SAFESIDE® Permanent Electrical Safety Devices

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INSTALLATION AND OPERATING INSTRUCTIONS

R-3F2-LXX

UL APPROVED FOR:
CLASS I, DIVISION 2 HAZ LOC
CAT III & IV

Part Number Description: The “XX” specifies the fiber-O cable length in inches.

General Usage: This 3-phase device reduces the risk of electrical arc flash into a HazLoc area by pre-verifying the electrical isolation from outside of a control panel. Engineered with redundant circuitry, the Voltage Indicator is powered by the same voltage that it indicates. The electronics housing is hardwired to the circuit breaker or main disconnect. A sleeved all plastic non-conductive fiber-optic cable passes light from the electronics housing to the separately mounted 30mm diameter "through-the-door" display adaptor, providing for a true “zero” voltage display. Grounding of the door then becomes un-necessary. Whenever AC or DC voltage is above detection thresholds the display indicators will flash or glow.

⚠ WARNING If the equipment is used in a manner not specified by the manufacturer, the protection by the equipment may be impaired.

⚠ WARNING - Probability of death or serious injury if accident occurs: **COULD**

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BE SURE POWER IS SHUT OFF PRIOR TO INSTALLING THIS DEVICE!

SAFESIDE® VOLTAGE INDICATOR R-3F2 UL NEC CLASS I, DIVISION 2 Patented

⚠ WARNING

AUXILIARY DEVICE SUITABLE FOR USE IN
CLASS I, DIVISION 2 (or ZONE 2), GROUPS A, B, C, D
HAZARDOUS LOCATIONS, or NONHAZARDOUS LOCATIONS ONLY

Class I Groups:

A - acetylene
B - hydrogen
C - ethyl-ether vapors, ethylene or cyclopropane
D - gasoline, hexane, naptha, benzene, butane, propane, alcohol, acetone, benzol, lacquer solvent vapors, or natural gas

Division 2 : Ignitable concentrations of gases, vapors, or liquids are not likely present under normal operating conditions

Haz Loc Normal Atmospheric Conditions: a) -25C to +40C ambient b) 21% Max. Oxygen concentration per volume c) barometric pressure range of 80 kPa (0.8 bar) to 110 kPa (1.1 bar)

⚠ WARNING

EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT WHILE THE CIRCUIT IS LIVE OR UNLESS THE AREA IS KNOWN TO BE FREE OF IGNITABLE CONCENTRATIONS.

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⚠ WARNING

EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENT MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2

Approvals:

UL LISTED file No. E334957
Per ISA 12.12.01-2007
CAT REPORT No. E311256
per UL61010-1, 2ND Edition
CAN/CSA-C22.2 No. 61010-1, 2ND Edition

CAT III 1000V
CAT IV 600V
DC or AC-rms to Ground
(Peak Impulse Transient 8000V
20 repetitions, 2 ohm source)

UL TYPE 4X
TYPE 12
TYPE 13

LISTED
IND. CONT. EQ.
HAZ. LOC. 42RV
46RD

⧈ - Double Insulation Symbol

Specifications:

Input: AC SINGLE OR 3-PHASE: 20 to 600V 3 ~, 50/60/400 Hz
DC OR *STORED ENERGY:* 20 to 1000V ⎓, (Voltages Line-to-Line or Line-to-Ground)

Maximum Rating: 750V 3 ~ or 1000V ⎓ @ 1.2 Watts, Operating Ambient Air of 55°C Max.

Detection Thresholds: 14V 3 ~, 18.5V 1 ~, 15V ⎓ (typical cut-off's)

Temperatures
Operate: -20C to +55C, Code T5
Storage: -45C to +85C

Indicators: (8) Red Super Bright LED's

Terminations: (4) 6 ft, 18 AWG, 90°C @ 1000V, UL-1452 PVC insulation w/ nylon jacket
L1- L3: Black w/ bar identification (Fig. 1) GND: Green w/ Yellow stripe

DIN Enclosure: Black Lexan, encapsulated including LEDs for environment protection

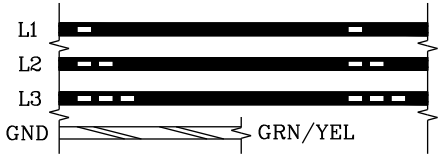
Display Adapter: Black Rynite, Fiber-O cable bundle fully encapsulated

Cable Sleeving: PET Flame Retardant braided sleeving, UL Category UZIQ2

O-Ring Seal: Blue VFMQ Florosilicone, UL approved material

R-3F2-L**XX**: Fiber-O standard cable length in inches (08, 12, 18, 24, 36, 48, 72)
Minimum bend radius = 40mm

Fig. 1 Wire Identification



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Environmental Ratings

Overvoltage Category: CAT III 1000 V & CAT IV 600 V per UL61010, 2ND Edition

Safety category ratings are important, differences and limitations are as follows:

CAT III 1000 V –rating allows up to 1000-V phase to ground with distribution level wiring, 480-volt and 600-volt circuits such as 3-phase bus and feeder circuits, motor control centers, load centers and distribution panels. Also included in CAT III are switchgear, motors, transformers and similar fixed loads, and loads that can generate their own transients.

CAT IV 600 V -rating means that it is suitable for use in all locations such as 3-phase utility or outdoor wiring on conductors that have up to 600-V phase to ground. Applications may include overhead or underground lines that power detached buildings or underground lines that power well pumps.

Transient Withstand: Both CAT III & CAT IV ratings are tested to withstand an 8,000-V transient overvoltage event from a 2 ohm source.

Pollution Degree: 2 - Equipment being evaluated to 60950, Laboratories, Test Stations, Office Enviroment

NEMA Enclosure designation: 4X -UL TYPE

Enclosures constructed for either indoor or outdoor use to provide a degree of protection to personnel against incidental contact with the enclosed equipment; to provide a degree of protection against falling dirt, rain, sleet, snow, windblown dust, splashing water, hose-directed water, and corrosion; and that will be undamaged by the external formation of ice on the enclosure.

Ingress Protection: IP66

First digit 6 = Dust-Tight. Second digit 6 = Protected against powerful water jets.

Operating maximum altitude: 5000 meters (UL's testing limit)

Humidity: 95% RH @ 1,000 hours

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GND Indicators:

For isolated Delta or 3-Phase WYE applications, it is normal for the “GND” indicator pairs not to flash unless a phase is lost producing an unbalanced condition. This peculiarity results when the Phase-to-Phase voltages are balanced resulting in no current to a Neutral connection. The R-3F2 indicators are current driven; therefore, no net current in the R-3F2 ground line (connected to Neutral) will cause the “GND” indicators to not flash.

GND DETECTOR THRESHOLDS (LEAKAGE ANY PHASE-TO-GROUND)

3~ LINE-TO-LINE (VAC)	20	120	240	480	750
L1,L2,or L3 TO GND CONTINUITY (OHMS)	2M	5M	7.5M	13M	20M
DETECTOR INDUCED FAULT CURRENT (µA)	4	12	17	20	21

INDICATOR FLASH RATES (L1,L2,L3,GND)

3~ LINE-TO-LINE (VAC)	<14	20	120	240	480	600	750
FLASHES/SEC (TYPICAL)	0	0.9	2.6	3.3	3.7	3.8	3.9
⎓ OR STORED ENERGY (VDC)	<15	20	48	110	300	600	1000
FLASHES/SEC (TYPICAL)	0	0.9	1.9	3.2	3.7	4.0	4.0

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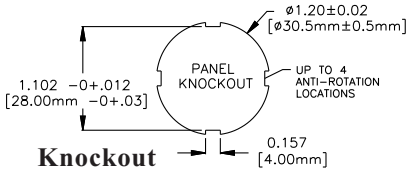
INSTALLATION & OPERATING INSTRUCTIONS



1.) Follow all Local, State, and National Electrical Codes when installing this equipment. Overcurrent protection of the supply leads may be necessary. When determined necessary, use a low .1A or .125A 600VAC fast acting fuse like KTK-1/10 or -1/8. The installation shall be used on a clean flat surface of a type 4X, 12, or 13 enclosure, or equivalent elevated ambient rating.

2.) The disconnecting means must first be suitably located and easily reached; and it must be marked as the disconnecting device for the equipment.
The 30mm Display Adapter knock-out location must be in visual proximity to the control panel ON/OFF disconnect. Make sure to allow for enough fiber-optic cable length (part No. suffix 'XX' in inches) to properly route it back to the intended electronics housing's mounting location & orientation with all bends meeting the 40mm minimum bend radius . The universal mount housing location also must be installed within a 6 Ft. wire routing length to all monitored L1, L2, L3 and GND line connections.

3.) For the best sealing performance of the O-ring, verify the inside contact surface around the panel knockout is clean, flat and free of debris.

4.) For Delta configured power, connect the 1 bar, 2 bar & 3 bar printed black wires (Fig. 1, PG. 2) to L1, L2, & L3 respectively on the fused or disconnect side of the 3-Phase line voltage (Fig. 2, PG. 6). The Green/Yellow stripe (Grn/Yel) wire **MUST** be connected to Earth Ground.

5.) Wye configured power with grounded Neutral is connected the same as for Delta in step 4. The **GRN / YEL (GND)** wire **DOES NOT** connect to neutral but to Earth Ground.
Caution: The neutral will not be monitored for voltage by the Detector, only Phase-to-Phase and Phase-to-Ground voltage will be detected. To include neutral monitoring go the step 6.

6.) Ungrounded or high resistance Wye configured power requires 2 additional units to include Neutral monitoring. (See Fig. 4, PG. 7)

7.) For DC configured power wire as per Fig. 3, PG. 6.

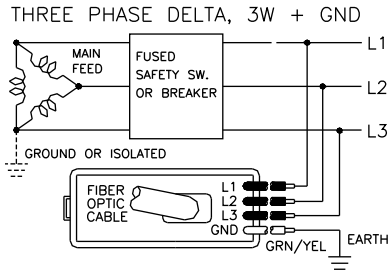
8.) **Verifying Proper Operation:** ***First disconnect all equipment that may introduce a hazard and notify personnel before powering the panel!***
TURN POWER ON. With up to 600V 3~ applied, the L1, L2, and L3 indicators should flash according to "FLASH RATE" Specifications above.
The type of power system grounding configuration determines if the GND indicator normally indicates (See **GND Indicators,** PG. 4).

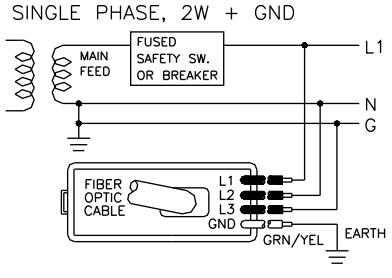
9.) **TURN POWER OFF.** All indicators should be extinguished. **Note:** If only a single LED illuminates for any (2) indicator pairs, **STORED ENERGY** is likely present and must be removed or discharged.
All (8) indicators must be extinguished or a shock hazard is present on the monitored lines. Use this procedure to insure proper grounding:

To complete proper installation, verify grounding of the GRD lead-wire. Under normal operation, the power system determines if GRD LEDs illuminates.
1.) Apply power to the R-XXX, if the GRD LEDs do not illuminate, proceed to step 2.)
2.) Remove power and re-establish an electrical safe work condition to allow one phase lead-wire to be disconnected from its source by either disconnecting wire or pull a fuse.
3.) Re-apply power and verify that the GRD LEDs now illuminate to insure a proper ground connection.
4.) Complete installation by removing power and reconnecting the phase lead-wire or fuse and reapply power and re-verify that L1, L2, & L3 LEDs illuminate.

⚠ WARNING

BEFORE OPENING A PANEL, TURN POWER OFF! (Steps 1-9 must first verify proper operation of indicators.)
SAFETY PROCEDURES STILL APPLY: Before working on an electrical conductor, verify zero electrical energy with proper voltage testing instrument and the proper procedure as per NFPA 70E 120.1(5), 120.2 (F)(2)(f)(1-6), OSHA 1910.333(b)(2)(iv)(B).


THREE PHASE DELTA, 3W + GND
MAIN FEED
FUSED SAFETY SW. OR BREAKER
L1
L2
L3
GROUND OR ISOLATED
FIBER OPTIC CABLE
L1
L2
L3
GND
GRN/YEL
EARTH


SINGLE PHASE, 2W + GND
MAIN FEED
FUSED SAFETY SW. OR BREAKER
L1
N
G
FIBER OPTIC CABLE
L1
L2
L3
GND
GRN/YEL
EARTH

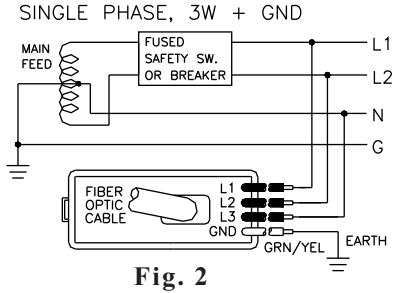
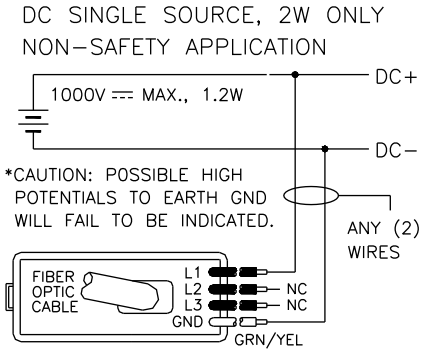

SINGLE PHASE, 3W + GND
MAIN FEED
FUSED SAFETY SW. OR BREAKER
L1
L2
N
G
FIBER OPTIC CABLE
L1
L2
L3
GND
GRN/YEL
EARTH

Fig. 2


DC SINGLE SOURCE, 2W ONLY
NON–SAFETY APPLICATION
1000V ⎓ MAX., 1.2W
DC+
DC–
*CAUTION: POSSIBLE HIGH POTENTIALS TO EARTH GND WILL FAIL TO BE INDICATED.
ANY (2) WIRES
FIBER OPTIC CABLE
L1
L2
L3
GND
NC
NC
GRN/YEL

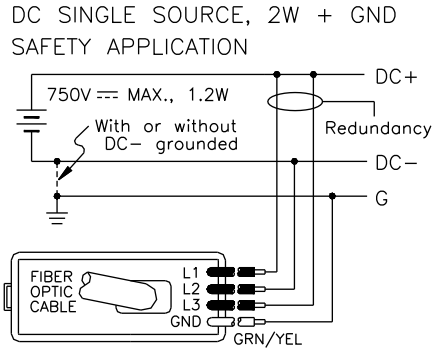

DC SINGLE SOURCE, 2W + GND
SAFETY APPLICATION
750V ⎓ MAX., 1.2W
With or without DC– grounded
DC+
Redundancy
DC–
G
FIBER OPTIC CABLE
L1
L2
L3
GND
GRN/YEL

Fig. 3

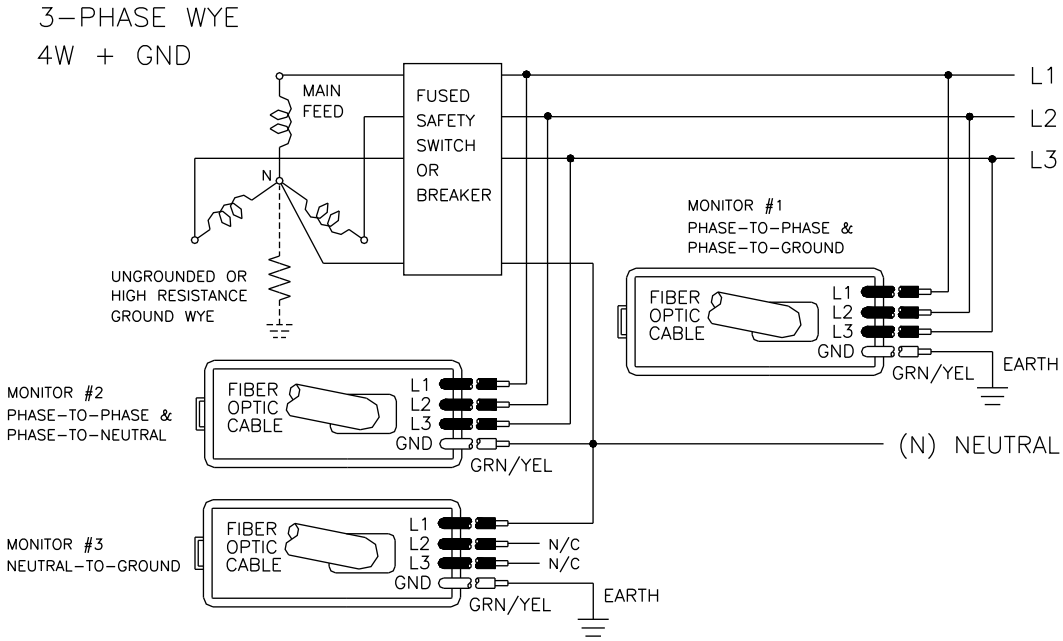

3–PHASE WYE
4W + GND
MAIN FEED
N
FUSED SAFETY SWITCH OR BREAKER
L1
L2
L3
UNGROUNDED OR HIGH RESISTANCE GROUND WYE
MONITOR #1
PHASE–TO–PHASE &
PHASE–TO–GROUND
FIBER OPTIC CABLE
L1
L2
L3
GND
GRN/YEL
EARTH
MONITOR #2
PHASE–TO–PHASE &
PHASE–TO–NEUTRAL
(N) NEUTRAL
MONITOR #3
NEUTRAL–TO–GROUND
N/C
N/C

Fig. 4

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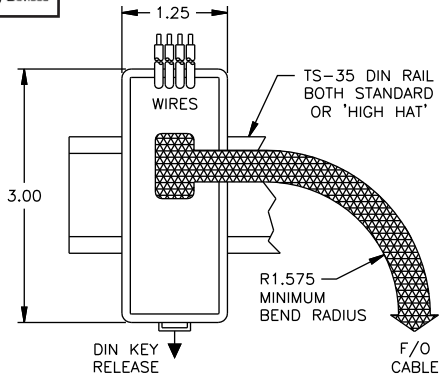
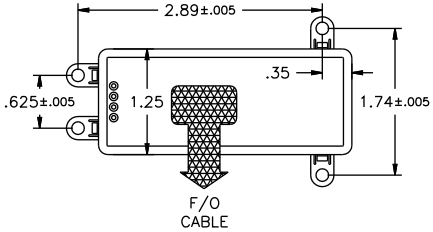
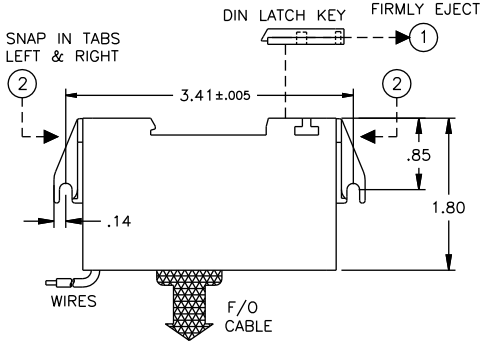
Universal Mounting



DIN MOUNT Fig. 5

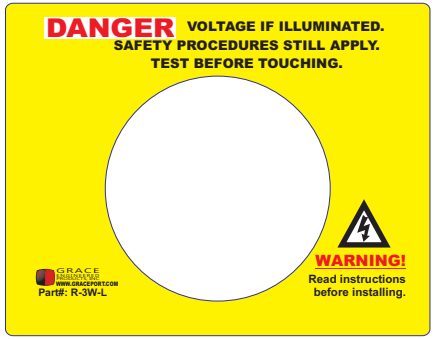


VERTICAL MOUNT Fig. 6



SIDE MOUNT Fig. 7

NOTE: Vertical or Side mount requires snap-in installation of respective mounting tabs (hardware included).



Part#: R-3W-L*

*These labels install around the R-3F2 with no affect on its UL certification. The labels are not UL approved.

Part#: R-3W-NP-F*

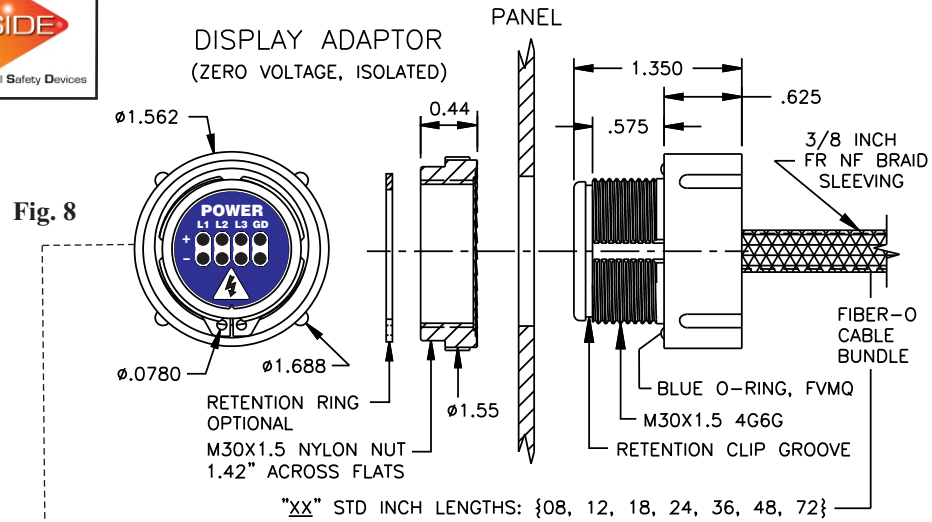
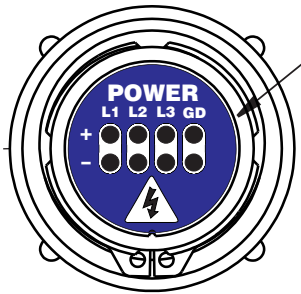


Fig. 8



MAINTAIN A CLEAN DISPLAY LABEL BY GENTLY WIPING WITH A CLEAN DAMP CLOTH. ALL (8) INDICATORS MUST BE VIEWABLE FOR INDICATION.

- CAUTION, possibility of electric shock

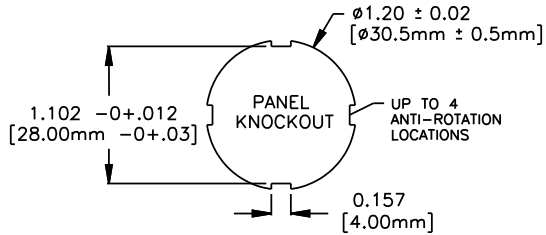


Fig. 9

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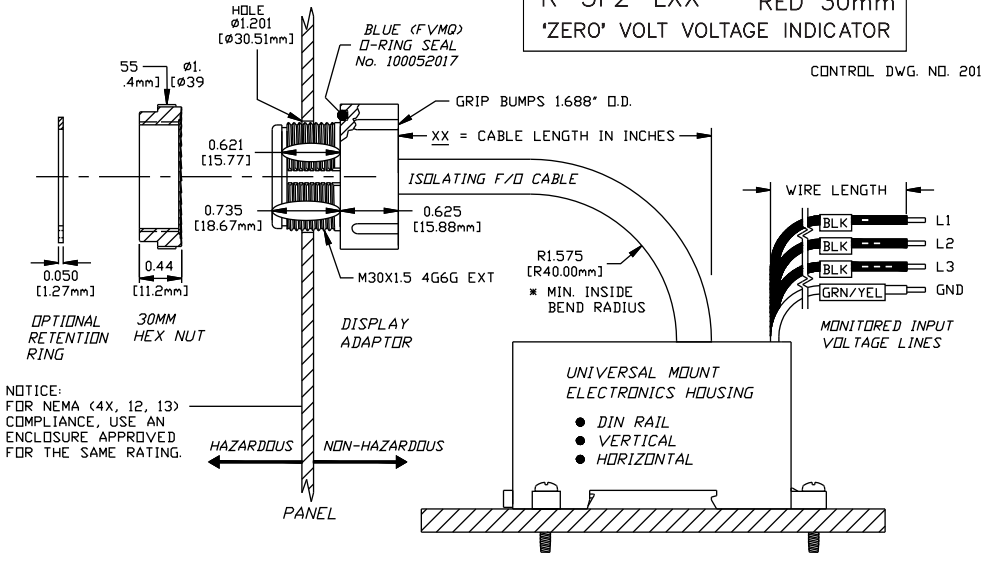
R-3F2-LXX RED 30mm
'ZERO' VOLT VOLTAGE INDICATOR

CONTROL DWG. NO. 201



Installation Notes:

1. The inside mounting surface must be clean and smooth. Tighten the Hex nut until the grip flange contacts the panel surface so the O-ring is fully compressed. Do not overtighten.

Uninstalling for Inspection:

⚠ WARNING: DO NOT UNINSTALL DEVICE UNLESS POWER HAS BEEN DISCONNECTED AND INSTALLATION & OPERATION INSTRUCTIONS STEPS 1-9 HAVE BEEN REVIEWED.

⚠ WARNING: EXPOSURE TO SOME CHEMICALS MAY DEGRADE THE SEALING PROPERTIES OF THE FLUOROSILICONE (FVMQ) O-RING SEAL.

1. Periodic inspection of the O-ring seal is recommended. Replace O-ring if any degradation is found.
2. For replacement O-ring, use part number 100052017.

⚠ WARNING: SUBSTITUTION OF FVMQ O-RING MAY VOID SUITABILITY FOR UL TYPE 4X, 12, 13.

⚠ - Indicates a potential personal injury hazard if not observed.

Weight (XX \ Kg): (08 \ .304), (12 \ .309), (18 \ .317), (24 \ .325), (36 \ .341), (48 \ .357), (72 \ .389)

Notes:
1. XX =Model No. suffix, cable length in inches
2. includes mounting hardware, excludes packing materials

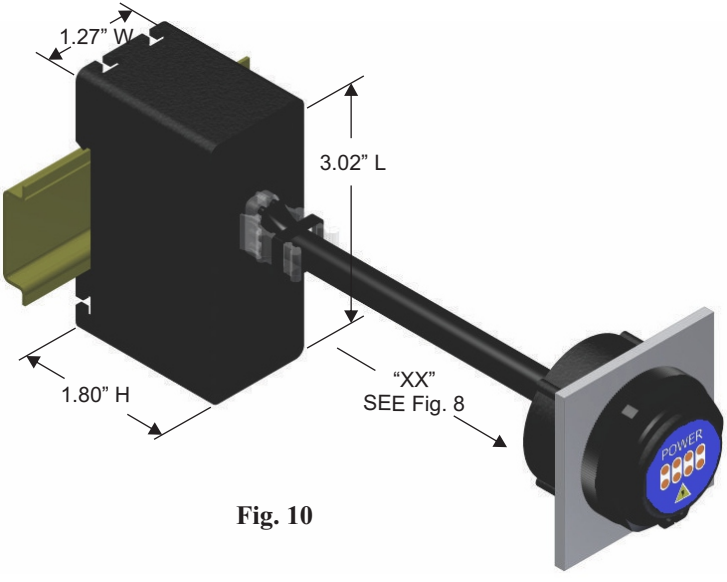


Fig. 10

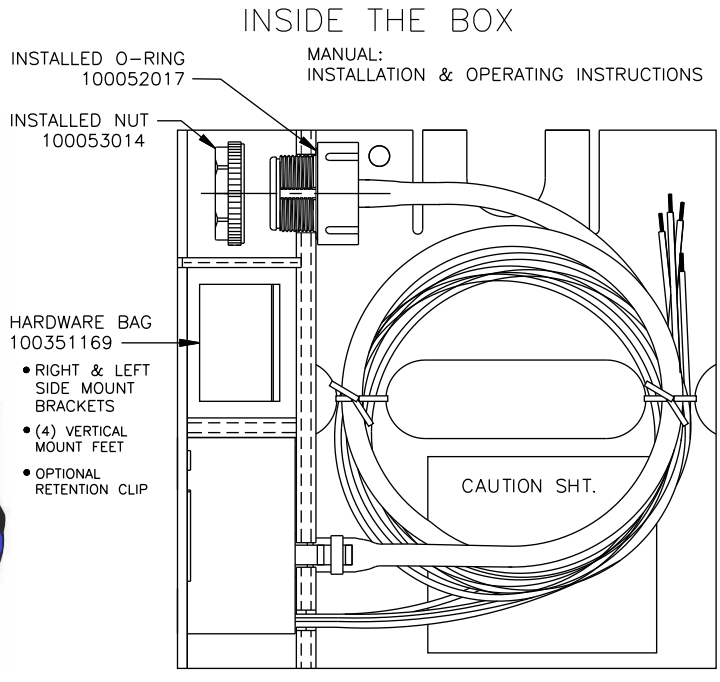


Fig. 11

For additional information, see SAFESIDE® Technical Info:
www.pesd.com