism. Clamp to cable.

   ☐ Record in table below as **Short-Circuit A_{RMS}**

   j. Set Multimeter (DMM) to Current DC with clamp-on current sensing mechanism.

   ☐ Record in table below as **Short-Circuit A_{DC}**

   k. Choose the appropriate Z value for ISP according to the table.

   ☐ Multiply and Record $Z*A_{RMS}*1.414$ as **Vpk_{AC}**

   ☐ Add and Record **Vpk_{AC} + V_{DC}** as **V_{TOTAL}**

   ☐ Check **V_{TOTAL}** is less than 17V (for 20V ISP trigger)

***NOTE:** if **V_{TOTAL}** does not meet this condition, contact technical support of your application (or Dairyland) to determine next steps before proceeding. This indicates the ISP ratings may not satisfy the application’s steady-state operating conditions; in other words, the ISP may trigger repetitively.

   l. Disconnect shorting cable from system.

TERMINAL CONNECTIONS

6. Connect bond wire from **positive terminal to enclosure**.

7. Attach **positive terminal to system ground**.

8. Attach **negative terminal to cathodically protected structure**.

9. After both terminals are connected, check for repetitive triggering indicators. The indicators mentioned below are similar. If any of the below indicators are present, call attention to the situation with local technical resources.

   a. Red Indicator (if present) illuminates repetitively

   b. Audible “clicking” sounds

   c. DMM **V_{RMS} + V_{DC}** measurement from step 5 **Option A pre-installation procedure** should be repeated. In normal operation, the ISP is likely to reduce these voltage measurements from their pre-installation values.

EXAMPLE

Assuming ISP-75-20-35-90-NS-40 model in 60Hz system.

If the pre-installation Short-Circuit **A_{RMS}** value is 10A, expected **V_{RMS}** is as follows:

V_{RMS} = 10**A_{RMS}** x 0.088 Ohm = 0.88**V_{RMS}**

Measured Open-Circuit **V_{RMS}** = 0.9**V_{RMS}**

Therefore, since **V_{RMS}** (measured) is approximately equal to expected **V_{RMS}**, the ISP is functional.

OPTION A POST-INSTALLATION TEST PROCEDURE

10. Calculate and compare leakage current of the ISP.

☐ Record the **Leakage A_{DC}** as follows: multiply earlier **Open-Circuit V_{DC}** measurement by the constant 0.25mA/V.

EXAMPLE

If the pre-installation **V_{DC}** measurement is 10V, the acceptable DC current after installation is:

10V x 0.25mA/V = 2.5mA

a. Set Multimeter (DMM) to Volts DC and measure at ISP terminals.

☐ Record voltage measurement as **Open-Circuit V_{DC}** in the table under "Post-Installation" column. Check that this post-installation value is comparable to the pre-installation measurement.

***NOTE:** DC Voltage measurements should not change significantly from pre-installation measurements (consult technical support of your specific application to confirm how much **V_{DC}** change may be expected.)

b. If change of **V_{DC}** from before and after installation is determined to be significant, it may indicate **Leakage A_{DC}** is beyond the expected value recorded in the table. In this case, consult technical support of your specific application to measure leakage current.

Consult Dairyland Electrical Industries if the measurement is greater than **Leakage A_{DC}**.

11. Remove safety **grounding jumper**.

If the unit ever appears failed for any reason described in the above procedure, or for other reasons you may identify, contact Dairyland Electrical Industries. Dairyland may assist with these technical steps or with authorization to return unit to factory for test and/or repair. Repair under warranty is invalid if circuit has been disassembled

Z Values	60Hz System	50Hz System
-AC code: 90	0.088	0.106
-AC code: 120	0.066	0.080

Measurements	Option A: Pre-Installation	Option A: Post-Installation
Leakage A_{DC}		
Open-Circuit V_{RMS}		
Open-Circuit V_{DC}		
Short-Circuit A_{RMS}		
Short-Circuit A_{DC}		
Vpk_{AC}		
V_{TOTAL}		

OPTION B: ISP TESTER PROCEDURE

ISPs with the Test Point option may be comprehensively and automatically tested in situ with the "ISP Tester" accessory. Ensure the cap is firmly tightened when the test point is not in use. Contact Dairyland for more information.

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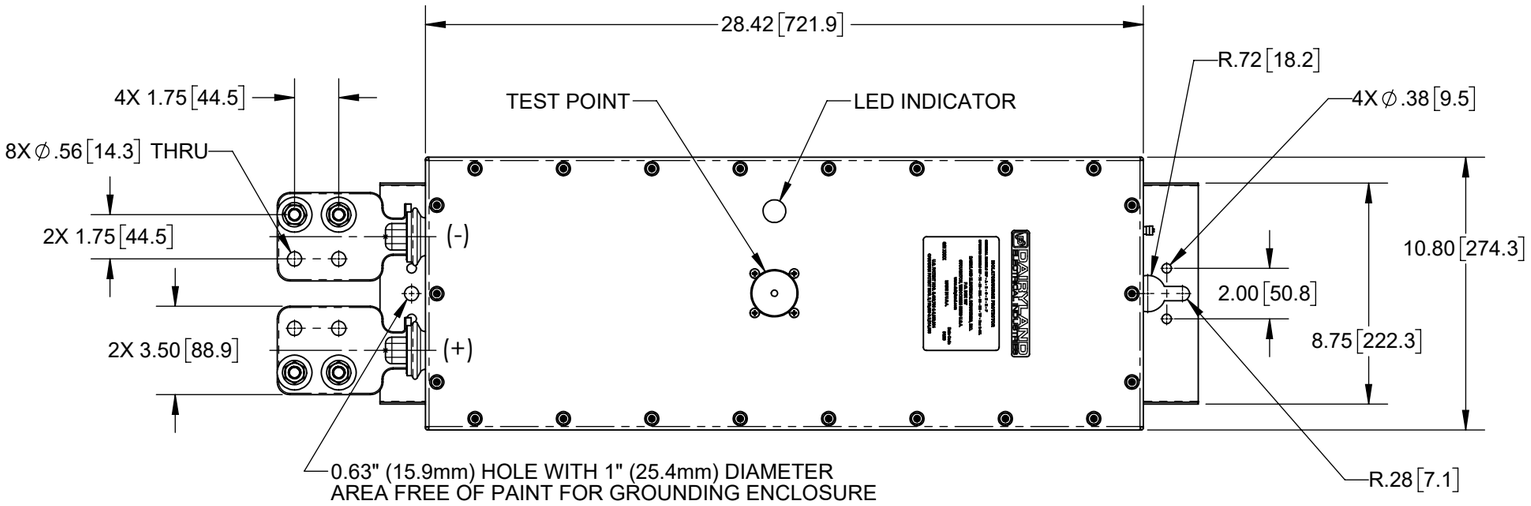

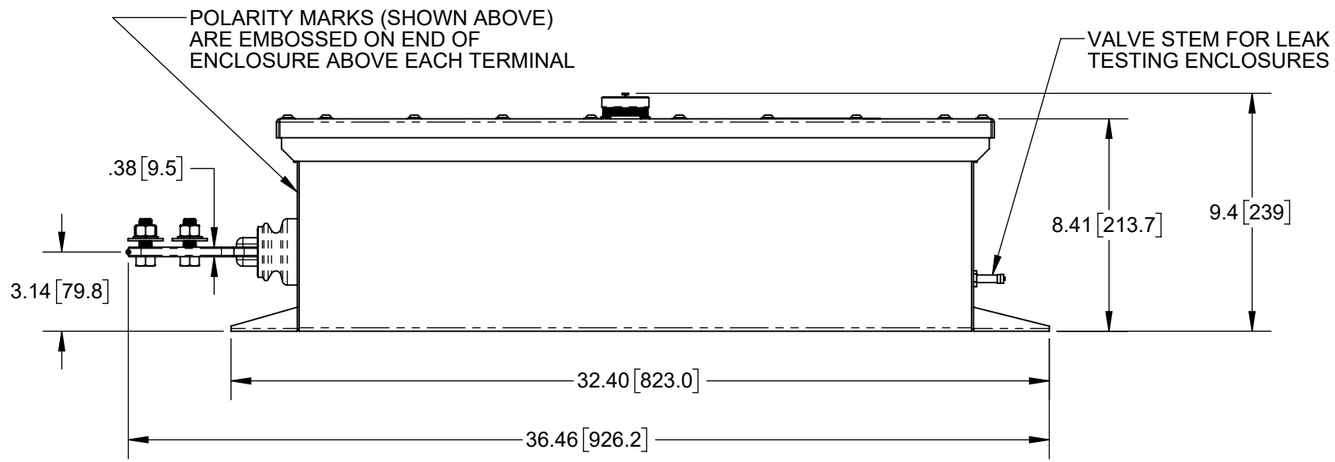

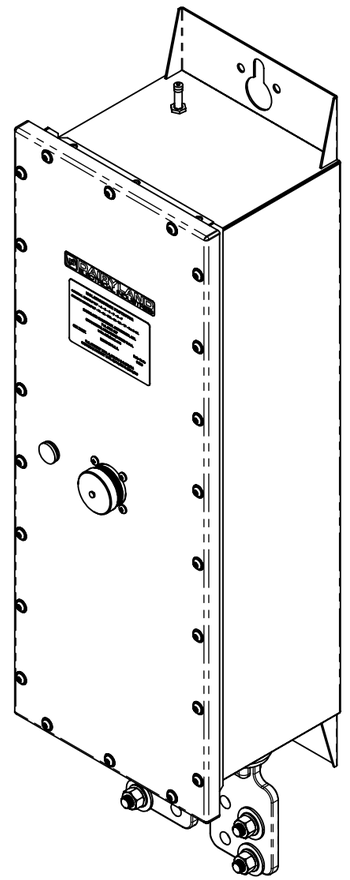

ISOMETRIC VIEW

35kA/68kA ISP

NOTE:

1. THE TEST POINT AND LED INDICATOR ARE ONLY AVAILABLE WITH A NON-SUBMERSIBLE ENCLOSURE AND ARE NOT AVAILABLE ON THE SUBMERSIBLE ENCLOSURE.

ASME Y14.5M 2018 APPLIES UNLESS OTHERWISE SPECIFIED DIMENSIONS ARE IN INCHES. COMPUTER-GENERATED DRAWING DO NOT EDIT MANUALLY. .XXX = ±.005" .XX = ±.01" .X = ±.03" ANGLES = ±1° 63	MATERIAL: NA FINISH: NA	DRAWN: JPW	DATE DRAWN: 2015-01-06	DAIRYLAND ELECTRICAL INDUSTRIES, INC. P.O. BOX 187 STOUGHTON, WI 53589 608-877-9900 DAIRYLAND.COM
		DWG APPROVAL: RJH	DATE APPROVAL: 09/30/2021	TITLE: ISP OUTLINE DIMENSIONS

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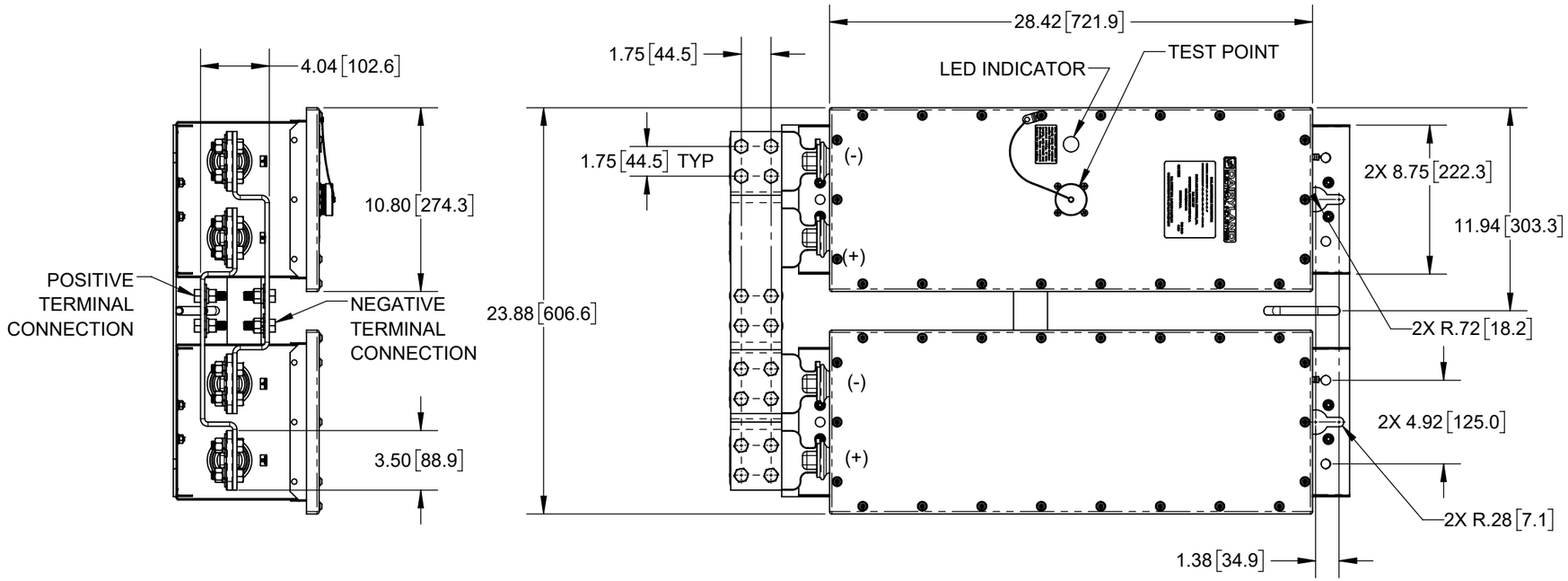

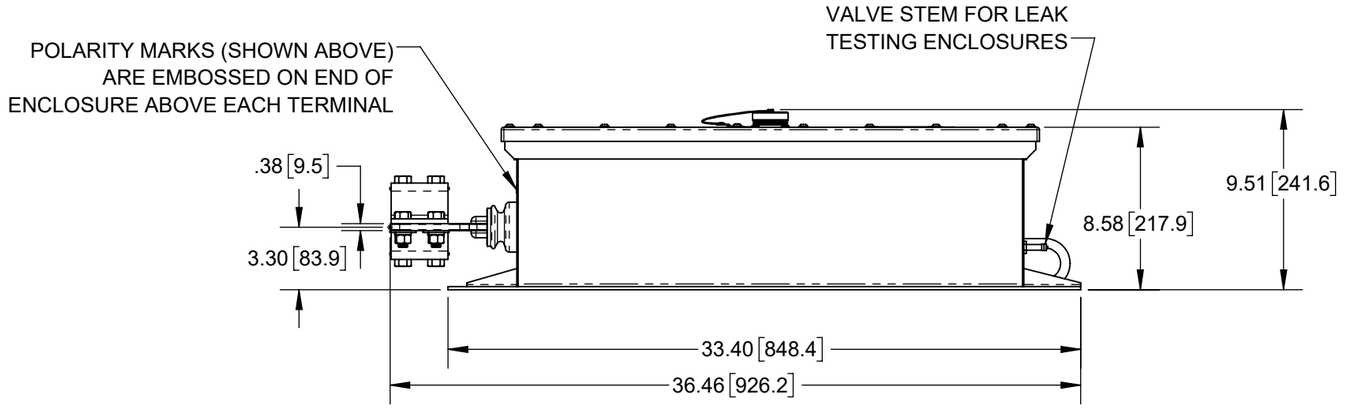

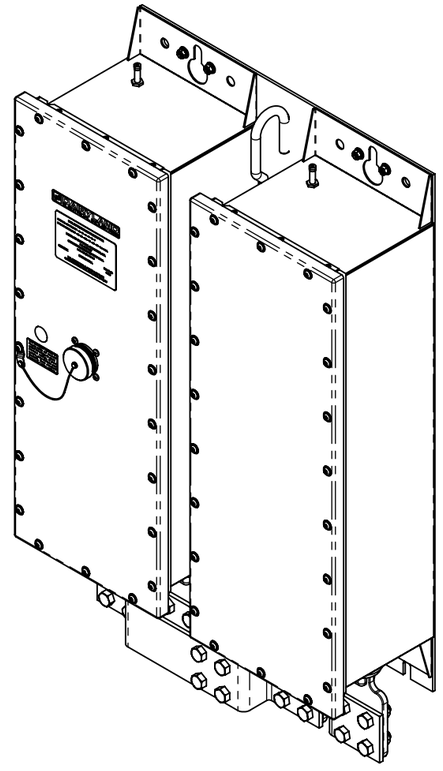

ISOMETRIC VIEW

118kA ISP

NOTE:

1. 118kA RATED ISP NOT AVAILABLE IN SUBMERSIBLE VERSION.

ASME Y14.5M 2018 APPLIES	MATERIAL: NA	DRAWN: JPW	DATE DRAWN: 2015-01-06	DAIRYLAND ELECTRICAL INDUSTRIES, INC. P.O. BOX 187 STOUGHTON, WI 53589 608-877-9900 DAIRYLAND.COM
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