INSTRUCTIONS

ISOLATOR/SURGE PROTECTOR 118kA

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INTRODUCTION

The Isolator/Surge Protector (ISP) is a solid-state, logic-controlled device which provides DC isolation and AC grounding/coupling of cathodically protected systems. The system on which this product is installed should be compatible with the product ratings below.

Note: For more information on the ISP product, please view the full ISP Technical Literature.

RATINGS

The code letters in the following ratings tables refer to the model number position. See product nameplate.

INSTALLATION INSTRUCTIONS

Ambient Operating Temperature

-40°F to +150°F

(-40°C to +65°C)

Typical Model Structure

ISP-A-B-C-D-E-F

Lightning Current Rating (8 x 20 waveform)	
"A" Code	Peak Amperes
75	75,000
Note: 8 x 20 micro-second waveform	

Voltage Blocking Rating	
"B" Code	Volts Peak
12.5	12.5
20 (Alternate)	20

AC Fault Current Ratings (Amps AC-RMS Symmetrical)				
60 Hz "C" Code Cycles				
1	3	10	30	60
118kA	96kA	75kA	54kA	40kA

Steady-State Current Ratings (Amps AC-RMS Symmetrical)	
60 Hz "D" Code	Amperes
120	120

If there is DC voltage across the ISP that is above normal cathodic protection voltages, the steady-state current must be derated from the above values as illustrated in the ISP technical literature.

Enclosure	
"E" Code	Type
NS	Non-Submersible

The enclosure is made of 14 gauge (0.0747" thick) #304 series stainless steel and is rated NEMA 4X. It is rain-tight and suitable for outdoor application.

Two hole NEMA terminals are furnished as standard equipment.

The enclosure is isolated from the both terminals as furnished. The enclosure should be grounded externally to the positive terminal, and the positive terminal should be connected to electrical system ground.

MODEL CODE "F"

TP = Test Point. (Optional) This ISP is furnished with a multi-pin connector through which the unit can be comprehensively tested in-situ with a field tester available for rent from Dairyland Electrical Industries.

Rev4 = Rev. 4 of logic/control circuit (current version).

40 = Maximum allowable DC current that can be flowing through the ISP when in its conducting mode and still enable the device to be automatically reset back to its normal mode after a fault condition.

L = Red LED indicator that will flash about once per second only if the DC voltage is above the voltage blocking level (i.e., about 12.5 volts) or if the steady state AC current is above the steady state rating for this model (i.e., above 120A). Should either of these conditions occur, consult DEI. Under normal operating conditions this LED should always be off.

Note: If either of the above conditions occur, there will be an audible "clicking" sound as the thyristors are being switched

Typical Catalog Number

ISP-75-12.5-118-120-NS-TP-Rev4-40L

INSTALLATION INSTRUCTIONS

These general instructions apply to all applications.

⚠ WARNING

During installation, the voltage on the structure may rise to an unsafe level (i.e., due to induced AC, AC fault or lightning on the structure). Sparking and current flow may occur when connecting or disconnecting decouplers or over-voltage protectors. Assure that this does not occur in hazardous locations where gases or vapors may be present. All necessary safety precautions must be taken by the user to avoid unsafe worker conditions, including arcing, in accordance with applicable industry and/or company-required practices. Dairyland provides suggested procedures for installing and operating this equipment (See the section on Worker Safety). But the user must be responsible for and approve the procedures to be used by its workers when installing the equipment because Dairyland cannot be familiar with each user's safety guidelines.

Worker Safety

For worker safety during installation, it is recommended that the user obtain certain equipment; namely a pair of electrically insulated gloves, a shorting cable approximately 3 ft (0.91 m) long with insulated clamps on each end, and a multi-meter to measure AC voltage. The following installation procedure assumes that these items are available. It is suggested that a grounding jumper be used as a safety precaution in the event the lead to the structure rises to an unsafe potential when it is disconnected during the installation process or if an electrical disturbance occurs while the decoupler is being installed. Be sure to remove the grounding jumper after the decoupler is completely installed. If the structure voltage is not at a safe touch potential (i.e.,>15VAC to ground per NACE SP0177), then insulating gloves should be used.

Mounting

Mounting is to be made as close as possible to the connection points, using four 3/8" diameter bolts (user furnished).

Polarity

The positive terminal (i.e., the terminal toward the bottom of the enclosure) of the ISP is to be connected to ground.

The negative terminal (i.e., the terminal toward the top of the enclosure) is to be connected to the cathodically protected cable casing.

Lead Connections

The leads should be cut to the shortest possible length and should run in the most direct manner to the points of connection. (This will minimize the voltage developed between the connection points due to lead inductance when subject to lightning and/or switching transients.)

Field-Testing

This ISP can be field tested in place with a custom designed field tester available from Dairyland Electrical Industries.

Field testing is suggested if a problem with the ISP function is suspected or following a major fault on the cable being protected.

Note: The ISP Tester was not originally designed to for this subsequent product variation; hence, when testing, an error message will appear for Test # 2 that says "+ By-Pass Logic Fault" and Test # 7 "- By-Pass Logic Fault". This is normal when the ISP Tester is used to test this model. These two specific error messages are not valid as proven by other factory tests that were conducted prior to shipment. All other tests should read "Normal". To provide a "Normal" readout for all tests (as is the case when testing standard ISP's) would require considerable reprogramming of the tester. This is not warranted due to the small number of ISPs furnished with this fault current rating.

If ISP is equipped with the Test Point option, its cap must be firmly tightened when not in use.

APPENDIX TO INSTALLATION INSTRUCTIONS

ISP Installation Measurements – Optional

Measurements may be taken at the time of installation to:

1) become familiar with the ISP, or
2) verify that the appropriate model number (i.e., ratings) was selected.

This information will help to assure that the ISP is applied within its intended ratings under steady-state operating conditions.

Equipment Required

- A multimeter with AC/DC amperes, volts, ohms.
- A clamp-on AC ammeter
- A Hall Effect clamp-on DC ammeter with mA resolution

Prior to Installation: ISP Test

It is suggested that a user become familiar with the ISP's response to a DC ohmmeter connected across its terminals. Knowing this characteristic of the ISP can prove useful in future field testing. Proceed with this test as follows:

- Set the multimeter on the lowest DC ohms scale. Momentarily provide a short-circuit between the two ISP terminals to assure that there is no residual charge in the capacitor in the ISP. While observing the meter, connect it across the ISP terminals; positive meter lead to (+) terminal, negative meter lead to (-) terminal.
- For a functional unit, the DC resistance upon initial contact will begin at essentially zero ohms and then gradually increase to a value of several thousand ohms or more (if necessary, adjust the ohms scale to observe).

- For a non-functional unit, the DC resistance is typically about one ohm or less.

This check may be repeated several times if desired, if between each test the two terminals of the ISP are momentarily "short circuited" to remove any residual charge on the internal DC blocking/AC by-pass capacitor.

Testing for System Characteristics Before ISP Installation

It is desirable to know the system characteristics to assure that the steady-state conditions that will be imposed on the ISP are within the rating selected. To make this determination, measure the following parameters between the two points to which the ISP will be connected.

- Measure "open circuit" voltage:

The "open circuit" voltage is the voltage measured between the two points to which the ISP will be connected.

VDC = [ ] Volts

VAC-RMS = [ ] Volts

- Measure "short circuit" current:

The "short circuit" current is the current that will flow through a solid bond between the two points to which the ISP will be connected.

IDC = [ ] Amperes

IAC-RMS = [ ] Amperes

- Calculate the peak AC current through the ISP, and the peak AC voltage across the ISP after it will be installed, using the following formulas:

IAC peak = IAC-RMS x 1.414

= [ ] Amperes

VAC peak = IAC peak x XC

= [ ] Volts

For 60 Hz systems:

XC = 0.066 ohms if "D"Code = 120

V(TOTAL) = VT = VDC + VAC peak

= [ ] Volts

Verifying ISP Ratings for Application

To verify that the ISP has been properly selected and installed, compare the above measured/calculated values against the model number as follows:

- If position B of the model number is 12.5, then V(TOTAL) should be less than 10 volts and if position B is 20, then V(TOTAL) should be less than 17 volts.

Maximum Steady-State Current Allowable

The maximum steady-state AC current flowing thorough the ISP should always be less that the value shown for the "D" Code position in the nameplate model number and as identified in the ratings section of these instructions.

After Installation

Assuming that the ISP is connected to a system compatible with its steady-state ratings, the following information will be helpful in "after installation" analysis.

- The ISP should be completely silent (noise free). If an audible clicking sound is heard, the ISP is being subject to an AC current that is above its rating for the DC voltage applied. This sound is caused by a magnetic effect of certain solid-state components and is not any form of electrical arcing. In addition, a red indicator on the cover of the ISP will flash intermittently. (Indicator is furnished with non-submersible enclosures only.) Should this occur, consult Dairyland Electrical Industries as a higher steady-state current rating is required for this application.

A partial test to verify that the ISP is functioning properly is to compare the VAC-RMS measured after installation to the calculated VAC-RMS. These values should be approximately equal.

VAC-RMS (measured) = [ ] Volts

Note: The value of "VAC-RMS (measured)" may be significantly lower than the open-circuit VAC-RMS measured before the ISP was installed (as recorded above), this is an intended effect of the ISP's low impedance to AC.

VAC-RMS calculated = IAC-RMS

(measured) x XC

IAC-RMS = [ ] Amperes

XC = [ ] Ohms

VAC-RMS calculated = [ ] Volts

Example

Assume IAC (measured)

= 10.0 Amperes AC-RMS

VAC (calculated) = 10.0 x 0.066

= 0.66 Volts AC-RMS

Assume VAC (measured) = 2.60 Volts

Therefore, since VAC (measured) is approximately equal to VAC (calculated), the unit is functional. For this same model unit in the failed mode,

VAC (measured) = 0.02 Volts would be a typical value.

Note: If the steady-state AC current through the ISP exceeds its steady-state current rating, the above field test procedure will not apply; consult DEI.

- The ISP presents a low impedance to AC under steady-state conditions. Therefore, the AC current flowing through the ISP will be about equal to the steady-state “short circuit” current available before installation (i.e., based on using the ISP to mitigate induced AC voltage.)

- The ISP presents a virtual “open circuit” to DC; therefore, the DC current will be too small to measure with most readily available field test instruments. The normal DC leakage current is nominally 0.25 milliamperes per volt DC. The DC leakage current should be approximately: 0.25 mA/V x VDC-(measured). Therefore, if a higher DC current is measured, consult Dairyland Electrical Industries.

IDC = [ ] ma @ [ ] VDC Volts

- Since the ISP presents a virtual “open circuit” to DC, the DC voltage measured across the ISP terminals should be the same as that measured under open circuit conditions before the ISP was installed.

If the unit ever appears failed, contact Dairyland Electrical Industries for assistance, and if necessary, for authorization to return unit to factory for test and/or repair. Repair under warranty is invalid if circuit has been disassembled, because disassembly sequence is important to prevent damage to components.

For assistance, please contact Dairyland Electrical Industries.