

Benefits of retrofitting integrated surge

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What's the need for surge protection?

Electronic circuits control practically every system in a building. Damage to electronic circuits can occur from nearby lightning strikes or from switching disturbances within an electrical system, such as the starting of motors, switching on/off of lights and other internal high frequency electrical sources.

Below are examples of electronic equipment that your facility should be protecting with a SPD (surge protective device):

- Variable frequency drives
- PLCs
- AC motors
- Safety/alarm systems
- Production machinery

High-energy surges can damage sensitive micro-processor or microcontroller integrated circuits in these types of devices. Microprocessor or micro-controller failures can result from surge events depending on the sensitivity of the load.

Surge protection has become an essential piece of a buildings' infrastructure. It's a piece of equipment that does its job without too much fanfare. But when a surge or other potential electrical damaging event occurs, you will realize how important it is when it sacrifices itself to protect your expensive piece of machinery.

Traditional surge mounting: integrated vs. side mount

Surge protection devices integrated into panelboards and switchboards, rather than mounted to the side is the optimal solution for protecting loads within a facility.

Consultants in the electrical industry have long been recommending that surge protection devices be installed inside switchboards or panelboards.

A bus mounted SPD offers a number of key benefits compared to side-mounted applications:

- **Performance** – eliminating the wires leading to the integrated SPD's will significantly improve the let through voltage (lower VPR)
- **Reduced wall space** – integrating the SPD eliminates the wall space taken up by the externally mounted SPD (between 2 to 3 feet)

Lead length from the bus, inside a panelboard, to the side mounted SPD can add between 15 to 25 volts per inch of wiring. For example, a side mounted SPD with just 12 inches of #14 wire, will result in having approximately 200V added to the let through voltage. On a 120V system this could damage the most sensitive electronics.

If the opportunity presents itself, it is much better to install an integrated SPD than running extra wires to a side-mount unit. You will benefit from lower VPR numbers, lower installation costs, and faster install time using Eaton's new RSPF series surge protector.

New solution: RSPF

- **Benefits of integrated surge mounting**
 - Molded case surge device uses space more efficiently
 - Lowest VPR vs a wired side mount through the elimination of wire lead length
- **Reduced installation costs**
 - The bus mounted RSPF can be installed faster and easier than a side mounted SPD
 - Minimal amount of tools needed to install RSPF
- **Comply with new NEC code requirements** using a molded case surge protection such as Eaton's RSPF
 - NEC is now requiring surge protection in more places to protect critical loads. It requires a listed surge-protective device (SPD) to be installed in/on switchboards and panelboards that feed branch circuits to these types of systems:
 - Emergency systems: elevators, fire alarms, HVAC
 - Critical operations data systems:
 - Industrial machinery with safety interlock circuits



Powering Business Worldwide

- **UL Listed Product**
 - The UL listing label on the RSPF allows contractors and electricians to be able to install our molded case surge protection device without concern for deviating from the NEC or impacting the listing of the panelboard or switchboard
 - The UL Listed label assures our customers that they are receiving a surge protection device that passed stringent UL safety requirements and that it has been manufactured by a UL certified company



- The product identity is: "SURGE PROTECTIVE DEVICE" (or "SPD"). NO. XX000000 - sequential serial numbers assigned by UL
- The Listing Mark of UL requires the use of a holographic label.

Eaton continues to develop new and innovated ways to introduce surge protection devices into places that were overlooked during the initial commissioning of the electrical system. Now, using the new Eaton RSPF, facility managers can rectify these situations in their panelboards in switchboard and protect their electrical circuits from surge in a quick and easy manner.

Common terms associated with surge protection technical considerations

VPR (Voltage Protecting Rating)

- A common term for this is the "let through voltage"
- The combination waveform is the benchmark limiting voltage for determining the VPR of an SPD across all reputable manufacturers
- Customers must evaluate whether their systems can withstand the remaining let through voltage that their equipment will be exposed to

Nominal discharge current rating (I_n)

- The results of this test can be successfully used to compare the durability of one manufacturer's surge unit to another
- The I_n test acts as an accelerated life test by subjecting the SPD to repeated severe events. The higher the value the more durable the unit
- The I_n test is part of the UL1449 4th edition standard and you can be confident every manufacturer's surge unit was tested under the same conditions

Basic differences between I-nominal (I_n) and Short Circuit Current Rating (SCCR)

- I_n is a current pulse (8/20 μ s) that simulates the effects of a nearby lightning strike
- SCCR is the highest symmetrical fault current at the nominal voltage that equipment is rated to safely withstand

MCOV (Maximum Continuous Operating Voltage)

- This is the voltage at which the MOV inside the TMOV's start conducting current
- The MOV becomes a conductive component when the voltage across it exceeds a certain level known as the maximum continuous operating voltage (MCOV)
- Once the voltage exceeds the MCOV, the current is allowed to flow through the MOV, which then passes the surge to ground

By gaining familiarity with the terms used in discussing surge protection, the installer and end user can feel confident in the decision to purchase an aftermarket integrated SPD to protect downstream electrical equipment.

About Eaton

Eaton is a power management company with 2016 sales of \$19.7 billion. We provide energy-efficient solutions that help our customers effectively manage electrical, hydraulic and mechanical power more efficiently, safely and sustainably. Eaton is dedicated to improving the quality of life and the environment through the use of power management technologies and services. Eaton has approximately 96,000 employees and sells products to customers in more than 175 countries. For more information, visit Eaton.com.

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Printed in USA
Publication No. WP158002EN / GG
December 2017