Surge Protection Devices

Overview Catalog
Surge Protection Devices (SPD) are designed to protect against transient surge conditions. Transient surges can reach values of hundreds of thousands of volts or instantaneous current flow of tens of thousands of amperes, but typically last less than one hundred microseconds in duration.

Transient surges generated within a facility typically account for 80% of the surge activity. These internally generated transients can be caused by switching power supplies (computers), electronic ballasts (building lighting) and variable frequency drives (air handlers, elevators, etc). The most destructive transient voltage surges can be attributed to lightning and utility load switching; however, experts predict that these two events account for 20% of all transient surge activity.

Reliable data sources suggest that lightning strikes have current magnitudes in excess of 200,000 amps. Moreover, lightning strikes are not single strike events. Strikes typically consist of four to six “hits” and sometimes can be as high as 40kA. Therefore, SPDs must be appropriately sized to provide adequate protection during multiple surge events.

Large transient surge conditions can damage printed circuit board traces and puncture semiconductors causing immediate or intermittent equipment failures. Continued exposure to surges can degrade printed circuit board traces or semiconductors resulting in seemingly random delayed equipment failures. Therefore, equipment failures cannot always be contributed to a single power quality event. Surge remnants on data lines can alter digital data and logic levels causing equipment failures and lockups.

Professionally installed Current Technology® products provide superior protection against transient surges preventing unnecessary downtime and costly repairs.

Surge FAct

Lightning has proven to be the most destructive environmental generator of power quality disturbances, yet only account for 20% of all transient surge activity. 80% of all transient surges are generated internally within a facility’s electrical system.

2008 NEC SECTION 708 COPs

COPS STANDS FOR CRITICAL OPERATIONS POWER SYSTEMS.

Section 708.20(d) requires facilities that must comply with the section to include surge protection devices at each voltage level within the facility. This is the first time the NEC has required the use of surge protection devices as part of a facilities design. COPS systems are to include any facility that if disrupted or destroyed would affect the economy, public health, or safety.

2014 NEC UPDATE

Modular Data Centers Article 646.3(l)
“Where provided, surge protective devices shall be listed and labeled and installed in accordance with article 285.”

Wind Electric Systems Article 694.10 (D)
“A SPD shall be installed between a wind electric system and any loads served by the premises electrical systems.”

Emergency Systems Article 700.8
“A listed SPD shall be installed in or on all emergency switchboards and panelboards.”

ISO 9001:2008 CERTIFIED

Thomas & Betts Power Solutions, LLC, a member of the ABB group, has been certified by an independent auditor and has achieved ISO 9001:2008 certification for our quality management system.
FACILITY-WIDE PROTECTION

SURGE CURRENT CAPACITIES: HOW MUCH IS ENOUGH?

<table>
<thead>
<tr>
<th>CATEGORY C</th>
<th>CATEGORY B</th>
<th>CATEGORY A</th>
</tr>
</thead>
<tbody>
<tr>
<td>High Exposure</td>
<td>Medium Exposure</td>
<td>Low Exposure</td>
</tr>
<tr>
<td>Select SL3</td>
<td>TransGuard TG3</td>
<td>Select SL3</td>
</tr>
<tr>
<td>300–200kA</td>
<td>300–200kA</td>
<td>80–50kA</td>
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<tr>
<td>200–100kA</td>
<td>150–100kA</td>
<td>100–80kA</td>
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<tr>
<th>High Exposure</th>
<th>Medium Exposure</th>
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<tbody>
<tr>
<td>CurrentGuard Plus</td>
<td>CurrentGuard Plus</td>
<td>PX3</td>
</tr>
<tr>
<td>200–100kA</td>
<td>150–100kA</td>
<td>100–80kA</td>
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</tbody>
</table>

These recommendations are based on an average exposure, based on the Isokeraunic map of the U.S. Product recommendations may vary by geographic location or facility.

HOW MUCH PROTECTION DOES YOUR FACILITY REQUIRE?

IEEE C62.41 states that the best approach for total protection is using a cascaded strategy by installing SPD devices at multiple locations throughout the electrical distribution system of a facility. When multiple protector units are deployed at the main and secondary panels in a cascaded strategy, a facility has the most versatile power quality protection system against internally and externally generated transient surges.
5 SPD TYPES CREATED

Type 1 – Historically referred to as a surge arrester. Permanently connected SPD installed between the secondary of the service transformer and the line side of the service disconnect.

Type 2 – Historically referred to as a TVSS or SPD device. Permanently connected SPD installed on the load side of the main service disconnect.

Type 3 – Point of use SPDs, installed a minimum of 10m from the panel, cord connected, direct plug in, or receptacle types.

Type 4 and 5 – Components SPDs, including discrete components as well as component assemblies.

MEASURED LIMITING VOLTAGE TEST

SVR (Suppressed Voltage Rating) 6kV 500A is being replaced with VPR (Voltage Protective Rating) 6kV 3kA.

Iₚ TEST OR NOMINAL DISCHARGE SURGE CURRENT TEST

This is a new test designed to thermally stress the MOVs (Metal Oxide Varistor) and the design of the SPD. The manufacturer must claim the surge rating kA level per mode of the protection device and the MCOV (Maximum Continuous Operating Voltage) value per mode. Type 1 devices can be 10 or 20kA. Type 2 devices can be 3, 5, 10, or 20kA. During this test the unit is surged at the claimed kA level, 1 second after the surge the manufacturer’s claimed MCOV voltage must be applied to the unit under test for 1 minute. This is repeated for a total of 5 surges, then the unit can rest for 30 minutes. After 30 minutes 5 more surges are applied, followed by another 30 minute rest, followed by a final set of 5 surges. Pre and post VPR shot clamping voltages can not deviate by more than +/- 10% for the test to be successful. The key to this test is that MCOV values are no longer determined based upon the value of the MOV used in the system. MCOV values are now tested values that are determined and/or verified during this test. A graphical representation of this test is shown below.

UL96A COMPLIANCE

TO COMPLY WITH UL96A, MASTER LABEL, FOR A LIGHTNING PROTECTION SYSTEM UL REQUIRES THAT ALL SERVICE ENTRANCE SURGE DEVICES COMPLY WITH THE FOLLOWING:

1. All Service Entrance SPDs must be listed by UL to UL 1449 4th Edition
2. All Service Entrance SPDs must be listed as either a Type 1 or Type 2 SPD
3. All Service Entrance SPDs must have a 20kA Nominal Discharge surge current rating

For more information go to tnbpowersolutions.com/current_technology
DOES AN INTERNALLY MOUNTED SURGE PROTECTOR REALLY HAVE SHORTER LEAD LENGTHS?

Hard wired surge protection is typically installed two ways, internally or externally to the switch gear. The benefits of internally mounted units have been touted by the panelboard manufacturers. These benefits are overstated, as these manufacturers sell their own SPD devices.

SHORTEST LEAD LENGTH

All SPD manufacturers suggest in their installation instructions to keep the lead length as short as possible, realizing the impact lead length has on the installed performance of surge devices. Per UL 1449 and IEEE C62.45, all surge manufacturers evaluate their products with six inches of lead length. The six inch lead length is chosen so that all SPD products can be evaluated based on the same test setup and criteria.

The diagram below illustrates how the test is performed.

![Diagram showing the test setup for surge protection]

The surge current will flow through the phase conductor and travel a path inside the surge device, with any remaining current flowing back through the neutral conductor. The lead length of the phase conductor and the lead length of the neutral conductor will both have an impact on the overall performance of the surge device.

Tests have shown that every foot of standard cabling added to the installation length of an SPD increases the clamping levels (or let-through voltage) by as much as 100–150 volts per foot, severely impacting the installed performance of the surge device. This exposure to higher let-through voltages can put the downstream loads at serious risk.

The overall installed system lead length required to install the surge device dictates the let-through voltage capability (or performance) of the installed SPD. An integrated SPD tapped directly to the bus may have very short connections to the phases but the installed clamping levels must also take into account the lead length of the Neutral and Ground conductors that are part of the installation. Most integrated SPDs are installed at the top or bottom of an extended panelboard where the Neutral and Ground buses are typically at the opposite end. If you follow the path the surge would have to take, the overall length for this type of installation can be up to six feet or longer, which is a significantly longer lead length than what most integrated surge manufacturers mention in their marketing material. The overall lead length for this internally mounted surge protective device will have a negative impact on its installed performance.

TESTED SINGLE SURGE RATED

Most SPD manufacturers simply add up the number of surge components used in the construction of their products and provide a surge capacity rating. All Current Technology products are single surge tested at their rated values by a 3rd party laboratory.
**SELECT® SL3® OFFERS DOUBLE PROTECTION, SUPERIOR QUALITY**

The innovative Select® SL3 provides outstanding performance in all power quality surge events including temporary over voltages. The Select® SL3 product line combines selenium cells with the Current Technology patented Failure-Free Integrated Suppression Module (ISM®) to deliver the industry’s best surge suppression performance. The ISM® contains individual thermally fused and protected MOVs, surge-rated copper busing, robust filtering and advanced remote communications capabilities in a thermoplastic polycarbonate rated UL 94V-0 housing.

**WHY SELENIUM?**

- Selenium is the only technology that protects critical loads and downstream equipment from catastrophic overvoltages.
- Selenium provides additional protection to loads – lower clamping voltage than MOV only systems.
- Selenium conducts small routine transients – extending MOV life and ultimately the life of the unit.

**MODEL NUMBER SCHEME (SL3®)**

<table>
<thead>
<tr>
<th>Model</th>
<th>kA Rating</th>
<th>Voltage</th>
<th>Configuration</th>
<th>Enclosure</th>
<th>Cable Entry</th>
<th>Monitoring</th>
<th>Filter Option</th>
<th>Optional Feature</th>
</tr>
</thead>
<tbody>
<tr>
<td>SL3</td>
<td>050, 080, 100, 125, 150, 200, 250, 300</td>
<td>208  120/208</td>
<td>1G</td>
<td>MN</td>
<td>T</td>
<td>M0</td>
<td>Filter</td>
<td></td>
</tr>
<tr>
<td></td>
<td>240  120/240</td>
<td>2G</td>
<td>2 Phase, Grounded, Split Phase</td>
<td>MD</td>
<td>B</td>
<td>M1</td>
<td>N</td>
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<tr>
<td></td>
<td>380  220/380</td>
<td>3Y</td>
<td>3 Phase, Grounded Wye</td>
<td>MD*</td>
<td>B</td>
<td>M2</td>
<td>N</td>
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<tr>
<td></td>
<td>480  277/480</td>
<td>3R</td>
<td>3 Phase, Grounded</td>
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<td>B</td>
<td>M3</td>
<td>N</td>
<td></td>
</tr>
<tr>
<td></td>
<td>600  347/600</td>
<td>3H</td>
<td>3 Phase, Grounded, High Leg Delta</td>
<td>M6E</td>
<td>B</td>
<td>M4E</td>
<td>N</td>
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<td></td>
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<td>3 Phase, Grounded Delta</td>
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</table>

**kA Rating**

Available SL3® kA Ratings: 050, 080, 100, 125, 150, 200, 250, 300

**Voltage**

(Consult factory for additional Voltages)

208  120/208
240  120/240
380  220/380
480  277/480
600  347/600

**Configuration**

(Consult factory for additional Configurations)

1G  1 Phase, Grounded
2G  2 Phase, Grounded, Split Phase
3Y  3 Phase, Grounded Wye
3R  3 Phase, Grounded
3H  3 Phase, Grounded, High Leg Delta
3D  3 Phase, Grounded Delta

**Enclosure**

MN  Metal Without Disconnect
MD  Metal With Disconnect
SN  Stainless Steel Without Disconnect
SD  Stainless Steel With Disconnect

*Not available on 50, 80 or 100kA units

**Cable Entry**

T  Top Feed
B  Bottom Feed

**Monitoring**

M0  No local monitoring (see remote MxX stand-alone option)
M1  LED/Phase + Audible Alarm, Dry Relay Contacts
M2  M1 + Surge Counter
M3  Advanced Monitoring, Character Display, Modbus RTU
M4E  M3 + Ethernet, Modbus TCP
M5  Advanced Monitoring, Graphics Display, Modbus RTU
M6E  M5 + Ethernet, Modbus TCP

**Filter**

F  Filter
N  No Filter

**Optional Features**

2  Test Port
4  Enhanced Selenium

**Stand-Alone Options**

TO BE ORDERED AS SEPARATE ITEMS

DTS  DTS-2 Diagnostic Test Set
MxX  Remote Monitor Extension M1X through M6EX
HPI  HPI Cable

E.g.: SL3-300-208-3Y-M6E-F2

**Model Number Scheme (SL3®)**
**SELENIUM: THE ONLY ACCEPTABLE SOLUTION FOR SERVICE ENTRANCE APPLICATIONS**

Using a proprietary engineering process known as Seamless Technology™, Current Technology combines selenium with MOVs, polypropylene capacitors and precise component geometry to deliver the industry’s best suppression, highest tested single pulse surge current capacity ratings and — most importantly — longest product life. Current Technology’s patented seamless technology is the industry’s only power reliability design concept to take advantage of selenium’s proven, long-lasting suppression capabilities, which safeguard today’s busiest facilities with the most trusted and reliable protection available.

Patented seamless technology uses selenium cells combined with MOVs to provide superior bi-directional surge suppression. When coordinated as the “first line of defense” inside Select® SL3 suppression filter systems, selenium cells conduct routine, long duration surges, repetitive impulses and temporary over voltages, minimizing MOV wear and tear while protecting downstream equipment.  

The result: superior quality, maximum performance and dramatically extended product life.

**VALUABLE TYPE 1 PROTECTION TO SWITCHGEAR**

Surge suppression equipment is designed to protect sensitive electronic equipment from electrical transients. A surge suppressor is installed on the load side of the main service disconnect, providing limited protection to the switchgear — one of the most expensive elements of an electrical installation.

As a Type 1 SPD, the Select® SL3 may be installed in front of the main service disconnect, intercepting external surges before they flow through the main disconnect. In this way, the main disconnect and downstream breakers are protected from damage by transients that could otherwise cause them to trip, shutting off power to an entire electrical system, or leaving the system at risk to damage from additional transients.

**WHY TYPE 1 LISTING?**

- Select® SL3 provides protection before the main service entrance, increasing protection for downstream loads.
- Select® SL3 allows greater installation flexibility.
**FEATURES**

- Individual thermally fused and protected MOVs
- UL Listed Type 1 SPD
- UL96A compliant
- RoHS compliant
- Single surge rated and tested
- Extensive kA and voltage offerings
- Advanced remote monitoring capabilities

**MODEL NUMBER SCHEME (TG3™)**

E.g.: TG3-300-208-3Y-MDT-M6E-F2

<table>
<thead>
<tr>
<th>Model</th>
<th>kA Rating</th>
<th>Voltage</th>
<th>Configuration</th>
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<td>B</td>
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<tr>
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</table>

**ELECTRICAL TRANSIENT SUPPRESSION FILTER SYSTEMS**

TransGuard™ TG3™ suppression filter systems feature a powerful failure-free ISM™ (Integrated Suppression Module). The ISM™ contains individual thermally fused and protected MOVs, surge-rated copper busing, robust filtering and advanced remote communications capabilities. The TG3™ protects today’s facilities from costly downtime and equipment damage caused by routine or catastrophic electrical disturbances.

The result of an extensive design effort in Current Technology’s research and development facility, Current Technology's dramatically different and improved suppression filter assembly enables TransGuard™ TG3 models to provide unmatched performance and reliability.

For more information go to [tnbpowersolutions.com/current_technology](http://tnbpowersolutions.com/current_technology)
FEATURING

• Provides electronic grade power filtering for existing lighting and appliance distribution panels
• Extends equipment life by reducing equipment degrading high-frequency line noise and transients
• Easily mounts with most major brands of low-voltage (less than 600V) lighting and appliance panelboards
• Available in surface- or flush-mount configurations
• RoHS compliant

MODEL NUMBER SCHEME (PX3™)

E.g.: PX3-080-208-3Y-MFT-M6E-F2D

<table>
<thead>
<tr>
<th>PX3</th>
<th>080</th>
<th>208</th>
<th>3Y</th>
<th>MFT</th>
<th>M6E</th>
<th>F2D</th>
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</thead>
</table>

Panel Extension

FEATURES

• Provides electronic grade power filtering for existing lighting and appliance distribution panels
• Extends equipment life by reducing equipment degrading high-frequency line noise and transients
• Easily mounts with most major brands of low-voltage (less than 600V) lighting and appliance panelboards
• Available in surface- or flush-mount configurations
• RoHS compliant

MODEL NUMBER SCHEME (PX3™)

E.g.: PX3-080-208-3Y-MFT-M6E-F2D

<table>
<thead>
<tr>
<th>Model</th>
<th>kA Rating</th>
<th>Voltage</th>
<th>Configuration</th>
<th>Enclosure</th>
<th>Monitoring</th>
<th>Filter Option</th>
<th>Optional Feature</th>
<th>Integral Disconnect</th>
</tr>
</thead>
</table>

PA R E N T E X TION ELECTRICAL TRANSIENT SUPPRESSION FILTER SYSTEMS

The PX3™ offers an externally mounted surge solution that can be physically attached to the top or bottom of any panelboard, providing a reduced profile surge solution. Designed for quick and easy installation, the PX3™ suppression filter systems feature a powerful failure-free ISM™ (Integrated Suppression Module). The ISM™ contains individual thermally fused and protected MOVs, surge-rated copper busing, robust filtering and advanced remote communications capabilities. Unlike printed circuit board based designs, the ISM’s breakthrough technology does not rely on printed circuit board traces to carry full surge current magnitude. Instead, cumulative surge current travels on copper bus bars to multiple MOV paths. Printed circuit board trace failures are eliminated and current sharing is enhanced. Integral to the ISM™ is MOV fusing rated at 200 kAIC. This internal fusing ensures uninterrupted protection at rated surge current levels and protects all paths and elements.

FEATURES

• Provides direct bus connection capability to reduce wiring lead lengths, minimizing installation impedances and improving clamping voltages
• Removable end-plates allow installation above or below panelboards
• 15-Year standard product warranty
• Offers space-saving design that fits within a standard 6-inch deep wall and conserves horizontal wall space

Made in U.S.A. CUL US Listed
The Current Technology® MasterMind® monitoring system offers multiple levels of advanced, multifunction, power quality monitoring for SL3™, TG3™, and PX3™ suppression filter systems. A robust, full-featured system, the MasterMind provides real-time data on product performance and distribution system power quality. This critical information can now be accessed remotely through the addition of both modbus and ethernet communications options. The MasterMind® system is capable of providing time date stamps, magnitudes, and durations for most types of power quality events. End users have the ability to set alarm conditions by establishing the magnitude and duration required to trigger an alarm event. Memory capacity will allow for up to 2,000 events and 1,000 P.Q. records to be recorded.

% Protection Sensing
All MasterMind® monitoring options sense and communicate the available surge protection for each phase. This capability assures the operator that critical loads are fully and safely protected at all times. Most surge devices standardize on providing LED indication for communicating the status of the surge device. They say, if the LED is on, the surge device is working and if the LED is off, the surge device has failed. The MasterMind® provides real-time analysis of the percent of protection remaining so that the true status of the suppression filter system is known.

Not a Standard Surge Counter
The surge counter function of the MasterMind® exceeds the capability of standard surge counters by not only counting but categorizing surges into three industry recognizable categories. Most surge device counters utilize a current transformer that detects the amount of current flow through neutral or ground. When the current is high enough for the current transformer to detect it, the surge counter is incremented. Some surge devices that employ both surge protection and filtering protection can have false surge counts caused by noise filtering. The MasterMind® surge counter registers and records surge events in excess of 100A to eliminate false readings. Surges detected by the MasterMind® system will be categorized as low, medium, or high depending upon the level of surge current associated with each event.

Remote Communications
Methods for remote communications include ModBus-TCP/IP over ethernet, webserver via the ethernet connection, and modbus over RS485, or standard dry relay contacts. The ethernet and modbus options provide the end user access to the critical power quality data and health of the surge unit remotely. With the webserver, there is a platform for the end user to easily view all of the available information arranged in an easily recognizable display format. The versatility of the remote connectivity available with the MasterMind® monitoring package allows for access to the surge unit from just about anywhere and at any time.
MasterMind® Monitoring Options

A FULL-FEATURED MONITORING OPTION FOR SL3®, TG3® AND PX3® PRODUCTS

M3 Monitoring
- Local display with membrane switch user interface
- Power Quality Monitor that provides time, date, magnitude and duration of the following
  - Sags
  - Swells
  - Dropouts
  - Outages
  - THD
  - Frequency
  - Volts RMS per phase
  - Surges
    - Low 100A–500A
    - Med 500A–3000A
    - High 3000A+
  - Remaining surge protection percentage
- User settable alarm thresholds (magnitude and duration)
- Dry relay contacts
- Audible alarm, alarm silence
- Per phase LED indication
- ModBus RTU remote communications capability

M4E Monitoring
- M3 features plus...
- Ethernet, ModBus TCP remote communications capability
- Web Interface

M5 Monitoring
- Large local display with membrane switch user interface
- Power Quality Monitor that provides time, date, magnitude and duration of the following
  - Sags
  - Swells
  - Dropouts
  - Outages
  - THD
  - Frequency
  - Volts RMS per phase
  - Surges
    - Low 100A–500A
    - Med 500A–3000A
    - High 3000A+
  - Remaining surge protection percentage
- User settable alarm thresholds (magnitude and duration)
- Dry relay contacts
- Audible alarm, alarm silence
- Per phase LED indication
- ModBus RTU remote communications capability

M6E Monitoring
- M5 features plus...
- Ethernet, ModBus TCP remote communications capability
- Web Interface
The ISM™ (Integrated Suppression Module) features a suppression filter assembly, with individual thermally fused and protected MOVs, for improved current sharing. Surge rated copper bussing, robust filtering and advanced remote communications capabilities.

- Component SPD suitable for use in Type 1 or Type 2 applications
- Individual thermally fused and protected MOVs – ensures seamless product performance in the event of single MOV failure
- Heavy-duty filter capacitors ensure industry’s best high frequency noise and transient filtering
- Solid copper bus construction – cumulative surge current is carried on copper bus bars, eliminating reliance on PCB trace for conducting full surge current.
- Advanced remote communications capabilities
- Thermoplastic polycarbonate rated UL 94V-0 housing

**MODEL NUMBER SCHEME (ISM™)**

E.g.: ISM-300-240-3D-F

- **kA Rating** (Must Choose One)
  - Available ISM™ kA Ratings:
    - 050, 080, 100, 125, 150, 200, 250, 300

- **Voltage** (Must Choose One)
  - 208 120/208
  - 240 120/240
  - 380 220/380
  - 480 277/480
  - 600 347/600

- **Configuration** (Must Choose One)
  - 1G 1 Phase, Grounded
  - 2G 2 Phase, Grounded, Split Phase
  - 3Y 3 Phase, Grounded Wye
  - 3R 3 Phase, Grounded High Resistance
  - 3H 3 Phase, Grounded, High Leg Delta
  - 3D 3 Phase, Grounded Delta

- **Filter** (Must Choose One)
  - F Filter
  - N No Filter

**PRODUCT SPECIFICATIONS**

<table>
<thead>
<tr>
<th>General Specifications</th>
</tr>
</thead>
<tbody>
<tr>
<td>Safety Listings</td>
</tr>
<tr>
<td>C-UL-US Listed per UL1449 4th Edition 2015</td>
</tr>
<tr>
<td>Type 1 or 2 – Component SPD suitable for use in Type 1 or 2 SPD Applications; UL1283; CSA C22.2 No. 8-M1986; C233.1-87</td>
</tr>
<tr>
<td>CE marked (IEC 61643-11)</td>
</tr>
<tr>
<td>FCC/ RoHS compliant</td>
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</table>

<table>
<thead>
<tr>
<th>Protection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thermally Protected MOVs, Capacitive Filter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Product Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual Thermally Fused and Protected MOVs, and All Copper, Tin-plated Bus</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Installation Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Indoor</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Environment</th>
</tr>
</thead>
<tbody>
<tr>
<td>-40°C to +60°C</td>
</tr>
<tr>
<td>5% – 95% Non-Condensing Humidity</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Fault Current (SCCR)</th>
</tr>
</thead>
<tbody>
<tr>
<td>200 kAIC</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Connection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Parallel</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Protection Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>All Modes (L-N, L-G, N-G, L-L)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Response Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 0.5 Nanoseconds</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Operating Frequency</th>
</tr>
</thead>
<tbody>
<tr>
<td>47 – 63 Hz</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Warranty</th>
</tr>
</thead>
<tbody>
<tr>
<td>15 Years</td>
</tr>
</tbody>
</table>

**Filtering Attenuation Frequencies (Per Mil-Std-220B January 2000)**

<table>
<thead>
<tr>
<th>Frequency (Hz)</th>
<th>10 KHz</th>
<th>100 KHz</th>
<th>1 MHz</th>
<th>10 MHz</th>
<th>Max at 142 KHz</th>
</tr>
</thead>
<tbody>
<tr>
<td>18.1 dB</td>
<td>44 dB</td>
<td>22.8 dB</td>
<td>15.3 dB</td>
<td>54.6 dB</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Maximum Continuous Operating Voltage (MCOV)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Voltage</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>L-N MCOV</td>
<td>L-L MCOV</td>
<td></td>
</tr>
<tr>
<td>120 V</td>
<td>150 V</td>
<td>240 V</td>
</tr>
<tr>
<td>277 V</td>
<td>320 V</td>
<td>480 V</td>
</tr>
<tr>
<td>347 V</td>
<td>420 V</td>
<td>600 V</td>
</tr>
</tbody>
</table>

* Data based on actual tests. Contact factory for test reports.

**SPD INTEGRAL TO SWITCHGEAR**

Example showing the ISM integrated into the switchgear and the M6EX remotely mounted on the surface of the switchgear.

For more information go to [tnbpowersolutions.com/current_technology](http://tnbpowersolutions.com/current_technology)
### Typical Clamping Voltage Data

<table>
<thead>
<tr>
<th>System Voltage</th>
<th>Mode</th>
<th>B3 Ringwave</th>
<th>B3/C1 Comb. Wave</th>
<th>C3 Comb. Wave</th>
<th>UL 1449 14th Edition</th>
</tr>
</thead>
<tbody>
<tr>
<td>120/240</td>
<td>L-N</td>
<td>300</td>
<td>400</td>
<td>550</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>L-G</td>
<td>400</td>
<td>400</td>
<td>600</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>N-G</td>
<td>325</td>
<td>475</td>
<td>800</td>
<td>600</td>
</tr>
<tr>
<td></td>
<td>L-L</td>
<td>425</td>
<td>725</td>
<td>900</td>
<td>1,000</td>
</tr>
<tr>
<td>277/480</td>
<td>L-N</td>
<td>500</td>
<td>875</td>
<td>1,050</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>L-G</td>
<td>825</td>
<td>825</td>
<td>1,025</td>
<td>1,200</td>
</tr>
<tr>
<td></td>
<td>N-G</td>
<td>650</td>
<td>875</td>
<td>1,200</td>
<td>1,000</td>
</tr>
<tr>
<td></td>
<td>L-L</td>
<td>700</td>
<td>1,625</td>
<td>1,825</td>
<td>2,000</td>
</tr>
</tbody>
</table>

All ISM™ systems clamping voltages are in compliance with test and evaluation procedures outlined in NEMA LS 1-1992 (R2000), paragraphs 2.210 and 3.10.

ISM™ – Integrated Suppression Module
Individual thermally fused and protected MOV component of SL3™, TG3™ and PX3™ products.

### Voltage/Configuration Options

<table>
<thead>
<tr>
<th>Voltage</th>
<th>Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>120</td>
<td>X</td>
</tr>
<tr>
<td>120/208</td>
<td>X</td>
</tr>
<tr>
<td>208</td>
<td>X</td>
</tr>
<tr>
<td>220</td>
<td>X X</td>
</tr>
<tr>
<td>230</td>
<td>X</td>
</tr>
<tr>
<td>240</td>
<td>X X</td>
</tr>
<tr>
<td>380</td>
<td>X X X</td>
</tr>
<tr>
<td>415</td>
<td>X X X</td>
</tr>
<tr>
<td>480</td>
<td>X X X</td>
</tr>
<tr>
<td>600</td>
<td>X X X</td>
</tr>
</tbody>
</table>

Not all voltage configurations are displayed. Contact Thomas & Betts Power Solutions for additional configurations.
CurrentGuard™ SERIES

CurrentGuard™ Plus

FEATURES
• UL 1449 4th Edition Type 1 SPD
• Individually fused MOVs provide superior protection and continuous operation
• 200kAIC short circuit current rating allows direct bus connection without the need of an upstream overcurrent protection device
• Includes best-in-class UL 1283 enhanced EMI/RFI filter
• All modes of protection (L–N, L–G, N–G & L–L)
• Surge event counter – standard
• DTS-2 compatible for proactive field testing
• NEMA 4 steel enclosure
• 15-Year standard product warranty
• RoHS compliant

MODEL NUMBER SCHEME
E.g.: CGP200-120/208-3GY

CGP — 120/208-3GY — D

Available kA Ratings:
- 60, 80, 100, 120, 150, 200

Voltage*:
- 208 120/208
- 240 120/240
- 380 220/380
- 480 277/480
- 600 347/600

Available Option
- S Stainless Steel Enclosure

Stand-Alone Option
(To Be Ordered As Separate Items)
- D External Disconnect

E.g.: CG200 — 277/480-3GY

CG200 — 277/480-3GY — D

Configuration*:
- G 1-Phase, 2-Wire Plus Ground
- 2G 2-Phase, 3-Wire Plus Ground
- 3GY 3-Phase Wye, 4-Wire Plus Ground
- 3GHD 3-Phase High-Leg Delta, 4-Wire Plus Ground
- 3DG 3-Phase Delta, 3-Wire Plus Ground

Standard Monitoring Features
- Status Indicator Lights (one per phase)
- Service Indicator Light
- Form C Contacts (NO/NC)
- Audible Alarm with Silence Button
- Surge Counter

Configuration*
- G 1-Phase, 2-Wire Plus Ground
- 2G 2-Phase, 3-Wire Plus Ground
- 3GY 3-Phase Wye, 4-Wire Plus Ground
- 3GHD 3-Phase High-Leg Delta, 4-Wire Plus Ground
- 3DG 3-Phase Delta, 3-Wire Plus Ground

Available Option
- S Stainless Steel Enclosure

Stand-Alone Option
(To Be Ordered As Separate Items)
- D External Disconnect

*Consult factory for additional voltage configurations
CurrentGuard™ Flush Mount

FEATURES
• UL 1449 4th Edition Type 1 SPD
• Each mode protected by surge rated overcurrent fuse
• 200kAIC short circuit current rating allows direct bus connection without the need of an upstream overcurrent protection device
• Compact design to allow for flush mount installation
• Flush Mount plate available
• UL 1283 EMI/RFI filter
• All modes of protection (L-N, L-G, N-G & L-L)
• DTS-2 compatible for proactive field testing
• NEMA 4 steel enclosure
• 10-Year standard product warranty
• RoHS compliant

Available kA Ratings:
- 40
- 60
- 80

Voltage:
- 208 120/208
- 240 120/240
- 380 220/380
- 480 277/480
- 600 347/600

Configuration:
- G 1-Phase, 2-Wire Plus Ground
- 2G 2-Phase, 3-Wire Plus Ground
- 3GY 3-Phase Wye, 4-Wire Plus Ground
- 3GHD 3-Phase High-Leg Delta, 4-Wire Plus Ground
- 3DG 3-Phase Delta, 3-Wire Plus Ground

Optional Monitoring Features
- Status Indicator Lights (one per phase)
- Service Indicator Light
- Form C Contacts (NO/NC)

*Consult factory for additional voltage configurations

MODEL NUMBER SCHEME
E.g.: CGF40-120/208-3GY (as shown in above photo)

CurrentGuard™ Compact

RUGGED AND COMPACT
CurrentGuard™ Compact incorporates the same best-in-class features of the CurrentGuard™ series of products in a rugged, compact enclosure. Pre-wired and measuring only 6”W x 6”H x 4”D CurrentGuard™ Compact easily installs in applications with minimum space requirements.

FEATURES
• UL 1449 4th Edition Type 1 SPD
• Ideal for in-wall recess panel applications
• Surge rated component-level fusing
• UL 1283 EMI/RFI filter
• All modes of protection (L-N, L-G, N-G & L-L)
• Ultra compact weatherproof NEMA 4 steel enclosure
• Flush Mount plate available
• Small footprint and pigtail connection
• DTS-2 compatible for proactive testing
• 10-Year standard product warranty
• RoHS compliant

Available kA Rating:
- 50

Voltage:
- 208 120/208
- 240 120/240
- 480 277/480
- 600 347/600

Configuration:
- 2G 2-Phase, Grounded, Split Phase
- 3Y 3-Phase, Grounded Wye
- 3H 3-Phase, Grounded, High Leg Delta

Standard Monitoring Features
- Status Indicator Lights (one per phase)
- Audible Alarm
- Alarm Silence
- Dry Relay Contacts

Optional Monitoring Features
- Status Indicator Lights

*Consult factory for additional voltage configurations

MODEL NUMBER SCHEME
E.g.: CGC 050-120/208-3GY

Made in U.S.A.
SERIES-CONNECTED SUPPRESSION FILTER SYSTEM

The LoadGuard™ MSU (Modular Series Unit) is engineered for hard-wired installation within or adjacent to electrical loads such as outdoor lighting, robotics, process automation systems, motors, HVAC systems, pumps, heaters, programmable logic controllers and other point-of-use applications.

Compact and powerful, the LoadGuard™ MSU protects these and other individual components from damaging electrical transients, high-frequency noise and high-energy disturbances. LoadGuard™ provides 50kA of surge protection for loads up to 24A.

DTS-2

DIAGNOSTIC TEST SET

The Current Technology DTS-2 tester provides actual clamping performance values for SPDs. Every Current Technology product is evaluated with this tester at the factory to establish its benchmark of performance.

The portable DTS-2 tester can be deployed in the field to test units that have been in service for the remaining useful life of an installed product by comparing its latest clamping values against its benchmark values. The end user is given the opportunity to repair or replace the SPD before it fails, rather than waiting for it to fail and being left unprotected.

LoadGuard™

SERIES-CONNECTED SUPPRESSION FILTER SYSTEM

SURGE CURRENT PROTECTION

Parallel MOV Arrays: LoadGuard™ products employ MOVs in parallel arrays placed at the input and output terminals to protect critical loads from high-energy transient damage. MSU surge current capacity is 50kA per mode.

FEATURES

• Recognized to UL 1449 4th Edition as a Type 2 compliant assembly
• Industry’s best surge current rating
• Series-connected design
• Rugged, nonmetallic enclosure
• Sand-encapsulated
• Component-level fusing
• High frequency noise filtering
• Compact footprint/easy installation
• Status indicator light

MODEL NUMBER SCHEME

E.g.: MSU-050-120/240-2G-24A-6

<table>
<thead>
<tr>
<th>Model</th>
<th>kA Rating</th>
<th>Voltage</th>
<th>Configuration</th>
<th>Load Current</th>
<th>Modes of Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>050kA</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Voltage:

- 208 120/208
- 240 120/240
- 380 220/380
- 480 277/480

Configuration:

- 1G 1 Phase, Grounded
- 2G 2 Phase, Grounded, Split Phase
- 3Y 3 Phase, Grounded Wye
- 3R 3 Phase, Grounded High Resistance
- 3H 3 Phase, Grounded, High Leg Delta
- 3D 3 Phase, Grounded Delta

Load Current:

- 24A

Modes of Protection:

- 3 or 6

*Consult factory for additional voltage configurations

For more information go to tnbpowersolutions.com/current_technology
Installing SPD units using standard off-the-shelf cable can increase the clamping voltage unless the cable length is kept short.

Current Technology’s High Performance Interconnect (HPI) SPD Connection System provides the lowest possible impedance connection improving SPD performance.

The HPI SPD Connection System has 25% of the typical impedance of regular cable and allows the installer to increase the interconnection cable length by up to four times, while maintaining acceptable clamping voltage levels, ensuring maximum SPD unit performance.

Using the HPI SPD Connection System adds more location flexibility within the electrical room and significantly reduces the installation time.

**BenefitS**
- Maximizes SPD unit performance
- Allows the SPD unit to be installed outside of the switchgear
- Interconnect cable length can be increased up to four times
- Increases installation location options
- Improves installation quality
- Removes hazards of internal SPD installations
- Offered either pre-terminated at the SPD end or unterminated at both ends

**LEAD LENGTH TEST**

**SIX INCH LEAD LENGTH TEST CRITERIA**

Every SPD manufacturer tests their units with only six inches of lead length outside of the enclosure per the test criteria outlined in IEEE C62.41. Six inches of lead length does not represent the actual lead length required for installing an SPD. Current Technology applied a 20kV/10kA surge to a 14, 10, and 6 AWG wire measuring the voltage drop across a ten foot section of each wire. The graph shows the impact ten feet of 14 AWG wire would have to the installed performance of the SPD. The SPD, as tested with only six inches of lead length may drop the surge down to 700v, but with ten feet of 14 AWG wire, its installed performance is now 3,350v. The HPI cable was tested with the same 20kV/10kA surge with significant improvement. With ten feet of HPI cable the installed performance of the same SPD could be 1,150v. **THIS REPRESENTS AN 88% IMPROVEMENT.**
HIGH ENERGY TEST LAB
ADVANCED LABORATORY ENVIRONMENT

Current Technology owns and operates one of the most complete testing laboratories in the SPD industry. The Current Technology engineering team understands all applicable industry standards and applies that knowledge to the product development and testing of our advanced SPD systems. The engineering team has undergone extensive training to receive certification as an official UL test lab under UL’s Data Acquisition Program and ETL’s Supervised Applicant Testing Program. Being part of the UL and ETL test programs results in quicker turnaround and reduced cost associated with developing new products, passing savings on to the customer.

HIGH POWER LIGHTNING GENERATOR

These generators produce up to 100kV/200kA, 8x20µs lighting-type impulses. All Current Technology products are tested using the HPL generator to verify surge ratings of units.

MEDIUM CURRENT FAULT GENERATOR

These generators produce the UL 1449 Medium Current Fault voltages and currents. Voltages ranging from 120V to 600V, and currents 100A, 500A and 1000A can be produced in all combinations. All products have undergone review and testing through this new lab. The in-house lab enables Current Technology the ability to pre-test, redesign if necessary, and test for certification in a relatively short amount of time.

LIMITED CURRENT FAULT GENERATOR

These generators produce the UL 1449 Limited Current Fault voltages and currents. Voltages ranging from 120V to 600V, at a current of 10A, can be produced in all combinations. All Current Technology products have undergone review and testing through this new lab.

THREE KEYTEK SURGE GENERATORS

These generators produce the Industry Standard 8x20µs 6kV/500A impulses (and up to 20kV/10kA). They provide the Measured Limiting Voltage (MLV) and the Voltage Protective Rating (VPR) of the units. This is the test equipment “workhorse” of the SPD industry. Typically, this device will be used nonstop for weeks during launch of a new product series.

LECROY OSCILLOSCOPES

Current Technology has three high-speed LeCroy Digital Storage Oscilloscopes. They capture, to electronic and paper file, all the required test shots for certification. Networking of these files allows for easy access and storage of the certification information.

For more information go to tnbpowersolutions.com/current_technology
MASTERPLAN® FACILITY-WIDE PROTECTION
MORE POWER, MORE PROTECTION, INCREASED WARRANTY

Standard Warranty
Current Technology warrants products to meet all applicable industry standards and specifications and be free from defects in materials and/or workmanship. Should there be any failure of the product to meet these requirements, Current Technology shall either repair or replace the defective product.

Current Technology shall have no liability under this warranty for any problems or defects directly or indirectly caused by the misuse of the product, alteration of the product, accidents, or improper installation, application, operation or repair of the product.

Current Technology’s standard product warranty periods are provided below.

MasterPLAN® Warranty Upgrade
Current Technology also offers the upgraded warranty MasterPLAN®. IEEE recommends for premium site protection a cascaded installation of surge protection devices throughout the electrical distribution system of a facility. If a Select® SL3–200kA or greater unit is used on the service entrance of a facility, all Current Technology products installed downstream of that service entrance will have their respective warranty periods upgraded to 20 years. In order to qualify for the MasterPLAN® warranty upgrade, all Current Technology products must be purchased at the same time, installed at the same time, and be installed electrically downstream of the service entrance Select® SL3 unit.

<table>
<thead>
<tr>
<th>WARRANTY PERIOD</th>
<th>Standard</th>
<th>MasterPLAN®</th>
</tr>
</thead>
<tbody>
<tr>
<td>Select® SL3™ 100–300kA</td>
<td>20 Years</td>
<td>—</td>
</tr>
<tr>
<td>Select® SL3™ 50–80kA</td>
<td>15 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>HPI™</td>
<td>15 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>TransGuard® TG3™</td>
<td>15 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>Panelboard Extension – PX3™</td>
<td>15 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>CurrentGuard™ Plus</td>
<td>15 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>CurrentGuard™</td>
<td>10 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>CurrentGuard™ Compact</td>
<td>10 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>CurrentGuard™ Flush Mount</td>
<td>10 Years</td>
<td>20 Years</td>
</tr>
<tr>
<td>Monitoring &amp; Diagnostic Tools</td>
<td>5 Years</td>
<td>10 Years</td>
</tr>
</tbody>
</table>

WORLDWIDE SALES AND SERVICE
Our customers are supported by our worldwide network of more than 175 factory-trained representatives serving the protection needs of commercial, industrial, communications, government, military, education, retail, healthcare and transportation industries. Engineers and end-users with zero tolerance for downtime, data corruption or equipment damage resulting from routine or catastrophic electrical disturbances have made Current Technology the #1 name in surge suppression.