SAFESIDE
Permanent Electrical Safety Devices

Permanent Electrical Safety Devices (PESDs)

Part Number: R-T3W-LCH

Permanent Electrical Safety Devices (PESDs) are defined as external devices (except Medium Voltage Indicators, which are internal) permanently mounted to electrical systems that, directly or indirectly, reduce the risk of arc flash and/or shock hazard. They provide feedback on the voltage state within the enclosure and eliminate proximate exposure to that same voltage. Some examples of PESDs include voltage portals and voltage indicators.


Part Number: R-3W / R-3W-SR

Voltage Indicators: Flashing or non-flashing device that monitors both AC and DC voltage. They are externally mounted and give a visual indication outside the panel to the presence or absence of voltage. Voltage indicators are available in Class 1 Div 2, solid-on LEDs, Fiber Optic, and medium voltage from 2KV to 43KV.
Part numbers include: R-3W, R-3W2, R-3W-SR, R-3F, R-1VH003 and R-1VL003

Part Number:
R-T3 with label
(label sold separately)

Voltage Portals: Non-conductive, encapsulated point that allows for the detection of the presence or absence of voltage through a panel door with a non-contact voltage detector (NCVD).
Part numbers include: R-1A003-LPH and R-T3

"We use Permanent Electrical Safety Devices...to provide the operator tools to perform tasks outside of the enclosure rather than interacting with energized components." - **Dennis Doody, Project Manager, Vitler**

PESDs and NFPA 70E

The NFPA 70E states that the following principles are foundational to ensuring a zero energy state:

- **Locate all sources of electrical energy.**[1] Voltage portals and voltage indicators installed will locate each source.
- **Physically contact voltage detector to the electrical energy.**[2] Voltage indicators are hardwired to the source.
- **Test between each phase and phase to ground.**[3] Voltage indicators check voltage between phase-phase-ground.
- **Verify voltage detector before and after use.**[4] A non-contact voltage detector (NCVD) can be verified before and after use.

Please note: Employers are responsible to train employees in selecting and properly using a voltage detector. It is also the responsibility of employers to provide a written lock-out/tag-out procedure and train employees on those procedures.[5] Follow manufacturer's instructions when using a non-contact voltage detector. All other safety procedures apply.

NFPA 70 References: **[1]** Annex G 6.1, **[2]** 110.6 (D) (4)(e), **[3]** 120.1(5), **[4]** 120.2(F)(2)(f)(1), Annex G 3.4, **[5]** 120.2(C)(2)

Warning: 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).

RoHS (pending)

GRACE ENGINEERED PRODUCTS, INC

DS: PESD/Combo_6/2013
SafeSide® is a registered Trademark of Grace Engineered Products, Inc.

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More on Voltage Indicators

SafeSide™ voltage indicators help keep workers safe during lock-out/tag-out by giving them valuable information about the state of voltage within the panel. Here are some key benefits and features about voltage indicators:

Part Number: R-3W / R-3W-SR

- **Reduced Voltage Exposure and Arc Flash Risk -** While performing electrical LOTO with a SafeSide™ voltage indicator installed, the electrician can pre-check the internal voltage state without opening the enclosure.

- **Safer Lock-Out Tag-Out (LOTO) -** Keeping personnel away from live voltage is foundational to electrical safety. Electrical safety demands a precise answer to the question 'Is voltage present?'. SafeSide™ voltage indicators provide visibility of voltage from outside the enclosure without exposing personnel to voltage.

- **More Productivity in Mechanical LOTO -** Workers performing mechanical LOTO must isolate electrical energy. Without a SafeSide™ voltage indicator, a mechanic performing mechanical LOTO would be required to work in tandem with an electrician using a voltmeter to physically verify voltage inside an electrical panel. In this case, the electrician is exposed to voltage, but with SafeSide™ voltage indicator, the mechanic can verify zero electrical energy without any exposure to voltage.

FEATURES for R-3W, R-3W-SR, R-3W2:

- 40-750VAC / 30-1000VDC
- 35-600VAC 1Ø - R-3W and R-3W-SR only
- Potted Construction with 6' Leads
- Phase Insensitive
- 30mm Pushbutton or Pilot Hole
- High Surge Immunity
- UL Listed Type 4X,12 & 13
- Redundant Circuitry/ Long Life LEDs
- UL Hazardous Location / Class 1 Div 2 Group A, B, C, & D (R-3W2 only)
- CAT III/IV Electrical Rating* (R-3W2 only)

OTHER BENEFITS:

- Simplifies Personal Protective Equipment
- Stored Energy Detector (120.1(6))**
- Visible Blades Disconnect (120.1(3))**
- Permanent Devices are Less Prone to Damage
- Voltage Source Labels (120.2(F)(1)(a))**

**NFPA 70E 2012 Edition

Part Number: R-3W2

APPLICATIONS:

- Circuit Breaker Disconnects - No Visible Blades
- High Energy Panels (NFPA 70E Category 3 or 4)
- Frequently Accessed Panels
- Mechanical LOTO: Indicating Zero Energy
- Panels with Multiple Power Sources

Optical Cable Voltage Indicator

The SafeSide™ R-3F optical cable voltage indicator is a permanent electrical safety device (PESD) built to keep workers on the safe side of electrical panels by providing them with a no-voltage-at-the-door option when it comes to thru-door electrical safety. Global electrical designs specify panel-mount devices that operate at low voltage levels; the R-3F provides voltage indication with zero voltage on the outside of the panel.

Part Number: R-3F with label
(label sold separately)

The R-3F uses an optical cable bundle to illuminate the LEDs on a thru-panel adaptor mounted to the outside of an electrical enclosure. The optical cable bundle allows users to see the voltage status of L1, L2, L3 and GRD with the energized conductors safely kept away from the enclosure exterior.

The potted R-3F LED base unit with integral lead wires and flexible mounting options allow users to reliably locate it close to 3-phase voltage sources. The availability of different cable lengths lets users mount the fiber optic thru-panel adaptor at the best location on the enclosure.

FEATURES for the R-3F:

! 20-600VAC / 20-1000VDC (Max 750VAC non-UL)
! CAT III/IV* Electrical Rating (pending)
! UL Type 4X, 12, 13
! Potted Construction with 6' Lead

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BENEFITS of the R-3F:

! Simplifies Personal Protective Equipment
! Stored Energy Detector (120.1(6))**
! Visible Blades Disconnect (120.1(3))**
! Permanent Devices is Less Prone to Damage
! Voltage Source Labels (120.2(F)(1)(a))**

Medium Voltage Indicator

The R-1VH/R-1VL Medium Voltage Indicator mounts to a medium voltage bus and flashes when voltage is present on the bus. This product is designed to provide sufficient illumination to be easily seen through IR or viewing windows on a medium voltage starter, transformer, switchgear and other power distribution equipment.

The R-1VH/R-1VL is built for long life and reliability with solid-state LEDs and flame-rated material. Because the R-1VH/R-1VL capacitively couples to ground, it provides high surge immunity and has electrical-installation integrity.

Part Number: R-1VH /R-1VL

FEATURES for R-1VH/R-1VL:

- Qty. (3) Long Life LEDs per Unit
- 2KV to 43KV Operating Range
- ½" bolt hole mounting
- Viewing Angle Adjustability

APPLICATIONS for R-1VH/R-1VL:

- Medium Voltage Starters
- Switchgear
- Power Distribution Systems

Part Number: R-1VH /R-1VL

SAFESIDE™ Permanent Electrical Safety Devices

More on Voltage Portals

SafeSide™ voltage portals avoids voltage exposure for workers by extending the voltage source points to the outside of electrical enclosures. Each voltage point resides in an encapsulated non-conductive housing designed to insure that a NCVD senses voltage if placed into the voltage portal. Because voltage portals contain live voltage and mount on the outside of enclosures, a robust design and UL certification avoids any long term safety concerns. Here are some key benefits and features about voltage indicators:

R-T3 voltage portal with label (sold separately)

- **Reduced Voltage Exposure and Arc Flash Risk -** While performing electrical LOTO with a SafeSide™ voltage portal installed, the electrician can pre-check the internal voltage state without opening the enclosure.
- **Safer Lock-Out Tag-Out (LOTO) -** Keeping personnel away from live voltage is foundational to electrical safety. Electrical safety demands a precise answer to the question 'Is voltage present?'. SafeSide™ voltage portal provide visibility of voltage from outside the enclosure without exposing personnel to voltage.
- **More Productivity in Mechanical LOTO -** Workers performing mechanical LOTO must isolate electrical energy. Without a SafeSide™ voltage portal, a mechanic performing mechanical LOTO would be required to work in tandem with an electrician using a voltmeter to physically verify voltage inside an electrical panel. In this case, the electrician is exposed to voltage, but with SafeSide™ voltage indicator, the mechanic can verify zero electrical energy without any exposure to voltage.

FEATURES for R-1A003 Voltage Portal:

- Single-point, single phase
- Integral 6' lead wire
- Installs in a ½" hole for easy installation
- Rugged polycarbonate construction for safety
- UV outdoor rated so you can mount it anywhere
- UL Type 4, 4X, 12 Rated

Single-Point, Single-Phase Voltage Portal

FEATURES for R-T3 Voltage Portal:

- Single-point, three-phase
- Integral 6' #12 AWG lead wire
- Installs in a 30mm hole for easy installation
- Rugged polycarbonate construction for safety
- UV outdoor rated so you can mount it anywhere
- UL Type 4, 4X, 12 Rated

Single-Point, Three-Phase Voltage Portal

Combo Units

SafeSide™ Combo Units combine two complementary technologies – voltage indicators and voltage portals. When used together, the Combo Units meet the validation requirement of NFPA 70E 120.1. Voltage indicators and voltage portals are a great match because their features compliment each other. Here's how:

- the SafeSide™ voltage indicator is the primary voltage testing instrument because it provides the hardwired connection to the voltage source as required by NFPA 70E 120.1(5).
- the SafeSide™ voltage portal (and the non-contact voltage detector pen) becomes the testing device for the voltage indicator.
- both devices can be checked before a LOTO procedure while the control panel is energized to ensure proper operation.
- the traditional method of validating the voltage indicator to an independent voltage source is met with the NCVD/voltage portal combination (as seen in Figure 1).

Figure 1

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Permanent Electrical Safety Devices

Warning: 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).

Combo Unit Labels

Figure A

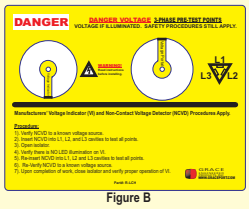

Figure B

Voltage indicators with R-1A003 Voltage portals

Voltage indicators with R-T3 Voltage portals

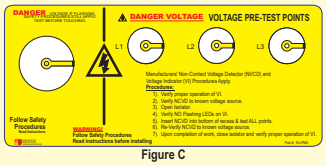

Figure C

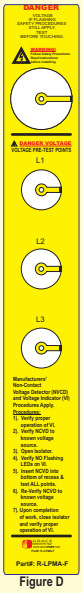

Figure D

Voltage Portal Labels

Figure E

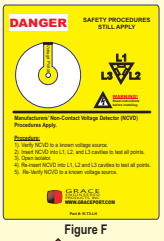

Figure F

R-T3 Voltage Portal Labels

R-1A003 Voltage Portal Labels

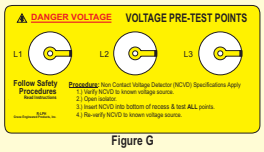

Figure G

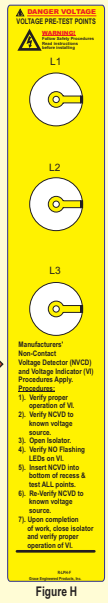

Figure H

Some PESDs

Part Number (Unit and Label)	Label	Size in inches [mm] W	H	Mounting D-Door/Side F-Flange	Includes Qty Voltage Indicator	Voltage Portal
R-1A0033W-NPLPH	Figure C	9.0[228.6]	4.0[101.6]	D	(1)R-3W	(3)R-1A
R-1A0033W-NPLPF	Figure D	1.9[47.0]	14.0[355.6]	F	(1)R-3W	(3)R-1A
R-1A003-LPH	Figure G	6.0[152.4]	3.0[76.2]	D	N/A	(3)R-1A
R-1A003-LPF	Figure H	1.9[47.0]	11.0[278.4]	F	N/A	(3)R-1A
R-1A3W-LPB	Not Shown	6.0[152.4]	3.0[76.2]	D	(1)R-3W	(3)R-1A
R-1A3W-LPBF	Not Shown	1.9[47.0]	9.5[241.3]	F	(1)R-3W	(3)R-1A
R-3F*	R-3W-L	3.0[76.2]	2.35[59.7]	D	N/A	(1)R-3F
R-T3*	R-T3-LH	4.0[101.6]	5.5[139.7]	D	N/A	(1)R-T3
R-T3*	R-T3-LF	1.9[48.3]	8.75[222.3]	F	N/A	(1)R-T3
R-T3W-LCH	Figure B	6.5[165.1]	5.0[125.0]	D	(1)R-3W	(1)R-T3
R-T3W-LCF	Figure A	1.9[48.3]	12.2[309.6]	F	(1)R-3W	(1)R-T3
R-T3WS-LCH	Figure B	6.5[165.1]	5.0[125.0]	D	(1)R-3W-SR	(1)R-T3
R-T3WS-LCF	Figure A	1.9[48.3]	12.2[309.6]	F	(1)R-3W-SR	(1)R-T3
R-T3W2-LCH	Figure B	6.5[165.1]	5.0[125.0]	D	(1)R-3W2	(1)R-T3
R-T3W2-LCF	Figure A	1.9[48.3]	12.2[309.6]	F	(1)R-3W2	(1)R-T3

*Labels Sold Separately.