

APPLICATION NOTE

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SUBJECT: PREDICTING END OF LIFE FOR SPDS

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Surge Protection Devices (SPDs) provide protection against the devastating effects of lightning and load switching to all equipment electrically downstream of where they are installed. Most SPDs typically include LEDs on the front of the unit which provide some level of visual indication that inform the end user if the SPD is on line and providing protection. When the LED is on, the unit is functioning properly and providing protection. When the LED is extinguished, protection has been lost and the downstream equipment is not protected. Some SPDs are equipped with dry relay contacts that change state when the surge protection has been lost and can be used to remotely alert the end user of the SPD's failure. An even smaller amount of SPD manufacturers offer products that are equipped with remote communications capabilities, RS-485 ModBus or TCP/IP Ethernet, that provide the end user with a range of useful data to include the presence or loss of the surge protection device. So, there are several different ways surge manufacturers can inform the end user of the surge protection device status, ranging from localized LEDs to advanced remote communications. All of these monitoring options are designed to tell the end user when the device has failed.

WHEN DO SPDs FAIL?

Most SPDs fail when they are subjected to a large surge or Temporary Over Voltage event near their end of life. Once they are taken off line, the downstream equipment is left exposed and is unprotected from all power quality events until the SPD can be repaired or replaced. Repair or replacement time frames can range from several days to several months depending on the surge manufacturer. The entire time an SPD is out of service the vulnerable downstream equipment is left fully exposed. Additionally, most lightning strikes are not single strike events, but consist of several strikes. For a surge protection device that is about to fail, it would be possible for a multi-stroke lightning strike event to knock the SPD out of service while the remaining strokes of the same event are left to cause damage to the unprotected load.



CAN YOU PREDICT SPD END OF LIFE?

The best way to maintain optimum surge protection would be to accurately predict the SPD's end of life, allowing it to be repaired or replaced **before** it fails. This would ensure that the device was at its optimum surge protection level, before being exposed to a large power quality event when it is needed most. Some surge manufacturers incorporate a "modular" design that utilizes several surge modules per mode. These designs may have 2-3 modules per mode depending on the surge rating of the product. The claimed benefit of this design is that if one of the modules fails, a replacement module can be installed to bring it back up to full capacity. However, a problem arises in that the SPD is typically reduced by as much as 50% of its rated capacity during the time that one of the modules has failed, and that there is no way of knowing when one is about to fail.



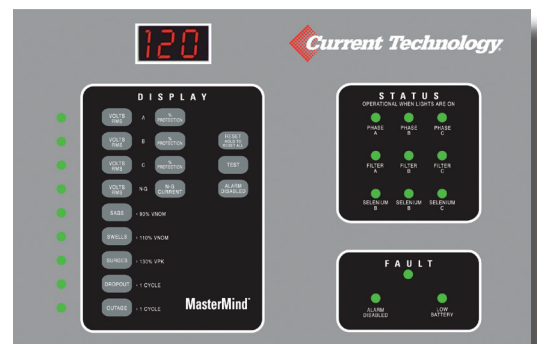
PREDICTABLE END OF LIFE SOLUTION

Current Technology offers several diagnostic tools that help with proactively testing an installed surge protection device. All Current Technology's product designs incorporate circuitry that includes individual fuses per MOV. The presence of the fuses is constantly monitored and can be tested to provide an end user with a percentage of protection remaining. *For example: The TG300 kA product utilizes 30 10kA MOVs per mode, and each MOV has a fuse in series. If a fuse opens, taking the MOV offline, the monitoring has the capability to show that the surge protection rating has dropped from 100% to 97%. If two of the MOVs are removed from the circuit then the percentage drops to 93%. Current Technology offers the following ways to obtain this information:*

INTEGRATED MONITORING

- *L3 MasterMIND® Diagnostic Monitoring* →

This package offers the end user a localized means of checking the percentage of protection on all three phases. In addition, the L3 monitor displays the RMS voltage per phase, as well as the number of sags, swells, surges, dropouts, and outages that the unit has been subjected to.



EXTERNAL MONITORING

- *MasterTEST® Hand-Held Tester* →

Current Technology also offers a hand held test set that can provide the percentage of protection remaining per phase, filtering, selenium (for Select2 units), as well as N-G voltage and current. This allows the end user to periodically check their surge protection devices, giving them the option of proactively replacing the surge component if the protection percentage level falls below a certain level of protection.



DIAGNOSTIC TOOLS

• DTS-2 Diagnostic Test Set

The DTS-2 test kit is a portable surge generator that sends a small surge through the SPD and displays the clamping level of the device. The DTS-2 tester is used here in the factory on every device manufactured. A test card is included with every unit so that the end user can see the clamping levels of the unit when it was manufactured. This same tester can be used on installed products, giving the end user the ability to compare factory clamping levels to the existing clamping levels of an SPD that has been in service. Following installation, an SPD is exposed to numerous power quality events during its service life that may degrade its performance. The DTS-2 tester allows the end user to verify if the clamping levels of the SPD are within the predefined factory acceptable voltage ranges. If the device is found to be outside of the acceptable ranges and is still within the warranty period of the product, then the surge component will be replaced at no charge to the end user.



DTS-2 SIGNATURE CARD												
Unit Model Number							Unit Serial Number					
DTS-2 Diagnostic Test Set Reading												
Date	Tested By	Phase to Neutral			Phase to Ground			Phase to Phase			Uninstalled	Test
		A-N	B-N	C-N	A-G	B-G	C-G	A-B	A-C	B-C	N-G	Polarity
												+
												-
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DTS-2 Test Card

Surge protection devices are a great way of eliminating unnecessary damages to an electrical distribution system that can be caused by the devastating effects of power quality events. However, if a surge protection device fails, the downstream equipment is exposed. The only way to guarantee 100% protection levels at all times is to accurately predict when a surge protection device is about to fail. Only Current Technology offers the products, monitoring options, and test sets that provide end users the ability to predict the near end of life of their SPDs. Contact your local Current Technology Representative for more information on Current Technology surge protection products.