# Surgelogic™ EMA Series
# Surge Protective Devices (SPDs)

# Dispositivos de protección contra sobretensiones transitorias (SPD)

# Dispositifs de protection contre les surtensions transitoires (SPD)

Instruction Bulletin
Boletín de instrucciones
Directives d'utilisation

8222-0014, Rev. 02, 03/2016

**Retain for Future Use. /**
**Conservar para uso futuro. /**
**À conserver pour usage ultérieur.**


SQUARE D™
by Schneider Electric

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## Precautions

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

**Failure to follow these instructions will result in death or serious injury.**

**⚠ CAUTION**

**LOSS OF BRANCH CIRCUIT POWER/LOSS OF SURGE SUPPRESSION**

- Perform periodic inspection of the SPD status indicator lights as part of the preventative maintenance schedule.
- Promptly service the SPD when an alarm state exists.
- Use dry contacts to signal an alarm state to the central supervisory system for unmanned, inaccessible, or critical installations.
- Use multiple SPDs to achieve redundancy for critical applications.

**Failure to follow these instructions can result in injury or equipment damage.**

At end-of-life conditions, Surge Protective Devices (SPDs) can lose their ability to block power system voltage and attempt to draw excessive current from the line. This SPD is equipped with overcurrent and overtemperature components that will automatically disconnect the surge suppression elements from the mains should the surge suppression elements reach end of life. Tripping of the branch circuit breaker or fuse feeding the SPD can occur when the surge suppression elements reach end of life.

**⚠ CAUTION**

**LOSS OF SURGE SUPPRESSION**

- Do not energize the Surge Protective Device until the electrical system is completely installed, inspected, tested, and all conductors have been connected and functional, including the neutral.
- Verify the voltage rating of the device and system before energizing the Surge Protective Device.
- Perform high-potential insulation testing, or any other tests where SPD components will be subjected to voltages higher than their rated turn-on voltage, with the neutral and SPD disconnected from the power source.

**Failure to follow these instructions can result in injury or equipment damage.**

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# Introduction

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

**Failure to follow these instructions will result in death or serious injury.**

**Note:** For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

Proper installation is imperative to maximize the EMA surge protective device's effectiveness and performance. Read the entire instruction bulletin before beginning the installation. These instructions are not intended to replace national or local electrical codes. Check all applicable electrical codes to verify compliance. Installation of modular surge suppressors should only be performed by qualified electrical personnel.

## Unpacking and Preliminary Inspection

Inspect the entire shipping container for damage or signs of mishandling before unpacking the device. Remove the packing material and further inspect the device for any obvious shipping damage. If any damage is found and is a result of shipping or handling, immediately file a claim with the shipping company.

## Storage

The device should be stored in a clean, dry environment. Storage temperature is -40 °F to +149 °F (-40 °C to +65 °C). All of the packaging materials should be left intact until the device is ready for installation.

## Safety Labels

English, Spanish, and French versions of all safety labels (Danger, Warning, and Caution) are provided.

# Surge Protective Device (SPD) Location Considerations

## Environment

The device is designed to operate in an ambient temperature range of -4 °F to +149 °F (-20 °C to +65 °C) with a relative humidity of 0 to 95% non-condensing. The operating temperature of the LCD on the diagnostic display panel is +14 °F to +140 °F (-10 °C to +60 °C). Refer to the product catalog for further details on enclosures. All EMA devices operate normally without reduction in performance when subjected to shock and vibrations described in IEC 60721-3-3, Class 3M4.

### Audible Noise

The device background noise is negligible and does not restrict the location of the installation.

### Mounting

The device is designed to be surface or flush mounted. Refer to the device submittal drawings or the product catalog for typical mounting dimensions and weight.

### Service Clearance

The service clearance should meet all applicable code requirements.

### Equipment Performance

To obtain the maximum system performance, locate the device as close to the circuit being addressed as possible to minimize the interconnecting wiring length. For every foot of wire length, approximately 160 Volts (6 kV / 3 kA, 8/20 microsecond) is added to the suppressed voltage. The Voltage Protection Rating (VPR) is located on the device nameplate and is measured six inches from the enclosure sidewall, according to UL® 1449 test standards.

## Electrical

### Voltage Rating

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.

**Failure to follow these instructions will result in death or serious injury.**

Prior to mounting the SPD, verify that the device has the same voltage rating as the power distribution system in which it is installed. Compare the nameplate voltage or model number on the SPD with the nameplate of the electrical distribution equipment.

The specifier or user of the device must be familiar with the configuration and arrangement of the power distribution system in which any SPD is to be installed. The system configuration of any power distribution system is based strictly on how the secondary windings of the transformer supplying the service entrance main or load are configured. This includes whether or not the transformer windings are referenced to earth via a grounding conductor. The system configuration is not based on how any specific load or equipment is connected to a particular power distribution system. See Table 1 for the service voltage of each SPD.

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**Table 1: Voltage Ratings**

| Service Voltage | Peak Surge Current Rating Per Phase | Catalog Numbers [1] |
|---|---|---|
| 120/240 V, 1-phase, 3-wire + ground | 120 kA | SSP01EMA12 |
| | 160 kA | SSP01EMA16 |
| | 240 kA | SSP01EMA24 |
| | 320kA | SSP01EMA32 |
| | 480 kA | SSP01EMA48 |
| 208Y/120 V[2], 3-phase, 4-wire + ground Wye | 120 kA | SSP02EMA12 |
| | 160 kA | SSP02EMA16 |
| | 240 kA | SSP02EMA24 |
| | 320kA | SSP02EMA32 |
| | 480 kA | SSP02EMA48 |
| 240/120 V, 3-phase, 4-wire + ground High-leg Delta | 120 kA | SSP03EMA12 |
| | 160 kA | SSP03EMA16 |
| | 240 kA | SSP03EMA24 |
| | 320kA | SSP03EMA32 |
| | 480 kA | SSP03EMA48 |
| 240 V, 3-phase, 3-wire + ground Delta | 100 kA | SSP06EMA10 |
| | 120 kA | SSP06EMA12 |
| | 160 kA | SSP06EMA16 |
| | 200 kA | SSP06EMA20 |
| | 240 kA | SSP06EMA24 |
| | 320kA | SSP06EMA32 |
| | 480 kA | SSP06EMA48 |
| 480Y/277 V, 3-phase, 4-wire + ground Wye [3] | 120 kA | SSP04EMA12 |
| | 160 kA | SSP04EMA16 |
| | 240 kA | SSP04EMA24 |
| | 320kA | SSP04EMA32 |
| | 480 kA | SSP04EMA48 |
| 480 V, 3-phase, 3-wire + ground Delta [4] | 100 kA | SSP05EMA10 |
| | 120 kA | SSP05EMA12 |
| | 160 kA | SSP05EMA16 |
| | 200 kA | SSP05EMA20 |
| | 240 kA | SSP05EMA24 |
| | 320kA | SSP05EMA32 |
| | 480 kA | SSP05EMA48 |
| 600Y/347 V, 3-phase, 4-wire + ground Wye | 120 kA | SSP08EMA12 |
| | 160 kA | SSP08EMA16 |
| | 240 kA | SSP08EMA24 |
| | 320kA | SSP08EMA32 |
| | 480 kA | SSP08EMA48 |
| 600 V, 3-phase, 3-wire + ground Delta [5] | 100 kA | SSP09EMA10 |
| | 120 kA | SSP09EMA12 |
| | 160 kA | SSP09EMA16 |
| | 180 kA | SSP09EMA18 |
| | 200 kA | SSP09EMA20 |
| | 240 kA | SSP09EMA24 |
| | 320kA | SSP09EMA32 |

1 Catalog numbers may require a suffix to indicate the addition of sine wave tracking (F), integrated switch (D) and/or NEMA 4x, stainless steel enclosure (S).

2 208Y/120 series also applies to the following voltage: 220Y/127.

3 480Y/277 series also applies to the following voltages: 380Y/220, 400Y/230 and 415Y/240.

4 480 V Delta series also applies to the following voltages: 480Y/277V HRG.

5 600 V Delta series also applies to the following voltages: 600Y/347V HRG.

## Terminals, Wire Size, and Installation Torque

Terminals are provided for phase (line), neutral, and equipment ground connections. The EMA terminals accept a range of 10 AWG to 2 AWG copper wire for the NO switch offer for phase, neutral and ground connectors and 10 AWG to 3/0 AWG copper wire for the switch offer for phase connectors. Torque connections to the following values:

**Table 2: Terminal Torque**

| Power Connection | Torque |
|---|---|
| AØ, BØ, CØ and N | 40 lb-in. (4 N•m) |
| Ground | |
| Switch | 50 lb-in. (5 N•m) |

## Branch Circuit Overcurrent Protection

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Use conductors rated for the Overcurrent Protection Device (OCPD) per applicable codes.
- Use conductors rated for the application per applicable codes.

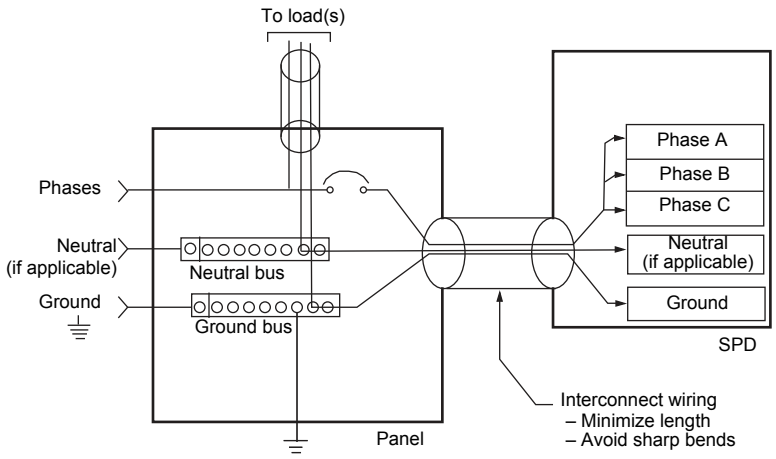
**Failure to follow these instructions will result in death or serious injury.**

UL 1449 Type 1 SPDs have been designed and approved for line side applications prior to the main service disconnect without supplemental overcurrent protection. Type 1 SPDs may also be installed on the load side of the main Overcurrent Protection Device (OCPD).

## Location of Surge Protective Device (SPD)

Locate the SPD as close as possible to the circuit being addressed to minimize the wire length and optimize SPD performance. Avoid long wire runs so that the device will perform as intended. To reduce wire impedance from surge currents, the phase, neutral, and ground conductors must be routed within the same conduit and tightly bundled or twisted together to optimize device performance. Avoid sharp bends in the conductors. See Figure 1.

**Figure 1: Surge Protective Device Wiring Practice**



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# Grounding

## ⚠ WARNING

**HAZARDOUS TOUCH VOLTAGE**

- Connect the Surge Protective Device ground terminal to the building grounding grid structure.
- Use an appropriately sized equipment grounding conductor.
- When using metallic raceway or conduit:
  - — Do not use isolated bushings to interrupt the metallic raceway or conduit.
  - — Maintain electrical continuity at all raceway and conduit connections using appropriate bonding devices.
- Do not use a separate isolated ground for the EMA Surge Protective Device.
- Verify proper equipment connection to the grounding system.
- Verify ground grid continuity by performing regularly scheduled inspections and testing as part of a comprehensive electrical maintenance program.

**Failure to follow these instructions can result in death or serious injury.**

## General

The EMA has SPD elements connected from phase to ground. It is critical that there be a robust and effective connection to the building grounding structure. The grounding connection must utilize an equipment grounding conductor run with the phase and neutral (if present) connection of the power system.

For best over-voltage suppression by the EMA SPD, use a single-point ground system where the service entrance grounding electrode system is connected to, and bonded to, all other available electrodes, building steel, metal water pipes, driven rods, etc. (for reference, see IEEE 142-2007). The ground impedance measurement of the electrical system should be as low as possible, and in compliance with all applicable codes.

## Power System Grounding

In addition to the power system configuration and voltage, the power system grounding method must be considered when selecting the appropriate EMA device. Refer to the following chart for information concerning the suitability of EMA device to specific power system grounding method.

**Table 3: Grounding Methods**

| EMA Device Catalog Number | Power System Grounding Method |
|---|---|
| SSP01EMA_ | Solidly-Grounded |
| SSP02EMA_ | |
| SSP03EMA_ | |
| SSP04EMA_ | |
| SSP08EMA_ | |
| SSP05EMA_ | Ungrounded / HRG |
| SSP06EMA_ | |
| SSP09EMA_ | |

## Solidly-Grounded Power Systems

**⚠ CAUTION**

**SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE**

- Do not connect devices rated for use on solidly-grounded power systems to resistance-grounded (for example, High Resistance Ground) or ungrounded power systems.
- Verify that the service entrance equipment is bonded to ground in accordance with all applicable codes.
- Verify that the neutral terminal of the power system transformer feeding the device is bonded to system ground in accordance with all applicable codes.

**Failure to follow these instructions can result in equipment damage.**

SPDs rated for use on solidly-grounded power systems must not be connected to resistance-grounded or ungrounded power systems. Such a connection can result in damage to the SPD.

Always verify the power system grounding configuration prior to application of power to the device. Confirm that all ground bonds are installed at both the service entrance equipment and power system transformer prior to application of power.

## Delta and Resistance-Grounded Power Systems

**⚠ CAUTION**

**SPD DAMAGE AND POWER SYSTEM OVERVOLTAGE**

- Ungrounded power systems are inherently unstable and can produce excessively high line-to-ground voltages during certain fault conditions. During these fault conditions any electrical equipment, including an SPD, may be subjected to voltages which exceed their designed ratings. This information is being provided to the user so that an informed decision can be made before installing any electrical equipment on an ungrounded power system.
- Resistance-grounded power systems must be maintained in an over-damped state to limit voltage overshoot and duration during operation.
- Verification and adjustment of correct power system damping should be done:
  - — Periodically as part of normal system maintenance.
  - — Following power system modifications.

**Failure to follow these instructions can result in equipment damage.**

The EMA product is intended for use on resistance-grounded power systems where the power system has been set for, and is maintained in, an over-damped state. For the power system to be over-damped, the current through the grounding resistor during a bolted phase-to-ground fault must be significantly greater than the total charging current of the system.

Periodic engineering evaluation of the power system is required to determine the worst-case charging current of the system and to adjust the grounding resistance accordingly. As the power system is modified, the value of the grounding resistor must be evaluated and adjusted to maintain the system in the over-damped state.

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# Installation

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

**Failure to follow these instructions will result in death or serious injury.**

## Conduit Location and Recommendations

The recommended conduit entry is at the bottom or either side of the device enclosure. Use a conduit seal that is appropriate for the enclosure rating.

## Special Enclosure Considerations

### Removing and Reconnecting the RJ45 Diagnostic Cables

The diagnostic cables are marked with matching phase connections. If any of the cables are removed, reconnect the cables as marked.

### Optional Sine Wave Tracking (SWT) Module

The addition of a dedicated Sine Wave Tracking (SWT) module and/or molded case switch may necessitate a larger enclosure. Please review page 12 for enclosure size information.

# Wiring

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

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- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.
- Confirm the SPD voltage rating on the module or nameplate label is the same as the operating voltage.
- Do not touch the bottom located terminals which are energized with the switch in either the ON or OFF positions.

**Failure to follow these instructions will result in death or serious injury.**

Follow the steps listed below when making wiring connections:

1. Turn off all power supplying this equipment before working on or inside any enclosure containing this equipment.
2. Confirm the SPD voltage rating and configuration is the same as the system voltage and power system configuration to which it will be connected.
3. Identify proper location for surge protective device. Locate as close as possible to the panel being addressed so the wires are as short as possible. Mount unit securely.

   **Note:** The surge protective device must be installed in an accessible location as described in the NEC.

4. Install in accordance with national and local electrical codes for overcurrent protection recommendations and wire ampacity considerations.

   **Note:** The neutral connection is not present on three-phase, three-wire WYE solidly ground or two-wire single-phase mid-point ground power systems. For these systems, bond the neutral and ground lugs together in the SPD. For a High Resistance Ground (HRG) or Delta SPD, no neutral connection exists. For installation wiring see Figures 7 through 14.

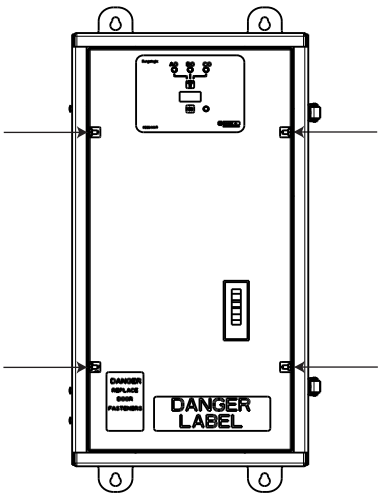
   **Note:** See “Terminals, Wire Size, and Installation Torque” and Table 2 on page 7 for acceptable wire size and installation torque.

   **Note:** On the NEMA 4X offer, before wiring, remove the internal door by loosening the four securing nuts and disconnect the diagnostic cables. See Figure 2.

5. Twist conductors 1/2 turn or more for every twelve inches of length. Do not loop or coil wires. Be sure to maintain adequate wire bending space per NEC.
6. If the remote signaling contacts of the diagnostic display panel are to be used, refer to the section, “Dry Contact”, on page 25 for wiring instructions.
7. On a high-leg delta installation, note the high leg connection per wiring diagram. See Figure 12.
8. Replace all devices, doors, and covers before turning on power to the equipment. If the SPD is properly installed and functioning, the green LED indicators on the display will be lit.

If you have any questions pertaining to the installation of this device, contact the Surgelogic Technical Assistance Group at 1-800-577-7353.

**Figure 2: NEMA 4X Enclosures**



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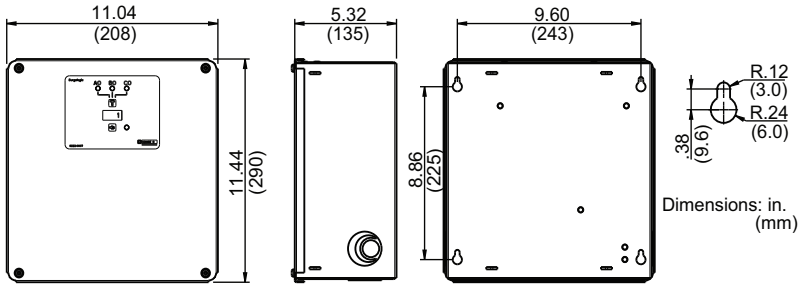
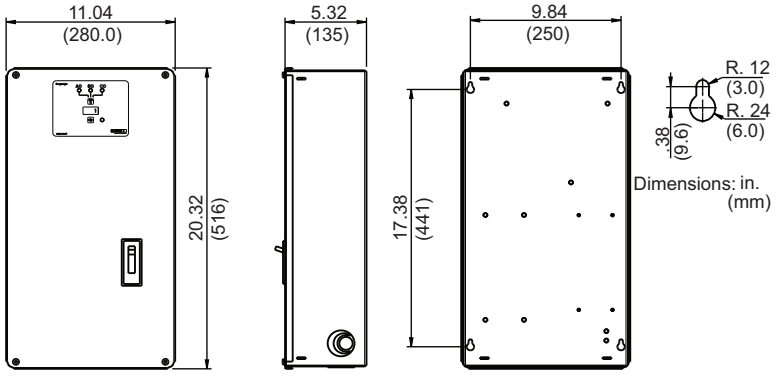
## Dimension and Weights EMA Series

**Figure 3: 11 x 12 in. NEMA 1 Enclosures**



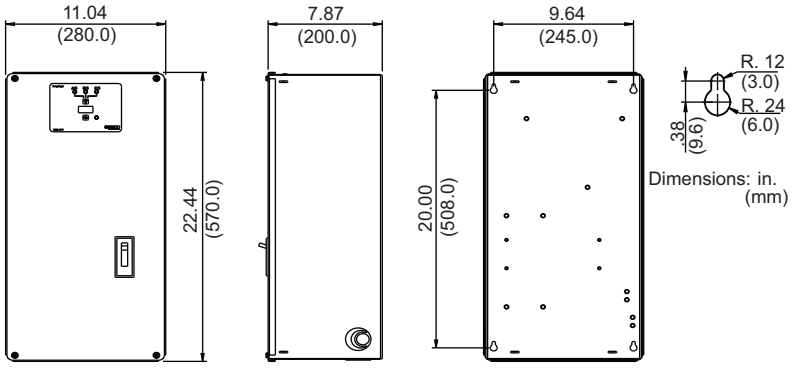

| | |
|---|---|
| Approximate Weight | 23 lbs (10.4 kg) |

**Figure 4: 11 x 20 in. NEMA 1 Enclosures with Integral Switch/SWT option**




| | |
|---|---|
| Approximate Weight | 27 lbs (12.2 kg) |

**Figure 5: 11 x 22 in. NEMA 1 Enclosures for 320 kA and 480 kA units with or without Integral Switch/SWT option**

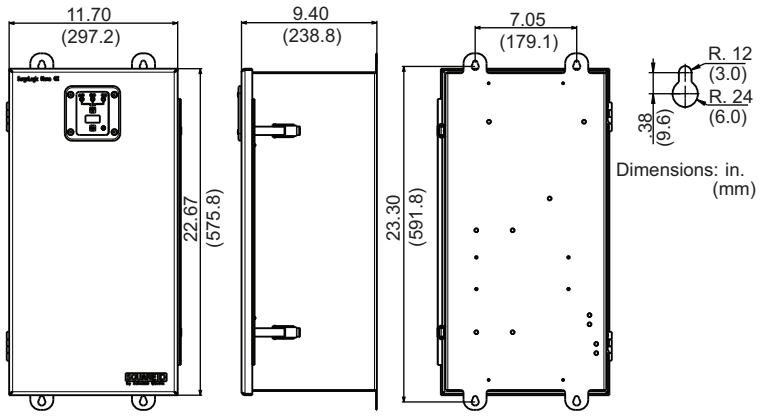



| | |
|---|---|
| Approximate Weight | 37 lbs (16.8 kg) |




**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

**Figure 6: 11 x 23 in. NEMA 4X Enclosures with or without Integral Switch/SWT option**




| | |
|---|---|
| Approximate Weight | 45 lbs (20.4 kg) |

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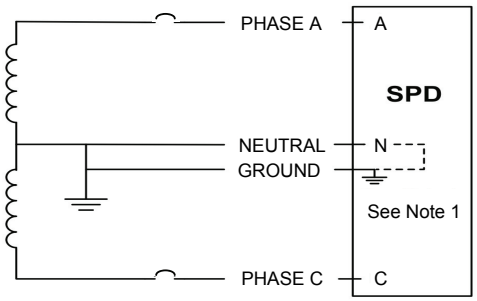
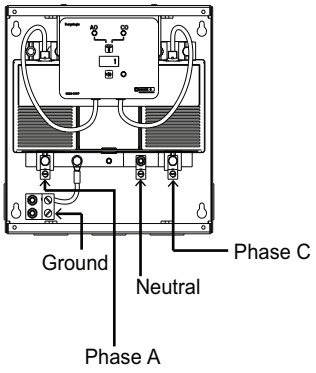
## Wiring Diagrams Without Integral Switch

**Figure 7: Single-Phase, Three-Wire Grounded Installation**

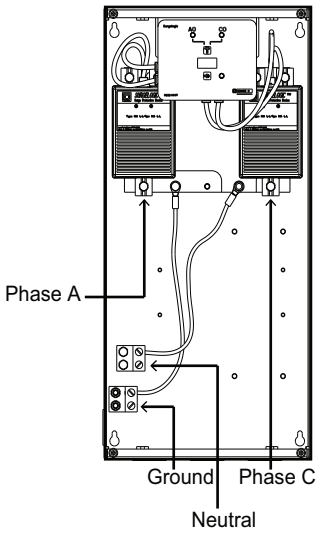
**Note 1:** The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire.



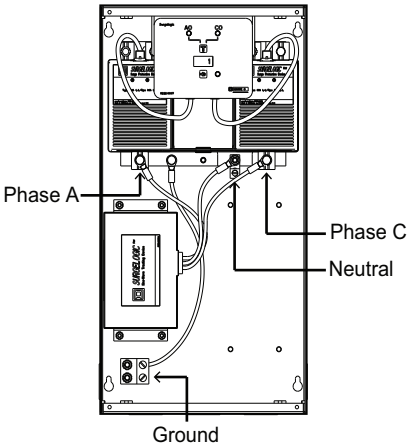

**Customer Connections 120-240 kA**



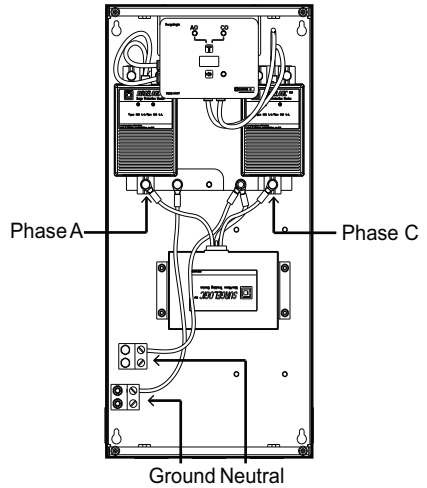

**Customer Connections 320-480 kA**




**Customer Connections 120-240 kA with SWT**




**Customer Connections 320-480 kA with SWT**



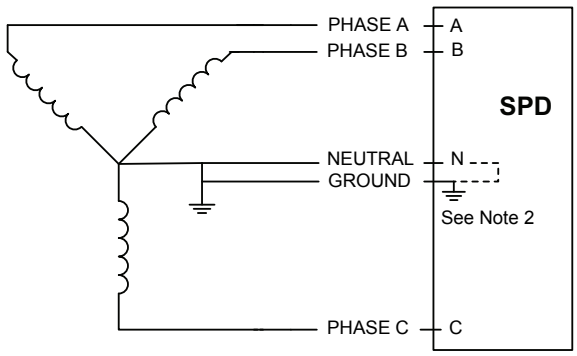




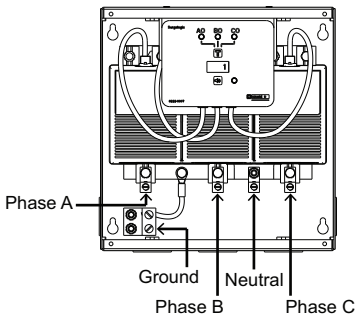
**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

**Figure 8: Three-Phase, Three- or Four-Wire, Grounded Wye Installation**

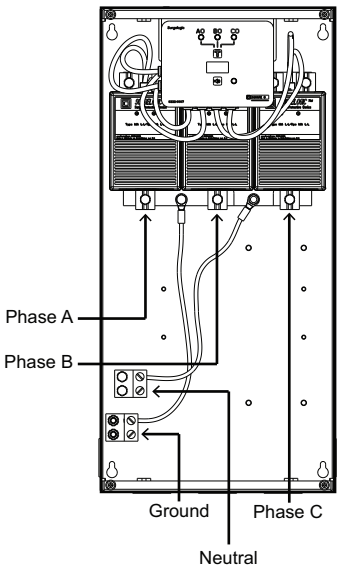
**Note 2:** The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



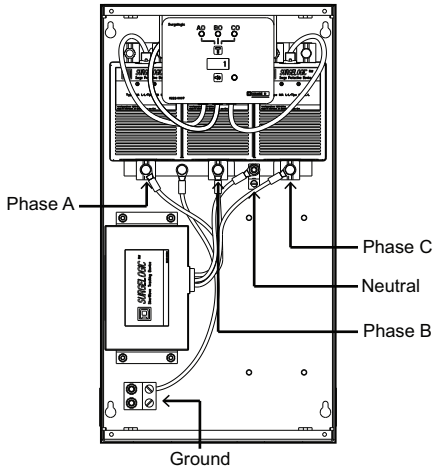

**Customer Connections 120-240 kA**



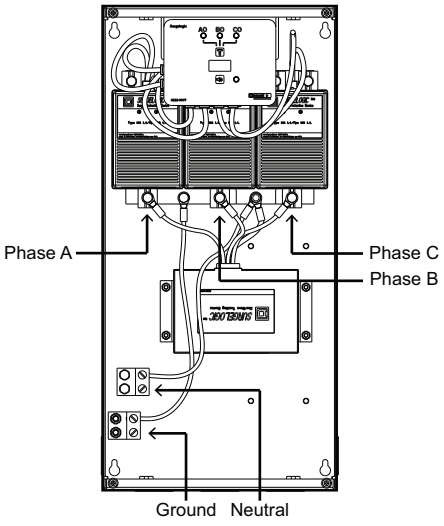

**Customer Connections 320-480 kA**




**Customer Connections 120-240 kA with SWT**




**Customer Connections 320-480 kA with SWT**








**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

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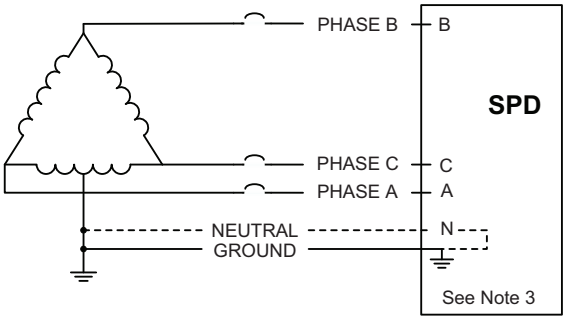
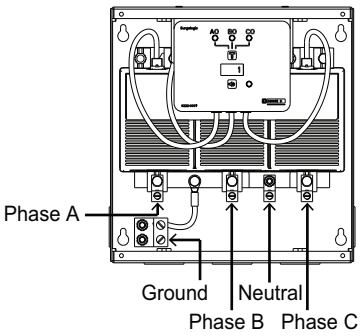
**Figure 9: Three-Phase, Three- or Four-Wire, High-Leg Delta Installation**

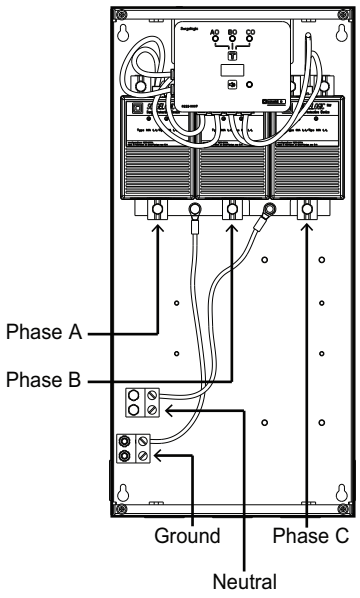
**Note 3:** The high-leg of the power system must connect to phase B of the SPD. The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.




**Customer Connections 120-240 kA**




**Customer Connections 320-480 kA**







**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

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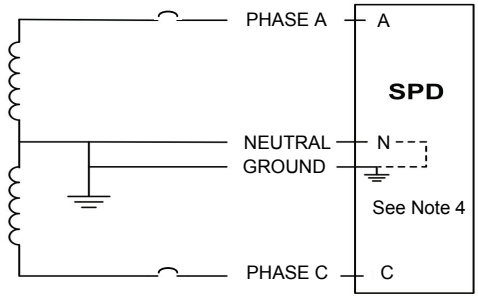
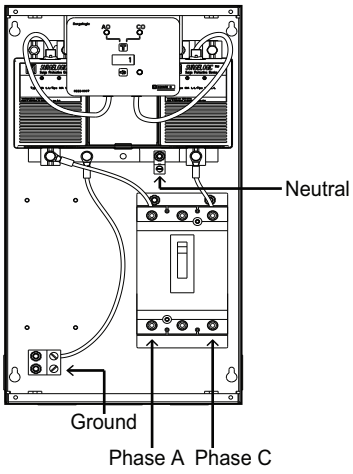
## Wiring Diagrams With Integral Switch

**Figure 10: Single-Phase, Three-Wire, Grounded Installation Integral Switch**

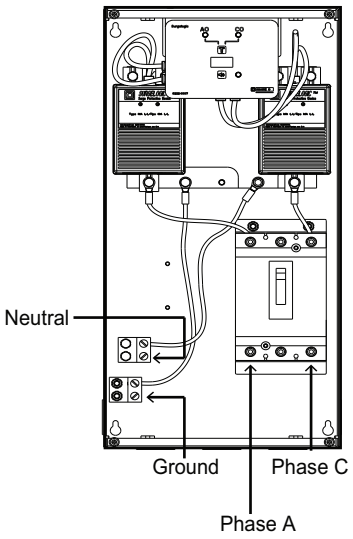
**Note 4:** The neutral conductor is not present on two-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



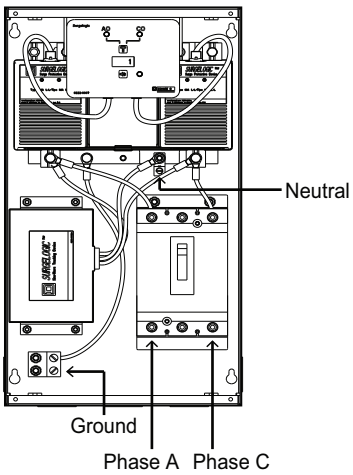

**Customer Connections 120-240 kA**



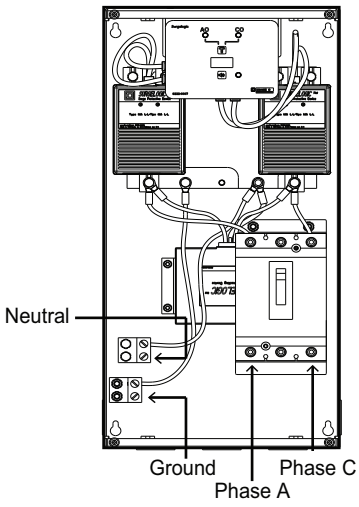

**Customer Connections 320-480 kA**




**Customer Connections 120-240 kA with SWT**




**Customer Connections 320-480 kA with SWT**








**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

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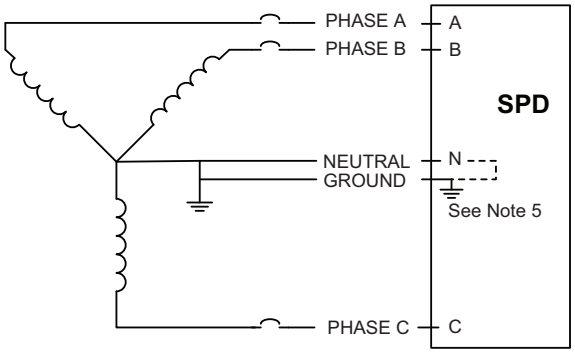
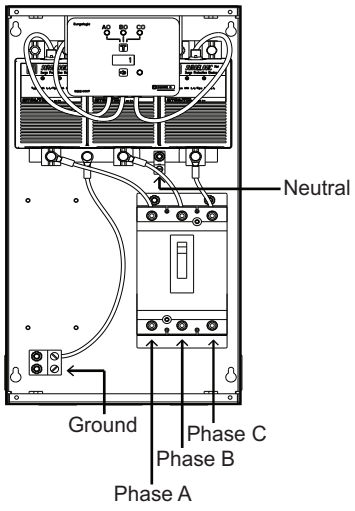
**Figure 11: Three-Phase, Three- or Four-Wire, Grounded Wye Installation with Integral Switch**

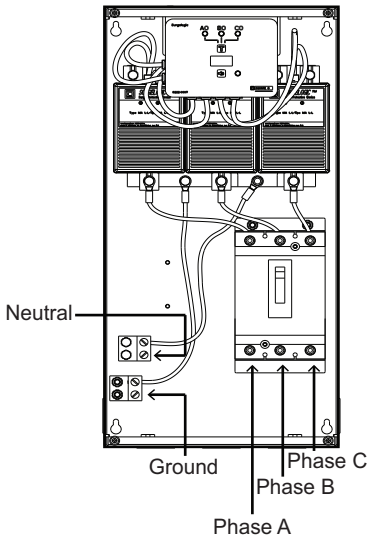
**Note 5:** The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using 10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.



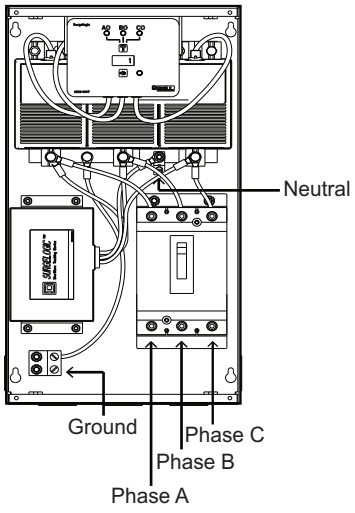

**Customer Connections 120-240 kA**



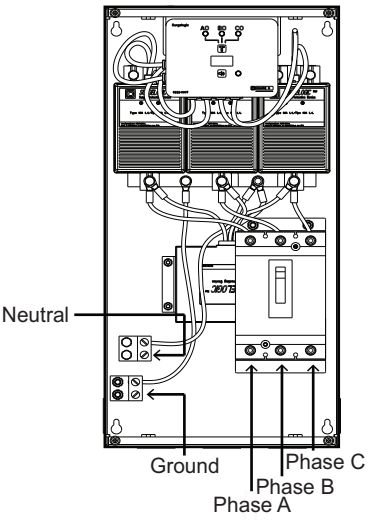

**Customer Connections 120-240 kA**




**Customer Connections 120-240 kA with SWT**




**Customer Connections 320-480 kA with SWT**



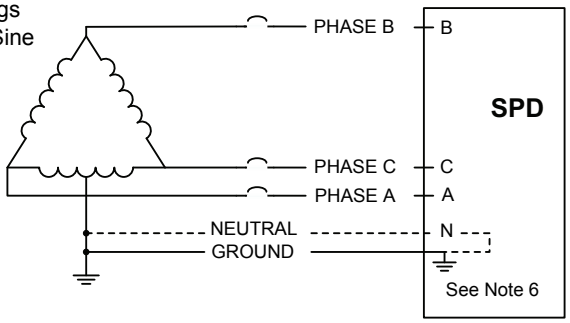




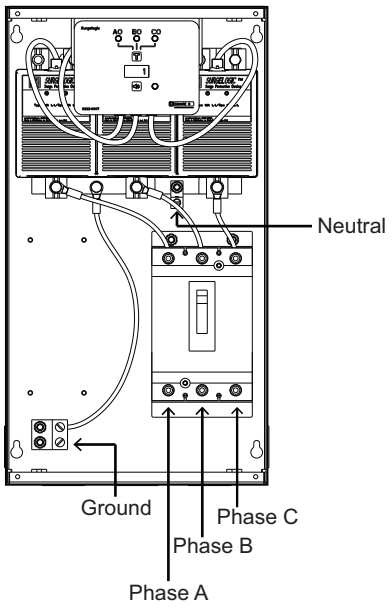
**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

**Figure 12: Three-Phase, Three- or Four-Wire, High-Leg Delta Installation with Integral Switch**

**Note 6:** The high-leg of the power system must connect to phase B of the SPD. The neutral conductor is not present on three-wire grounded power systems. For these systems, bond the neutral and ground lugs together inside the SPD using #10 AWG wire. Do not use optional Sine Wave Tracking (SWT) module with systems where neutral is not present.




**Customer Connections 120-240 kA**




**Customer Connections 320-480 kA**

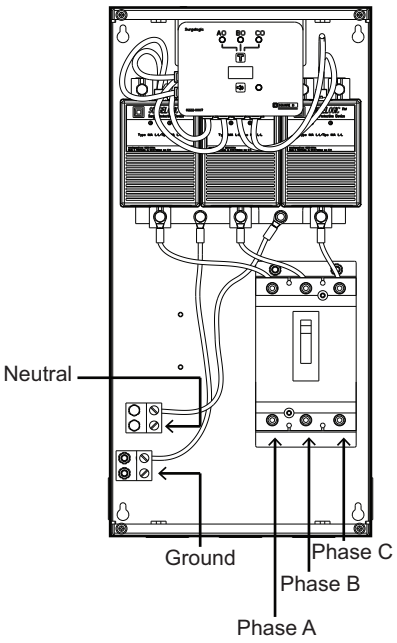


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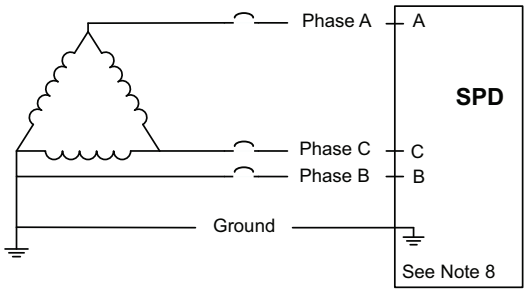
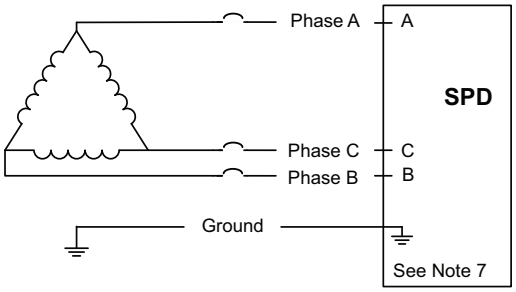
**Figure 13: Three-Phase, Three-Wire + Ground, Delta Installation**

**Note 7:** The ground connection of the Delta SPD shall be connected to the system ground conductor. The neutral conductor is not present on Delta systems.

**Corner Grounded Delta**

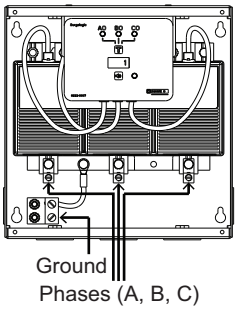



**Ungrounded Delta**

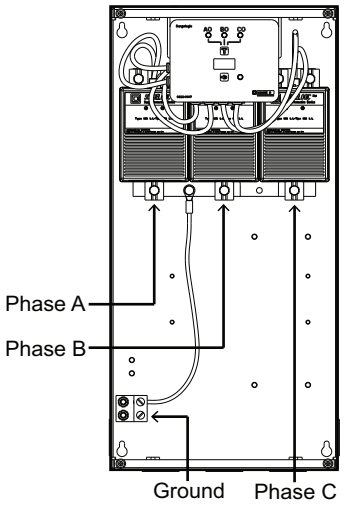



**Note 8:** Phase B of the electrical system is typically the grounded phase

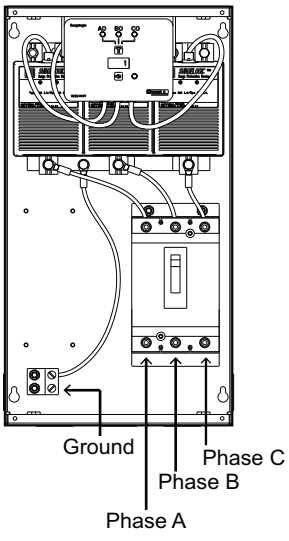
**Customer Connections 100-240 kA**



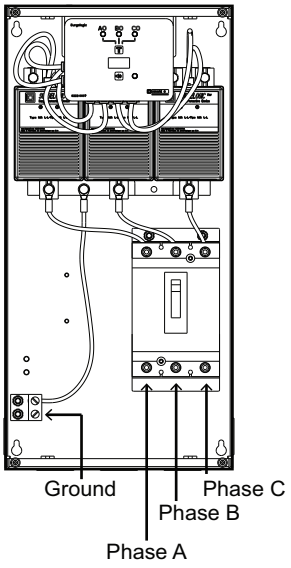

**Customer Connections 320-480 kA**




**Customer Connections 100-240 kA with Integral Switch**




**Customer Connections 320-480 kA with Integral Switch**







**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

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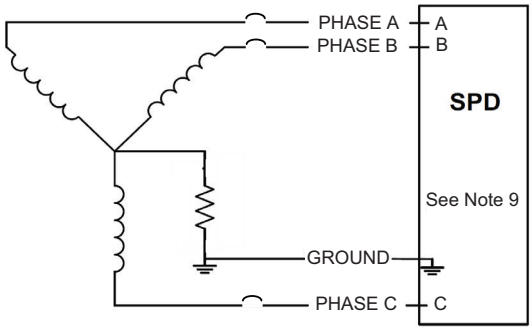
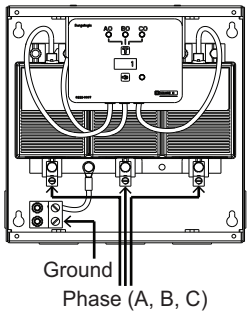
**Figure 14: High Resistance Ground HRG Wye Installation**

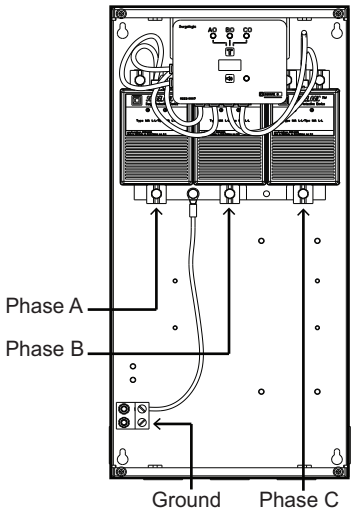
**Note 9:** The neutral conductor is not present on HRG WYE grounded power systems.



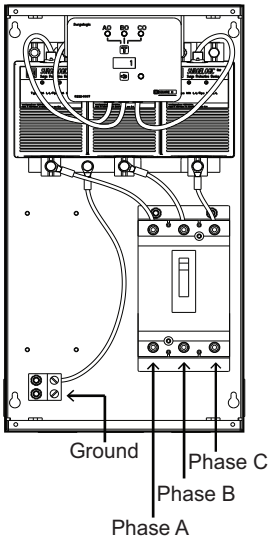

**Customer Connections 100-240 kA**



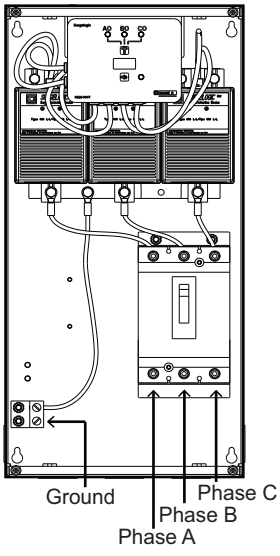

**Customer Connections 320-480 kA**




**Customer Connections 100-240 kA with Integral Switch**




**Customer Connections 320-480 kA with Integral Switch**








**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

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# Operation

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

**Failure to follow these instructions will result in death or serious injury.**

## LED Status Indicators

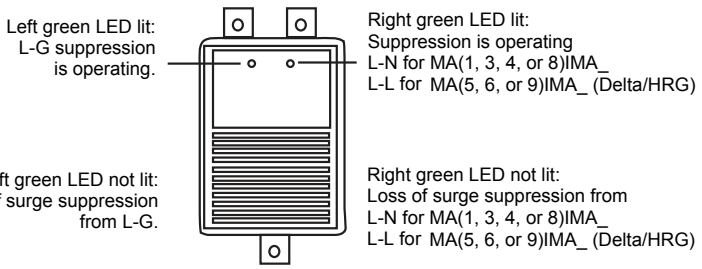
The SPD diagnostic display panel shows the status of each MA module with diagnostically controlled green/red LEDs (see Figure 16). If a unit is operating correctly, all of the phase LEDs will be illuminated green. To test the integrity of the diagnostics for each phase, push the button below the phase LEDs on the diagnostic display panel. The green LED will turn red and the alarm will sound, if the alarm is enabled. Releasing the test button will complete the test; the red LED will turn green and the alarm will shut off.

If an inoperable condition occurs on any phase, the audible alarm sounds and the corresponding phase LED on the diagnostic display panel is illuminated red. This indicates that the device needs service by qualified electrical personnel. The audible alarm can be silenced, until a qualified person is able to evaluate and service the SPD, by pressing the alarm enable/disable button. The alarm will silence and the green alarm LED will not be lit. The red phase LED will continue to be illuminated until the inoperative condition had been cleared.

On an MA module (see Figure 15), if either LED is not lit, the module should be replaced. If both green LEDs are not lit and the diagnostic display panel has power, then power has been lost to that phase or the module should be replaced (refer to Table 1 on page 6). Refer to the final equipment instruction bulletin for MA module disconnection and access instructions.

When power is applied to the SPD and one or more of the diagnostic display panel LEDs are red, and one or more MA module LEDs are out, the appropriate MA module should be replaced. Refer to “Maintenance and Troubleshooting” on page 27 for proper troubleshooting procedures and Table 4 for replacement modules.

**Figure 15: MA Module LEDs**







**For troubleshooting, call the Surgelogic Technical Assistance Group at 1-800-577-7353.**

## Replacement Modules

**Table 4: EMA Replacement Modules**

| Part Number | Description | Voltage | Peak Surge Current Rating (kA) | Catalog Numbers | | |
|---|---|---|---|---|---|---|
| | | | | Phase A | Phase B | Phase C |
| SSP01EMA12_ | SPD T1 EMA 120KA 120/240V 1P3W | 120/240 V | 120 kA | MA1IMA121 | N/A | MA1IMA121 |
| SSP01EMA16_ | SPD T1 EMA 160KA 120/240V 1P3W | 120/240 V | 160 kA | MA1IMA161 | N/A | MA1IMA161 |
| SSP01EMA24_ | SPD T1 EMA 240KA 120/240V 1P3W | 120/240 V | 240 kA | MA1IMA241 | N/A | MA1IMA241 |
| SSP01EMA32_[1] | SPD T1 EMA 320KA 120/240V 1P3W | 120/240 V | 320 kA | MA1IMA161 | N/A | MA1IMA161 |
| SSP01EMA48_[1] | SPD T1 EMA 480KA 120/240V 1P3W | 120/240 V | 480 kA | MA1IMA241 | N/A | MA1IMA241 |
| SSP02EMA12_ | SPD T1 EMA 120KA 208Y/120V 3P4W | 208Y/120 V | 120 kA | MA1IMA121 | MA1IMA121 | MA1IMA121 |
| SSP02EMA16_ | SPD T1 EMA 160KA 208Y/120V 3P4W | 208Y/120 V | 160 kA | MA1IMA161 | MA1IMA161 | MA1IMA161 |
| SSP02EMA24_ | SPD T1 EMA 240KA 208Y/120V 3P4W | 208Y/120 V | 240 kA | MA1IMA241 | MA1IMA241 | MA1IMA241 |
| SSP02EMA32_[1] | SPD T1 EMA 320KA 208Y/120V 3P4W | 208Y/120 V | 320 kA | MA1IMA161 | MA1IMA161 | MA1IMA161 |
| SSP02EMA48_[1] | SPD T1 EMA 480KA 208Y/120V 3P4W | 240Y/120 V | 480 kA | MA1IMA241 | MA1IMA241 | MA1IMA241 |
| SSP04EMA12_ | SPD T1 EMA 120KA 480Y/277V 3P4W | 480Y/277 V | 120 kA | MA4IMA121 | MA4IMA121 | MA4IMA121 |
| SSP04EMA16_ | SPD T1 EMA 160KA 480Y/277V 3P4W | 480Y/277 V | 160 kA | MA4IMA161 | MA4IMA161 | MA4IMA161 |
| SSP04EMA24_ | SPD T1 EMA 240KA 480Y/277V 3P4W | 480Y/277 V | 240 kA | MA4IMA241 | MA4IMA241 | MA4IMA241 |
| SSP04EMA32_[1] | SPD T1 EMA 320KA 480Y/277V 3P4W | 480Y/277 V | 320 kA | MA4IMA161 | MA4IMA161 | MA4IMA161 |
| SSP04EMA48_[1] | SPD T1 EMA 480KA 480Y/277V 3P4W | 480Y/277 V | 480 kA | MA4IMA241 | MA4IMA241 | MA4IMA241 |
| SSP05EMA10_ | SPD T1 EMA 100KA 480 DELTA 3P3W | 480V Delta/HRG | 100 kA | MA5IMA101 | MA5IMA101 | MA5IMA101 |
| SSP05EMA12_ | SPD T1 EMA 120KA 480 DELTA 3P3W | 480V Delta/HRG | 120 kA | MA5IMA121 | MA5IMA121 | MA5IMA121 |
| SSP05EMA16_ | SPD T1 EMA 160KA 480 DELTA 3P3W | 480V Delta/HRG | 160 kA | MA5IMA161 | MA5IMA161 | MA5IMA161 |
| SSP05EMA20_ | SPD T1 EMA 200KA 480 DELTA 3P3W | 480V Delta/HRG | 200 kA | MA5IMA201 | MA5IMA201 | MA5IMA201 |
| SSP05EMA24_ | SPD T1 EMA 240KA 480 DELTA 3P3W | 480V Delta/HRG | 240 kA | MA5IMA241 | MA5IMA241 | MA5IMA241 |
| SSP05EMA32_[1] | SPD T1 EMA 320KA 480 DELTA 3P3W | 480V Delta/HRG | 320 kA | MA5IMA161 | MA5IMA161 | MA5IMA161 |
| SSP05EMA48_[1] | SPD T1 EMA 480 DELTA 3P3W | 480V Delta/HRG | 480 kA | MA5IMA241 | MA5IMA241 | MA5IMA241 |
| SSP06EMA10_ | SPD T1 EMA 100kA 240 DELTA 3P3W | 240V Delta | 100 kA | MA6IMA101 | MA6IMA101 | MA6IMA101 |
| SSP06EMA12_ | SPD T1 EMA 120KA 240 DELTA 3P3W | 240V Delta | 120 kA | MA6IMA121 | MA6IMA121 | MA6IMA121 |
| SSP06EMA16_ | SPD T1 EMA 160KA 240 DELTA 3P3W | 240V Delta | 160 kA | MA6IMA161 | MA6IMA161 | MA6IMA161 |

[1] These products include two levels of SPD modules. SSP01EMA will have a total of four modules. All other configurations will have a total of six modules.

*—Continued on next page*

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**Table 4: EMA Replacement Modules**

| Part Number | Description | Voltage | Peak Surge Current Rating (kA) | Catalog Numbers | | |
|---|---|---|---|---|---|---|
| | | | | Phase A | Phase B | Phase C |
| SSP06EMA20_ | SPD T1 EMA 200KA 240 DELTA 3P3W | 240V Delta | 200 kA | MA6IMA201 | MA6IMA201 | MA6IMA201 |
| SSP06EMA24_ | SPD T1 EMA 240KA 240 DELTA 3P3W | 240V Delta | 240V kA | MA6IMA241 | MA6IMA241 | MA6IMA241 |
| SSP06EMA32_[1] | SPD T1 EMA 320KA 240 DELTA 3P3W | 240V Delta | 320 kA | MA6IMA161 | MA6IMA161 | MA6IMA161 |
| SSP06EMA48_[1] | SPD T1 EMA 480KA 240 DELTA 3P3W | 240V Delta | 480 kA | MA6IMA241 | MA6IMA241 | MA6IMA241 |
| SSP08EMA12_ | SPD T1 EMA 120KA 600Y/347V 3P4W | 600Y/347 V | 120 kA | MA8IMA121 | MA8IMA121 | MA8IMA121 |
| SSP08EMA16_ | SPD T1 EMA 160KA 600Y/347V 3P4W | 600Y/347 V | 160 kA | MA8IMA161 | MA8IMA161 | MA8IMA161 |
| SSP08EMA24_ | SPD T1 EMA 240KA 600Y/347V 3P4W | 600Y/347 V | 240 kA | MA8IMA241 | MA8IMA241 | MA8IMA241 |
| SSP08EMA32_ | SPD T1 EMA 320KA 600Y/347V 3P4W | 600Y/347 V | 320 kA | MA8IMA161 | MA8IMA161 | MA8IMA161 |
| SSP08EMA48_[1] | SPD T1 EMA 480KA 600Y/347V 3P4W | 600Y/347 V | 480 kA | MA8IMA241 | MA8IMA241 | MA8IMA241 |
| SSP09EMA10_ | SPD T1 EMA 100KA 600 DELTA 3P3W | 600V Delta/HRG | 100 kA | MA9IMA101 | MA9IMA101 | MA9IMA101 |
| SSP09EMA12_ | SPD T1 EMA 120KA 600 DELTA 3P3W | 600V Delta/HRG | 120 kA | MA9IMA121 | MA9IMA121 | MA9IMA121 |
| SSP09EMA16_ | SPD T1 EMA 160KA 600 DELTA 3P3W | 600V Delta/HRG | 160 kA | MA9IMA161 | MA9IMA161 | MA9IMA161 |
| SSP09EMA18_ | SPD T1 EMA 180KA 600 DELTA 3P3W | 600V Delta/HRG | 180 kA | MA9IMA181 | MA9IMA181 | MA9IMA181 |
| SSP09EMA20_[1] | SPD T1 EMA 200KA 600 DELTA 3P3W | 600V Delta/HRG | 200 kA | MA9IMA101 | MA9IMA101 | MA9IMA101 |
| SSP09EMA24_[1] | SPD T1 EMA 240KA 600 DELTA 3P3W | 600V Delta/HRG | 240 kA | MA9IMA121 | MA9IMA121 | MA9IMA121 |
| SSP09EMA32_[1] | SPD T1 EMA 320KA 600 DELTA 3P3W | 600V Delta/HRG | 320 kA | MA9IMA161 | MA9IMA161 | MA9IMA161 |

[1] These products include two levels of SPD modules. SSP01EMA will have a total of four modules. All other configurations will have a total of six modules.

## Audible Alarm

Push the alarm enable/disable button to enable or disable the alarm (see Figure 16). If the green alarm LED is lit the alarm is enabled. If the green alarm LED is not lit the alarm is disabled.

## Surge Counter

The surge counter displays the number of transient voltage surges since the counter was last reset. The counter is battery powered to retain memory in the event of a power loss to the SSP module. To reset the surge counter, remove all power and press the small switch located inside the unit on the underside of the diagnostic circuit board near the RJ45 connectors (also refer to Figure 17). This will reset the counter to zero.

## Dry Contacts

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Use 600 Vac rated dry contact wiring.
- Dry contact wiring must have less than 1/16 in. (1.6 mm) exposed wire from the dry contact block.
- Maintain at least 1.0 in. (25 mm) separation between dry contact wiring and the power wiring in the enclosure.

**Failure to follow these instructions will result in death or serious injury.**

The EMA series SPD is provided with dry contacts. The connection for the dry contacts is located on the back of the diagnostic display panel (lower right corner, refer to Figure 17). and will accept # 22 - 14 AWG stranded or solid wire. The dry contacts are three-position, Form “C” type with Normally Open, Normally Closed, and Common connections.

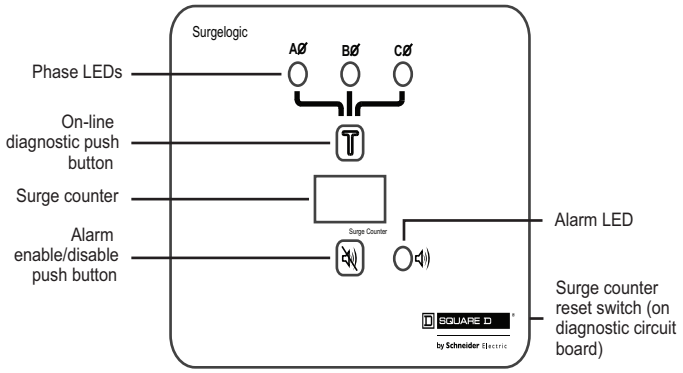
In the unpowered state the contact is closed between terminals NC and COM. This is also the alarm condition. The opposite state, closed between terminals NO and COM, indicates that power is on to the unit and that no alarm condition exists (See Table 5).

These contacts can be used for remote indication of the SPD’s operating status to a computer interface board or emergency management system. Also, these contacts are designed to work with the SPD remote monitor option described in the next section.

**Table 5: Dry Contact Configuration**

| Alarm Contact Terminals | Contact State with Power Applied |
|---|---|
| NO to COM | Closed |
| NC to COM | Open |

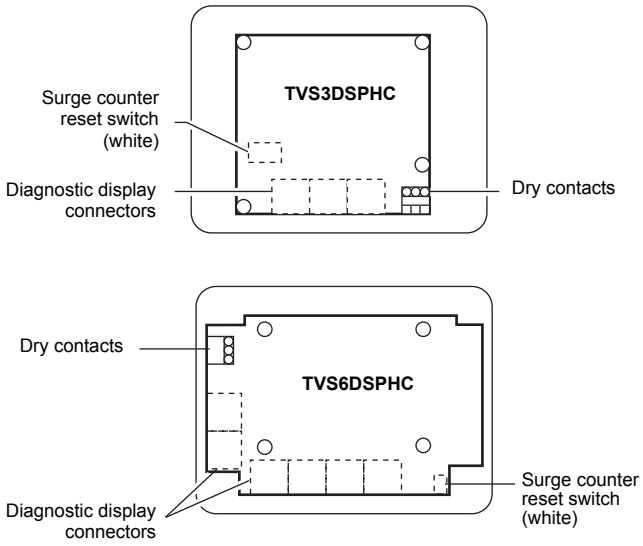
**Figure 16: Three-Phase Diagnostic Display Panel with Surge Counter**




**Note:** Phase B is not present on single phase applications.

ENGLISH

**Figure 17: Rear of Diagnostic Circuit Board**




Care must be taken when installing the dry contact wiring because the terminals are on a moving door. Avoid the door hinge, any switches, and the high voltage areas of the enclosure when routing the wiring. To avoid the door hinge, tie wrap any dry contact wiring to the existing cable harness which crosses the hinge. Once the dry contact wiring is secured on a non-moving point of the enclosure, it is the user's responsibility to maintain at least 1.0 in. (25 mm) separation between 600 Vac rated dry contact wiring and the power wiring in the enclosure.

The dry contacts are designed for a maximum voltage of 24 Vdc / 24 Vac and a maximum current of 2 A. Higher energy applications may require additional relay implementation outside the SPD. Damage to the SPD relay caused by use with energy levels in excess of those discussed in this instruction bulletin are not covered by warranty. For application questions, contact the Surgelogic Technical Assistance Group at 1-800-577-7353.

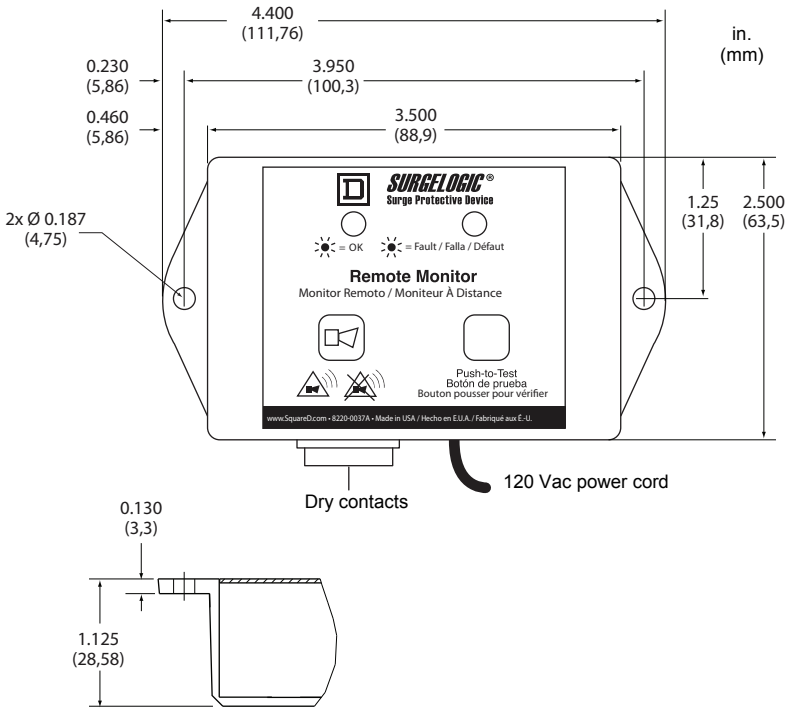
## Remote Monitor Option

The remote monitor option has two LEDs, one red and one green, and an audible alarm with an enable/disable switch. Normal status is a lit green LED, and no audible alarm. To test the integrity of the remote monitor, press the push-to-test switch. If the alarm is enabled, the green LED will turn off, the red LED will turn on, and the alarm will sound. Releasing the switch will complete the test; the red LED will turn off, the green LED will turn on and the alarm will shut off.

If suppression on any phase is lost, the green LED will turn off, the red LED will turn on and an alarm will sound. The audible alarm can be silenced by pushing the alarm enable/disable button. The alarm will silence and the green alarm LED will not be lit. The red LED will continue to be illuminated until the inoperative condition has been cleared.

The remote monitor includes a 120 Vac to 12 Vdc adapter with a six-foot power cord. Connections are made to the SPD diagnostic panel with Form "C", 3-position dry contacts (provided) and the appropriate length of solid or stranded # 22 - 14 AWG wire up to 1000 ft. (305 m), not provided.

**Figure 18: Remote Monitor Option (TVS12RMU)**




## Maintenance and Troubleshooting

**⚠ DANGER**

**HAZARD OF ELECTRIC SHOCK, EXPLOSION, OR ARC FLASH**

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. See NFPA 70E, CSA Z462 or NOM-029-STPS.
- This equipment must only be installed and serviced by qualified electrical personnel.
- Turn off all power supplying this equipment before working on or inside equipment.
- Always use a properly rated voltage sensing device to confirm power is off.
- Replace all devices, doors and covers before turning on power to this equipment.
- This equipment must be effectively grounded per all applicable codes. Use an equipment-grounding conductor to connect this equipment to the power system ground.

**Failure to follow these instructions will result in death or serious injury.**

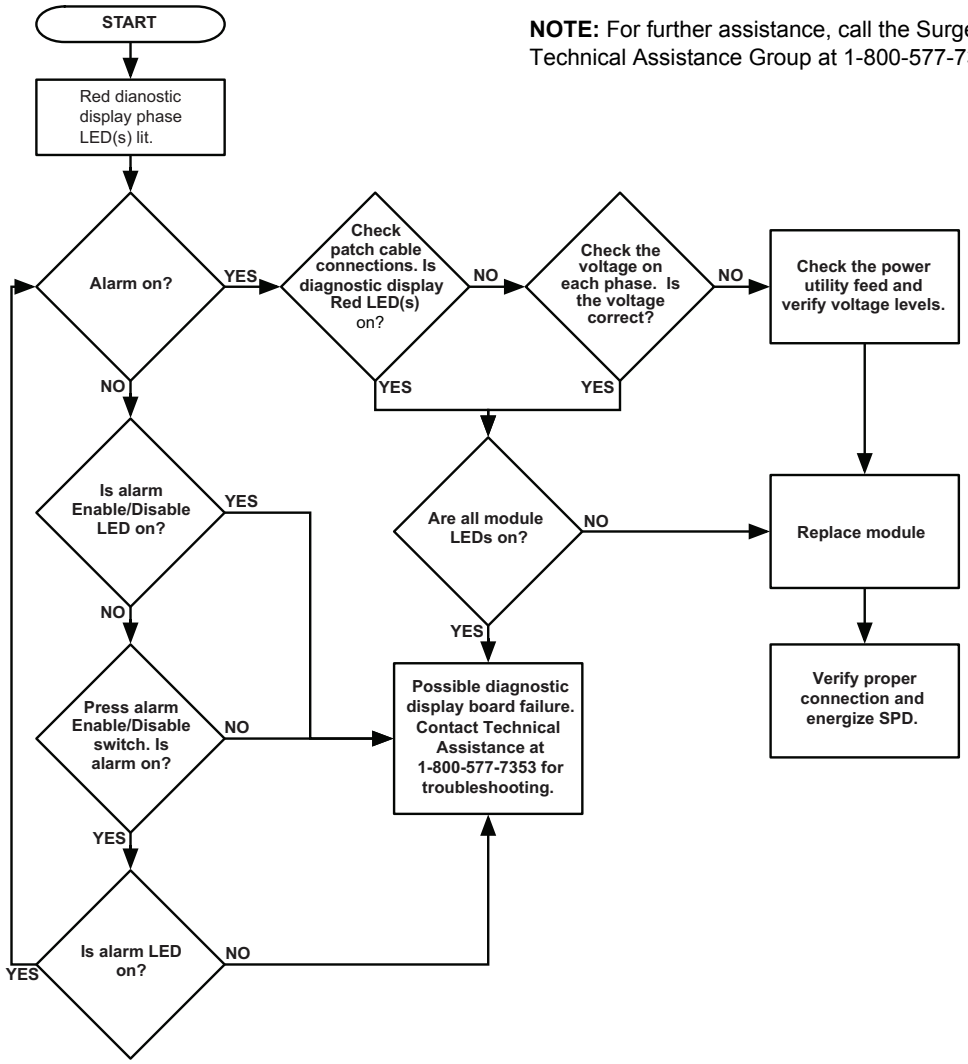
### Preventative Maintenance

Inspect the SPD periodically to maintain reliable system performance and continued transient voltage surge suppression. Periodically check the state of the diagnostic display panel LED status indicators. Routinely use the built-in diagnostics to inspect for inoperative modules.

## Troubleshooting

If a module shows two green indicator lights and the display panel shows a red phase indicator light, follow the Troubleshooting Flow Chart in Figure 19 below.

**Figure 19: Troubleshooting Flow Chart**




**NOTE:** For further assistance, call the Surgelogic Technical Assistance Group at 1-800-577-7353.

## Replacement Parts

The following replacement parts are available. For ordering information please contact your local distributor or refer to the product catalog.

- MA modules. Replacement instructions are included with the replacement parts.
- Diagnostic display panel assemblies. Replacement instructions are included with the replacement parts.



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