Power surges take many forms — lightning, inductive-load switching, electrostatic discharge, and more. These unpredictable voltage transients can be catastrophic to today’s AV devices, which are highly vulnerable due to their internal microprocessing technology. This circuitry is incredibly sensitive and is not built to withstand sudden changes in current.

With hundreds and even thousands of dollars of AV equipment on the line, surge protection is a vital and foundational element in any installation. Surge protection solutions are available in a variety of designs with the two most popular in the AV industry being: metal-oxide varistors (MOV), also known as just varistors, and series style protection.

Understanding the differences between these technologies is important when making decisions about budget, system requirements, and potential for ongoing service needs.

That said, you can take precautionary measures such as installing an intelligent power distribution unit (PDU) on site in advance and studying the power behavior prior to install. With products like Middle Atlantic’s RackLink™ you can monitor mains voltage and equipment current draw for any anomalies in real time to help plan for the realities of your site.
MOVs are the more well-known and common defense against power anomalies. This style of protection works by slowing down wayward electricity through zinc-oxide balls that have been fused into a ceramic semiconductor. The crystalline microstructure — MOV — absorbs high voltage and diverts surge current away, ultimately sacrificing itself for the greater good of the components downstream.

The amount of energy each MOV can absorb is dependent on its size (thickness & diameter). You’ll notice that most devices contain multiple MOVs. The size and quantity in each design is determined by the environmental factors, applications and standards such as ANSI. Most solutions feature an indicator light when the MOV protection is no longer effective. This is where service becomes key as the system is no longer protected from spikes and surge activity. These units require replacement.

MOV protection is a tried-and-true design that has been in market for years. It’s important however, to understand the tolerances of the protection selected for your system. For highly sensitive AV equipment there is an improved non-sacrificial approach that responds more quickly to an event and provides Superior on-going protection.
UNDERSTANDING Series Protection

Alternatively, series mode protection is a more reliable and stronger option ideal for maximizing protection of expensive, sensitive AV components. Its internal circuitry leverages a large, high-current inductor that is followed by an energy-absorbing circuit that’s generally comprised of a bridge rectifier and capacitors. The series inductor slows the incoming current spike, which in turn spreads out the peak surge energy in the time domain and allows the surge to be harmlessly absorbed by the capacitors. With this design, series mode protection eliminates sacrificial design challenges that make MOV solutions a short-term option.

The anatomy of series mode protection include the component parts of inductors and capacitors, however, there are unique circuit designs in market that are not created equally. In certain series protection designs, the surge detection can come too late, allowing harmful surge energy to progress unimpeded through the device before the capacitor bank is “switched” into the circuit diverting the excess energy. The result? There is a millisecond of impact that can damage or destroy equipment.

In addition, some designs incorporate a capacitor bank that is always in circuit. In time, these capacitors will degrade. They are also susceptible to sustained over-voltage failure which causes a long term reliability problem.

RIGHT-SIZING YOUR PROTECTION

If budget allows, Series Protection is the industry’s best form of surge protection that will ensure the longevity of your system but we know that’s not always the case. You have to decide where to allocate your client’s budget where it matters most. Consider this list of recommended devices [based on known power sensitivity] for Series Mode Protection vs. MOV protection.

**BEST PAIRED WITH SERIES MODE PROTECTION**
- Control system processors and sub processors
- Audio video receivers (AVR)
- Digital signal processors (DSP)
- Matrix switchers
- Network routers
- Network switches (with and without PoE)
- NVR or media servers

**ACCEPTABLE FOR MOV PROTECTION**
- Blu-ray/DVD
- Cable box
- DVR
- Satellite box
Normal Power Circulation

Power Circulation in a Surge Event

1. Surge is detected before reaching the inductor – unique to Middle Atlantic
2. Inductor slows down the surge event and begins to regulate the wave form
3. Surge is absorbed and eliminated – dissipating as heat
4. Power filtering
5. Power Distribution back at 120V to input devices at the normal 120V
Did you know that one of the primary causes of power supply failure is actually UNDER VOLTAGE? Believe it or not, few power products properly protect against this dangerous power anomaly. Learn more about the damaging effects of under voltage and solutions to protect your system at middleatlantic.com.

1: Middle Atlantic’s Series Protection detects a surge event prior to the event moving all the way through the inductor. With a sensor placed before the series inductor, the system can detect, react and eliminate the surge energy at a near instantaneous rate of speed. As a result, there’s a faster response and events don’t reach a threshold where equipment can be damaged, like in a traditional series mode product. This also protects the unit, unlike the sacrificial design of MOV surge protection and other series mode units that have to be replaced frequently.

2: To ensure the highest possible reliability, Middle Atlantic’s Series Protection disconnects the capacitor bank from the circuit under normal voltage conditions and connects it at the moment a surge event is detected. This keeps the capacitor at near zero volts, ensuring a lower temperature, a longer life, and ultimately preventing leakage current from damaging the capacitor. It’s the only patented series mode protection solution that takes a systems approach to protecting sensitive AV systems while also preserving your investment in power protection.

<table>
<thead>
<tr>
<th>PRODUCT CATEGORY</th>
<th>PART #</th>
<th>FORM FACTOR</th>
<th>AMPERAGE</th>
<th>OUTLETS</th>
<th>TYPICAL APPLICATIONS</th>
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<tbody>
<tr>
<td>Basic Power Distribution</td>
<td>PD-95SR-SP</td>
<td>Horizontal</td>
<td>15A</td>
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<td>In-rack installations</td>
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<td>PD-920R-SP</td>
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<td>Digital Signage, Kiosks, Carts/Stands</td>
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<td>Digital Signage, Kiosks, Carts/Stands requiring power data monitoring and control</td>
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<td>Modules for vertical MPR raceway (field configurable; designed for in-rack installs) requiring remote or local control via dry contact</td>
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SO MUCH
Over-Voltage Talk...

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