



GE Digital Energy  
Power Quality

## INSTALLATION, OPERATION AND MAINTENANCE MANUAL

GE TRANQUELL<sup>®</sup> Enhanced Thermal Protection (ETP) Series  
Integrally Mounted Medium and High Exposure  
Surge Protective Devices (SPDs)

For GE Spectra and OEM applications



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# IMPORTANT NOTICE

THE ENTIRE CONTENT OF THIS MANUAL MUST BE READ AND FULLY UNDERSTOOD BEFORE ATTEMPTING ANY INSTALLATION OR ENERGIZATION OF THE SPD.

If there are any questions about the operational status, or integrity of the electrical system prior to installation of the SPD, please consult a qualified trained electrician before attempting to continue.

If the minimum requirements of this manual are not followed, the SPD could become irreversibly damaged, and/ or the electrical system and connected loads could be left unprotected.

Choosing the right product for the application, along with correct installation methods, as defined within this manual, will allow the GE Tranquell SPD to provide the best possible protection for many years.

Failure to comply with the applicable requirements of this manual can void the SPD warranty.



## **WARNING**

SPECIAL ATTENTION MUST BE GIVEN TO VERIFY THAT A PROPER NEUTRAL-GROUND (XO) BOND HAS BEEN MADE WHEN POWER IS SUPPLIED FROM AN UPSTREAM TRANSFORMER OR ANY OTHER TYPE OF SEPARATELY DERIVED POWER SOURCE.

FAILURE TO PROVIDE THIS BOND, AS REQUIRED PER ARTICLE 250.30 OF THE NATIONAL ELECTRICAL CODE, CAN RESULT IN ELEVATED PHASE TO GROUND SOURCE VOLTAGE POTENTIALS. THESE VOLTAGES CAN CAUSE DAMAGE TO ELECTRICAL EQUIPMENT AS WELL AS SAFETY HAZARDS INCLUDING FIRE, ELECTRICAL SHOCK, SERIOUS INJURY, OR DEATH.

## **PRODUCT DESCRIPTION:**

GE Tranquell Enhanced Thermal Protection (ETP) Series Type 1 and Type 2 Surge Protective Devices (formerly called TVSS), are designed for installation on low voltage electrical distribution systems. GE SPDs are designed to protect electrical equipment loads against the damaging effects of transient voltages that can be induced or generated as a result of remote lightning, power equipment switching or high frequency disturbances.

All GE Tranquell ETP Series SPDs incorporate Metal Oxide Varistor (MOV) technology to achieve superior transient suppression performance. Integral to each MOV is a unique Thermal Protection System that provides effective circuit interruption in the event of an abnormal phase overvoltage condition. Other standard features include protection status indicating lights, an audible alarm with test and disable features, form C alarm contacts for remote monitoring, a surge event counter, EMI filtering and a Surge Rated Disconnect Switch.

The GE Tranquell SPD unit described in this manual is intended to be factory installed in electrical distribution equipment, by the equipment manufacturer. GE applications include, Spectra Series Panels, MCC and Switchgear for low voltage electrical distribution systems. The integrally mounted SPD is UL recognized, conforming to UL 1283 and UL 1449 3<sup>rd</sup> Edition where applicable. All ratings are in accordance with ANSI / IEEE C62.41.1-2002, C62.41.2-2002 and NEMA LS1-1992 (R2000) recommended guidelines.

### **Model covered by this manual are:**

GE Tranquell TPME and TPHE, UL Type 2 model types ending with the part number suffix of PP, ME, or SG. (Example: TPHE277Y20PP)

Model types are also available with a UL Type 1 rating. These models will be labeled with part number suffixes of PPT1, MET1, or SGT1.

## **APPLICATION GUIDELINES:**

Determining the surge protection to be provided in a facility or for a particular system or equipment can be a complex task that should be addressed as early as possible. This is typical when a new facility is constructed or when new sensitive electronic equipment has been installed. The following guidelines are offered for application assistance:

- Prior to installing any SPD, ensure that your facility electric supply system is properly installed and connected in accordance with all applicable national and local codes and safety procedures. All equipment and systems should be installed in accordance with manufacturer's instructions.
- Utilize the personnel from your local utility, your engineering department, GE application or service engineering, or a professional consulting engineering firm for technical guidance or troubleshooting.
- Understand your system, and the capabilities and limitations of SPDs and other power conditioning equipment.
- Select the proper GE TRANQUELL Series SPD unit for your system voltage, configuration, and the anticipated surge environment. Some of the key parameters for selection are defined below:
  - **SPD TYPE**  
The SPDs covered in this document are rated and marked accordingly for use on Type 1 or Type 2 applications. Type 1 SPDs can be installed on either line or load side of the electrical distribution system's main breaker or fuse. Type 2 SPDs can be installed only on the load side.

- **MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV)**  
This value defines the maximum line-to-line or line-to-neutral continuous AC voltage that can be safely applied to the SPD. MCOV levels for GE Tranquell Series SPDs are set at 115% of nominal system voltage. For 120-volt AC systems, the MCOV is 125%. If there is a risk that the electrical system voltage could exceed the SPD MCOV rating, or if any unusually high power frequencies, Temporary Over Voltages (TOV), or phase swells are anticipated, contact your GE Sales Engineer for further assistance.
  - **ELECTRICAL SYSTEM CONFIGURATION**  
SPDs are available for single (split) phase with neutral and ground, three-phase grounded WYE, three-phase ungrounded WYE, three-phase high-leg delta, and for three-phase ungrounded delta systems. (See page 7 for power source configurations)
  - **PEAK IMPULSE RATING**  
Peak surge current capability is an important characteristic for a SPD. The rating per mode should equal or exceed the maximum surge expected in service. GE Tranquell SPDs described in this manual are available in maximum surge ratings of 65kA, 80kA, 100kA, 125kA, 150kA, 200kA, 250kA and 300kA.
  - **UL 1449 NOMINAL DISCHARGE CURRENT (In)**  
The UL Nominal Discharge Current (In) rating should be considered when an SPD is selected for use within a UL96A Lightning Protection System. UL96A requires a Nominal Discharge Current (In) rating of 20kA for Type 1 or Type 2 SPDs.
  - **SHORT CIRCUIT CURRENT RATING**  
GE Tranquell Series SPDs described in this manual are UL certified for use on electrical systems with rated ampacities up to 200,000 symmetrical amperes maximum.
  - **ENVIRONMENTAL RATINGS**  
Integrally mounted SPD devices will maintain the same NEMA Enclosure rating as the Electrical Panel they are installed in. The SPD is designed to operate within an ambient temperature range of -40°C to 65°C (-40°F to 149°F) with a relative humidity level between 0-95% non-condensing.
- A direct lightning strike, that occurs within close proximity of an installed SPD, can result in surge currents that exceed the SPD's energy handling capability. This can result in reduced life expectancy or pre-mature failure of the SPD. Electrical power system supply voltages in excess of the SPD MCOV rating, can also cause SPD failure.
  - Should a condition occur that results in premature failure of the SPD, the suppression circuitry will short, thereby allowing the integral SPD fusing to interrupt current flow without disrupting power to the connected loads. However, after SPD failure, the load equipment will remain unprotected from subsequent surge activity until the SPD is replaced.
  - Increased rate of rise or higher surge current magnitudes can result in increased surge let-thru levels due to the non-linear clamping characteristics of SPDs. Conditions can occur where the surge withstand capability of the protected equipment is exceeded even though the SPD is functioning properly. In such cases, additional SPDs may be required, located closer to the sensitive load(s). (For additional information, refer to Standard IEEE 1100-2005, Section 3.4.3)
  - GE Tranquell ETP Series WYE-connected SPDs have both **normal mode** (L-N, L-L) and **common mode** (L-G, N-G) protection. Protection between neutral and ground is provided on units designed for WYE-connected applications.



## WARNING

THE EQUIPMENT COVERED BY THESE INSTRUCTIONS SHOULD BE INSTALLED AND SERVICED ONLY BY COMPETENT, QUALIFIED PERSONNEL UTILIZING PROPER SAFETY PRACTICES AND PROCEDURES THESE INSTRUCTIONS ARE WRITTEN FOR SUCH PERSONNEL AND ARE NOT INTENDED AS A SUBSTITUTE FOR ADEQUATE TRAINING AND EXPERIENCE IN SAFE PROCEDURES FOR THIS TYPE OF EQUIPMENT.

### PRE-INSTALLATION REQUIREMENTS:

Prior to energization of the GE Tranquell integrally mounted SPD, it is critical that the following items have been addressed.

**DO NOT ATTEMPT TO ENERGIZE THE SPD OR CONTINUE WITH THE INSTALLATION IF ALL OF THESE CONDITIONS HAVE NOT BEEN MET, OR ARE UNKNOWN.**

**1. SYSTEM CONFIGURATION AND VOLTAGE**

Check the configuration and voltage supply ratings that will be feeding the panel to ensure that the proper SPD model number has been selected for your system. The SPD model number can be found on the UL label affixed to the body of the SPD (see page 10). The SPD selection can be verified by comparing the Model Number to the correct electrical system described in the "VOLTAGE RATINGS & POWER SOURCE CONFIGURATIONS" chart shown on page 7. This effort might require removal of the panelboard cover and/or dead front shield. Refer to the electrical equipment installation manual for details on the panel assembly.

**2. SYSTEM GROUNDING AND BONDING**

Verify that a NEC (National Electrical Code) compliant X0-Ground bond has been made at the upstream transformer or other separately derived system that supplies voltage to the SPD. Per NEC Article 250.30, this bond must be in place on all 3-Phase WYE, 3-Phase Hi-Leg Delta, and Single Phase Split-Systems. Refer to page 8 for an example of an installation that complies with these NEC recommendations.



## WARNING

FAILURE TO PROVIDE THE X0 BOND WILL DAMAGE THE SPD AND VOID THE PRODUCT WARRANTY.

Verify that there have not been multiple instances of Neutral to Ground bonds on the electrical system. These bonds, while either intentional or accidental, result in Ground currents that can create differential voltage potentials between Neutral and Ground. Redundant Neutral to Ground connections can result in damage to the SPD and are in violation of NEC.

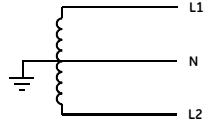
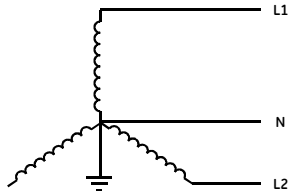
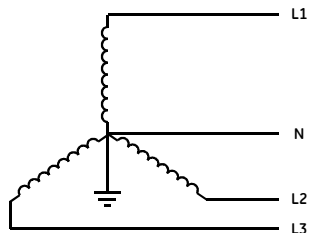
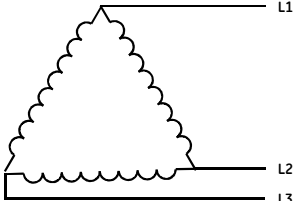
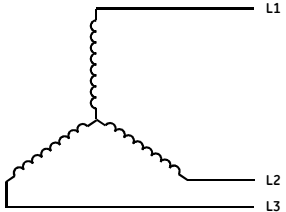
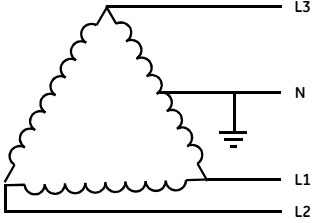
**3. SPD INSTALLATION ON UNGROUNDED POWER SYSTEMS**

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.

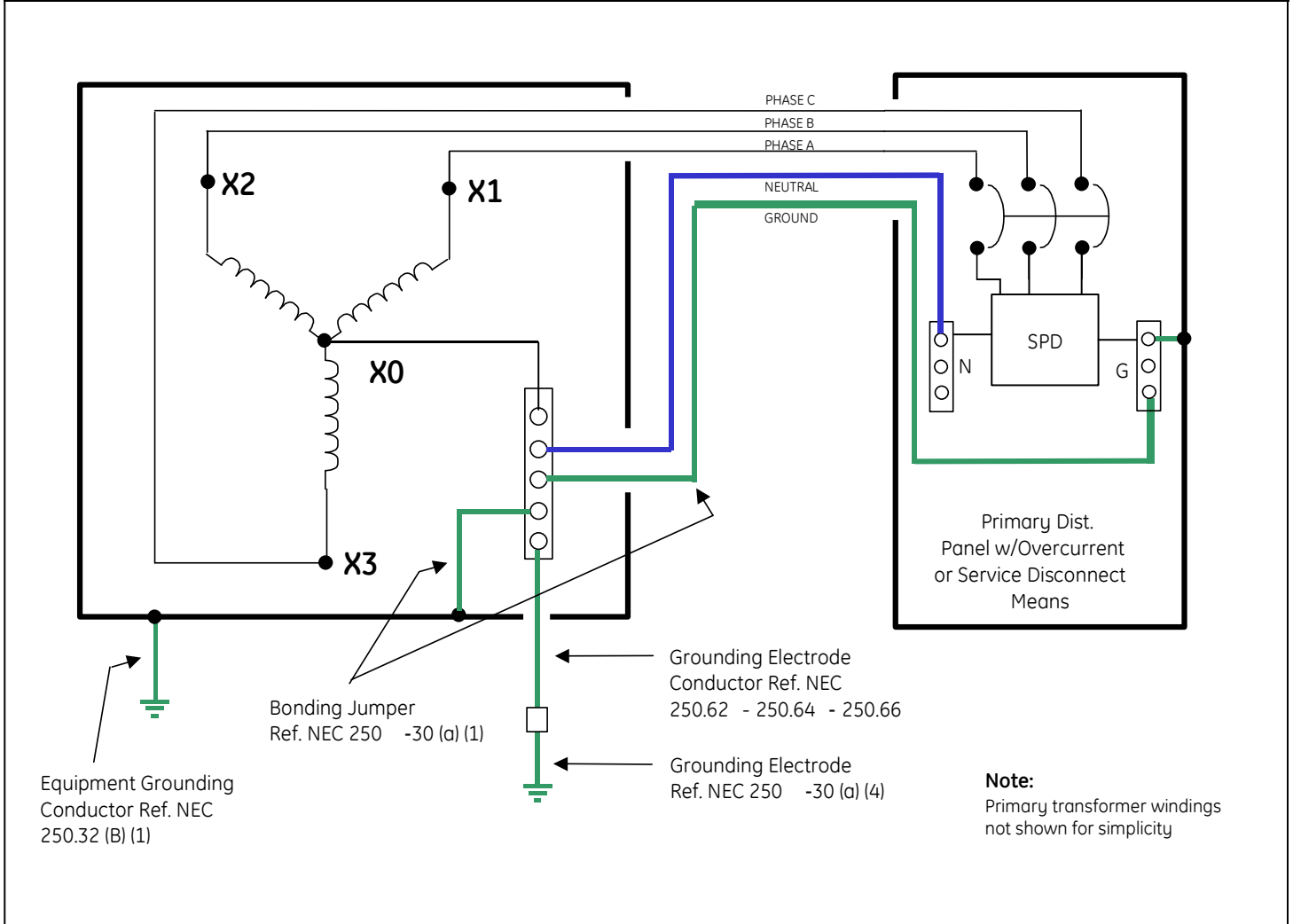
**4. SPD LOCATION / PRIMARY OVERCURRENT PROTECTION**

Per the National Electrical Code (NEC Article 285), Type 1 SPDs may be placed on either side of the main service breaker or fuse (line or load) without the need for supplemental overcurrent protection. Type 2 SPDs are allowed to be placed on the load side only.

# VOLTAGE RATINGS & POWER SOURCE CONFIGURATIONS

TRANQUELL MODEL	NOMINAL VOLTAGE (50/60Hz)	MAXIMUM CONTINUOUS OPERATING VOLTAGE (MCOV)	SYSTEM TYPE	SOURCE CONFIGURATION
TPME / TPHE 120S	120 / 208-240V	150V (L-N / L-G)	Single Phase 3 Wire + Ground	
			Dual Phase 3 Wire + Ground	
TPME / TPHE 120Y	120 / 208V	150V (L-N / L-G)	Three Phase WYE, 4 Wire + Ground	
TPME / TPHE 220Y	220 / 380V	320V (L-N / L-G)		
TPME / TPHE 240Y	240 / 415V	320V (L-N / L-G)		
TPME / TPHE 277Y	277 / 480V	320V (L-N / L-G)		
TPME / TPHE 347Y	347 / 600V	420V (L-N / L-G)		
TPME / TPHE 240D	240V	270V (L-G)	Three Phase Delta, 3 Wire	
TPME / TPHE 480D	480V	550V (L-G)	Three Phase WYE, 3 Wire	
TPME / TPHE 240H	120 / 240V	150V (L-N / L-G) Phase A & C  270V (L-N / L-G) Phase B	Three Phase Delta Hi-Leg, 4 Wire + Ground	

## Example of an NEC Compliant Grounding Arrangement for a Separately Derived System



The illustration shown above, provides a recommended method for grounding a separately derived power system, per the National Electrical Code, Article 250.30. Please check with the local municipality or governing authority for additional codes or other approved regulatory requirements before attempting to configure any electrical power distribution system.





## WARNING

POWER MUST BE PROVEN DISCONNECTED BEFORE STARTING INSTALLATION, INSPECTION OR MAINTENANCE. FAILURE TO DO SO MAY CAUSE SERIOUS INJURY, DEATH AND/OR PROPERTY DAMAGE.

### INSTALLATION:

The SPDs described in this manual are intended to arrive at the job site as factory-mounted and wired into GE Spectra Brand or other OEM Brand electrical panels or gear. For these applications, please begin at step number 5 below.

Installation steps 1-4, shown below (appended with "OEM"), are intended to provide guidance to OEM's for factory installation considerations.

Before attempting installation, make sure that the pre-installation requirements on [pages 6, 7 and 8](#) of this manual have been satisfied. If the status of the pre-installation requirements are not known, do not attempt to continue SPD installation until the requirements can be confirmed.

#### 1. MOUNTING CONSIDERATIONS (OEM)

The SPD is configured with a mounting base to allow for secure attachment to the equipment frame. The SPD can be installed in any orientation, however special consideration should be given to allow for periodic inspection of the diagnostic display panel. The SPD should be installed as close to the power source as possible to provide the best SPD performance. The SPD mounting base should always be secured to a structure that is intended to be grounded.

#### 2. POWER CONNECTIONS (OEM)

Mechanical terminals are provided on the SPD for connection to the electrical power system. These terminals will accommodate #14 to 2/0 AWG stranded copper conductors. The minimum recommended wire size for the GE Tranquell SPD is # 6 AWG. See [page 10](#) for terminal location and identification.

#### 3. WIRE ROUTING (OEM)

The length of wiring to the SPD must be kept at a minimum for the best performance. Wire lengths should be short, strait runs between the SPD and power source. Wiring impedance can be further reduced by twisting the phase, neutral and ground conductors together and routed in the same raceway or channel. Always avoid sharp bends when routing SPD connecting conductors.

#### 4. CIRCUIT BREAKER (OEM)

A dedicated circuit breaker is not required for TPME or TPHE models. If a dedicated branch breaker is to be used to connect the SPD to the power system, GE recommends a 60A rated breaker.

#### 5. REMOTE ALARM CONTACTS

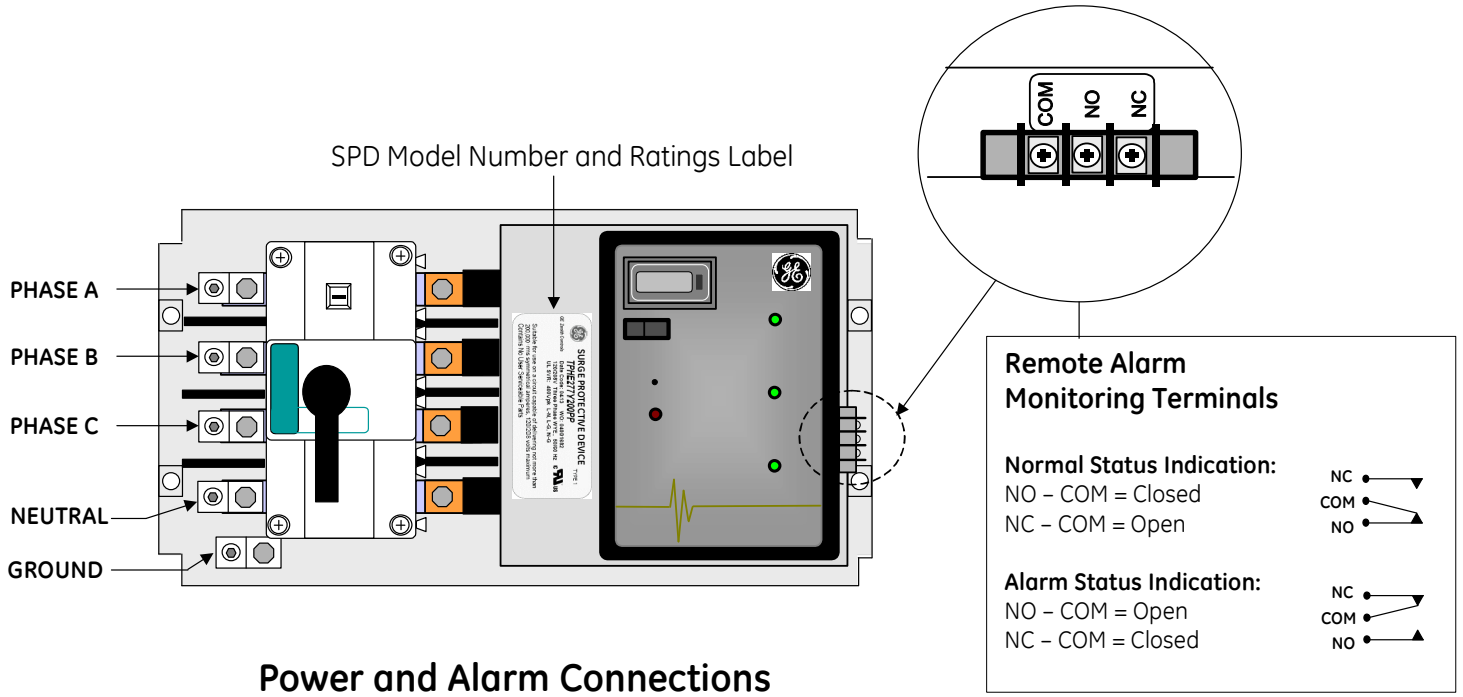
Remote Alarm Monitoring Contacts are provided on all SPD model types covered by this manual. If this type of monitoring is desired, refer to [page 10](#) for the location and pin configuration of these contacts. The contacts are dry, 1 form C type, rated 120 VAC, 1 A (30 VDC, 2A) maximum. Once the SPD has been energized and is operating as intended, the alarm contacts will switch to "Normal Status". The contacts will only change back to "Alarm Status" if there is a failure within the SPD suppression circuitry, or if power has been disconnected from the SPD. Allowing the Remote Alarm Contacts remain unconnected will not affect the performance or integrity of the SPD.

**6. SPD DISCONNECT SWITCH**

A manually operated disconnect switch is provided as a standard feature on some models. It can be used to disconnect the SPD for servicing. For models without an integral disconnect, a dedicated circuit breaker should be considered as a means of disconnect.

**7. PRE-ENERGIZATION CHECK**

Once all of the pre-installation conditions have been met and the GE Tranquell SPD has been installed, the SPD can now be energized. For SPD Operational Status, refer to Operation and Maintenance Sections – pages 11 & 12.



**Power and Alarm Connections**

This illustration represents the orientation of a SPD as installed in a GE Spectra Series Power Panel. Other orientations are possible depending on the type of equipment the SPD is installed in. The SPD features will be the same regardless of application.



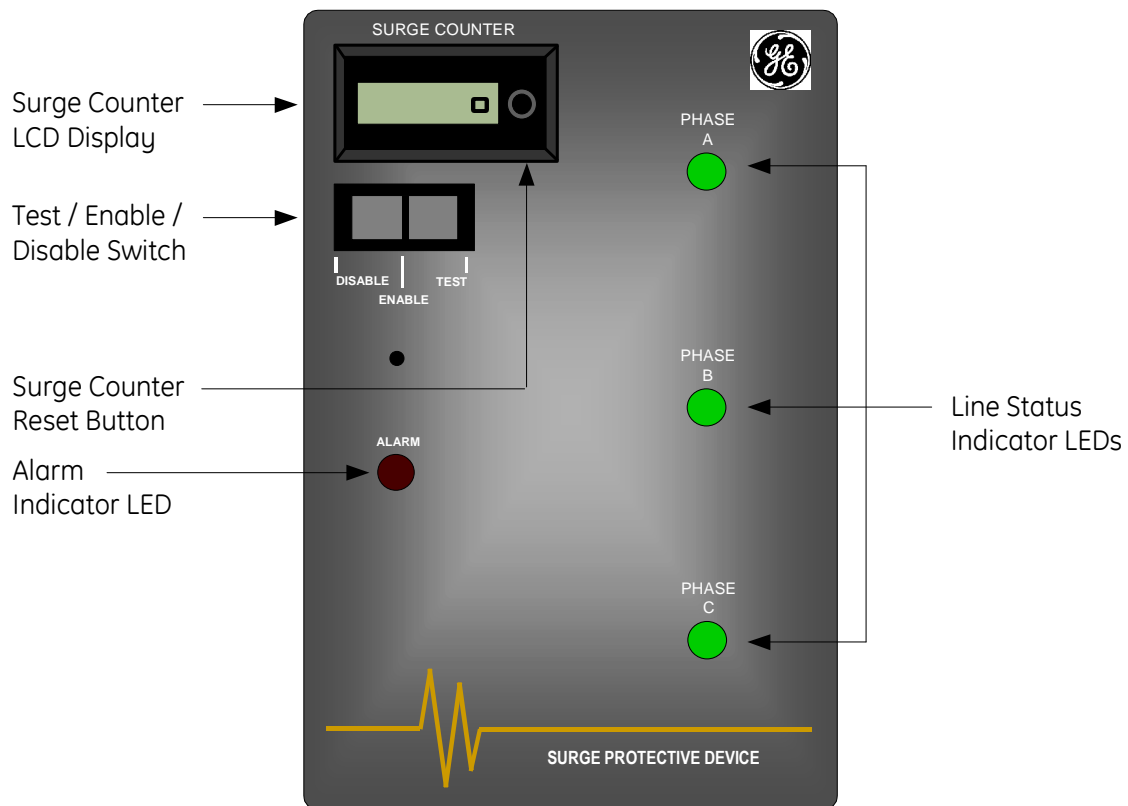
## WARNING

UPON ENERGIZATION OF THE SPD, IF ANY OF THE LAMPS OR ALARMS INDICATES AN ABNORMAL CONDITION, POWER SHOULD PROMPTLY BE DISCONNECTED FROM THE SPD. THE ELECTRICAL SYSTEM SHOULD BE INSPECTED AND THE PRE-INSTALLATION REQUIREMENTS SHOULD BE VALIDATED. DO NOT ATTEMPT TO LEAVE POWER APPLIED TO THE SPD, OR RE-ENERGIZE THE SPD IN THE EVENT OF AN ALARM CONDITION. PLEASE CONTACT YOUR LOCAL GE REPRESENTATIVE FOR FURTHER ASSISTANCE.

### OPERATION:

After applying power to the SPD, verify that the protection monitoring circuits are functioning correctly. If all status alarms indicate "normal", the SPD has been successfully installed and is operational.

### SPD Display Panel



- 1. LINE STATUS INDICATOR LEDs**  
The green line status LED's provide visual indication of SPD health status. As long as the SPD is connected to the electrical system supply voltage and the SPD suppression circuitry is functional, the line status indicators will be illuminated green. There is one green indicator per each protected phase.
- 2. ALARM STATUS INDICATOR LEDs**  
When illuminated, the red Alarm Status Indicator LED will provide notification of a SPD failure condition. Verify the Alarm Status Indicator is not illuminated upon startup.
- 3. REMOTE ALARM CONTACTS**  
Remote Alarm Contacts are available to remotely monitor the health status of the SPD. An alarm condition will result in a status change of the contacts. These contacts do not affect

the performance of the SPD and are not required to be connected for the SPD to function as intended. (See pages 9 & 10 for Alarm Contact details)

#### 4. TEST / ENABLE / DISABLE SWITCH

**Enable Position** - This is the normal position for the tri-position switch. In the Enable position, the Audible Alarm will sound in the event of a SPD failure mode.

**Disable Position** - This position will silence the Audible Alarm if desired. The Disable switch will not disable or disconnect the SPD from the electrical power system.

**Test Position** - The Test switch provides a quick diagnostic status of the Audible Alarm, Alarm Status Indicator and Remote Alarm Contacts. When pressed, the Audible Alarm will sound, the Alarm Lamp will illuminate, and the Remote Contacts will change state. The "Test" position is momentary. Once pressed, the switch will automatically reset to the "Enable Position" upon release.

#### 5. SURGE COUNTER LCD DISPLAY

The Surge Counter will sense and record transient surge events that have been mitigated by the SPD. The counter has been designed to detect transients that exceed the peak sine wave by more than 70%. If desired, the Surge Counter Display can be reset to zero at any time by pressing the reset button located on the LCD display.

### MAINTENANCE:

GE does not provide a specific schedule for preventative maintenance as conditions will vary based on location and the environmental factors presented at each installation site. However, periodic inspections should be scheduled to verify that the SPD does not indicate a failure mode.

Inspections should also be made to check the integrity of the electrical supply connections to the SPD to ensure continued reliable performance.

### SERVICING / TROUBLESHOOTING:

The GE Tranquell ETP Series SPD contains no user serviceable parts and requires no calibration. The rugged design of the SPD should provide many years of service.

Should a condition occur that results in premature failure of the GE Tranquell SPD, the integral SPD suppression thermal fusing will safely interrupt current flow through the SPD without disrupting power to the protected equipment. **This will remove the SPD from the power system and the load equipment will remain unprotected from subsequent surge activity until the SPD is replaced.**

If a change in operational status/alarm indication occurs, a qualified (licensed) electrician should inspect the electrical system to verify electrical system integrity. If the SPD remains in alarm after system inspection/corrections have been made, the SPD should be replaced. For further assistance, contact your local sales representative or call GE Power Quality at 1-800-637-1738.



### **WARNING**

IN THE EVENT OF AN SPD ALARM CONDITION, DO NOT ATTEMPT TO DIS-ASSEMBLE THE SPD TO REPLACE FUSING OR OTHER COMPONENTS. THE SPD CONTAINS THERMALLY PROTECTED MOV'S THAT WILL ONLY OPEN WHEN THE SPD HAS FAILED IN A NON-SERVICEABLE CONDITION. THE ENTIRE SPD MUST BE REPLACED.

**CONTACT GE POWER QUALITY AT 1-800-637-1738**

## NOTICE

These instructions do not purport to cover all details or variations in equipment nor to provide for every possible contingency to be met in connection with installation, operation, or maintenance. Should further information be desired or should particular problems arise which are not covered sufficiently for the purchaser's purposes, the matter should be referred to the GE Company.

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