

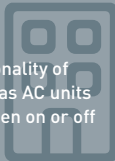
POWERING AV EDUCATION

COMMON CAUSES OF SURGE & SPIKE EVENTS

Building design & environmental factors affecting power are as unique as our AV system designs- there is no one culprit. Here are some of the more common examples as captured by our very own Tech Support team at Middle Atlantic:

INTERNAL CAUSES

- Undersized Power Supply: Seasonality of large power-drawing units such as AC units can cause variance in voltage when on or off depending on the site conditions
- Machinery or large power supply failure on-site at large industrial or manufacturing facilities operating large machinery
- Bad Transformers- either in line or at a transfer station



EXTERNAL CAUSES

- Lightning: - in the U.S., Central Florida is at the highest risk for lightning strikes. For the latest in strikes or to pull a specific region, check out <http://www.lightningmaps.org>
- Damage to telephone poles: Could be related to lightning, fallen trees, an automobile accident, etc.



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.



SURGE PROTECTION: Is Your AV System Truly Protected?

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.

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

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.



MOV TRUTHS

MOV-enabled surge protectors come in a variety of form factors and tolerances, which should be carefully selected. It's not a one-size-fits-all approach. For more advanced and expensive AV equipment, they are not the best choice for a number of reasons:

1. **Their lifespan is dependent on the design & environmental factors.**

Because of their sacrificial design, MOVs can degrade or fail due to voltage swells/sags or small surge events over a period of time or they can be completely wiped out with a single big event.

2. **Reliability decreases over time.**

Each jolt—big & small—reduces MOVs max capacity causing them to become less and less reliable over time. Look for multi-stage units with indicator lights as these can give you and/or end users a clear indication when the first line of MOV defense is down - giving ample notice to replace the unit.

3. **Quality is not guaranteed.**

There isn't a standards body overseeing MOV specifications and they are typically a sourced, commoditized component to a design. To combat this, manufacturers should have rigid sourcing requirements to select quality component parts & perform in-house testing to ensure performance to spec.



MOVs come in a variety of shapes and sizes.

UNDERSTANDING MOV Protection

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

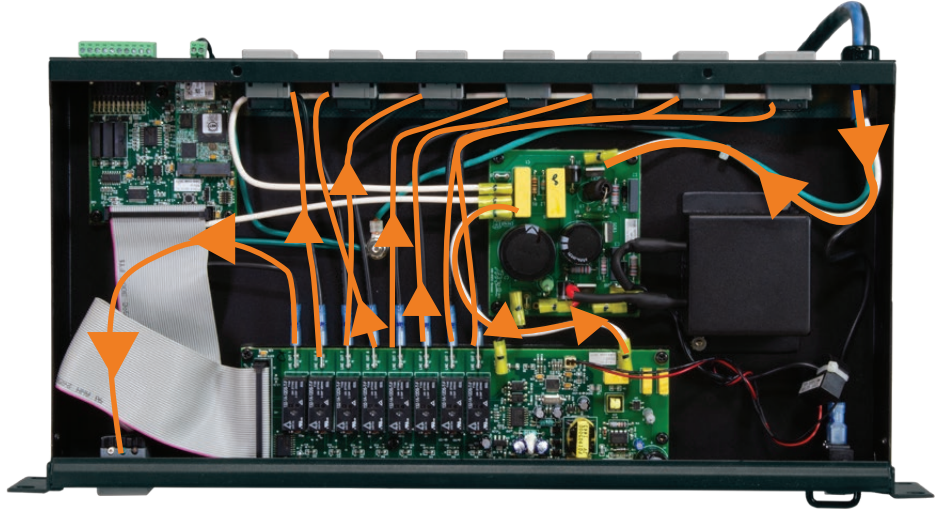
ACCEPTABLE FOR MOV PROTECTION

- Blu-ray/DVD
- Cable box
- DVR
- Satellite box



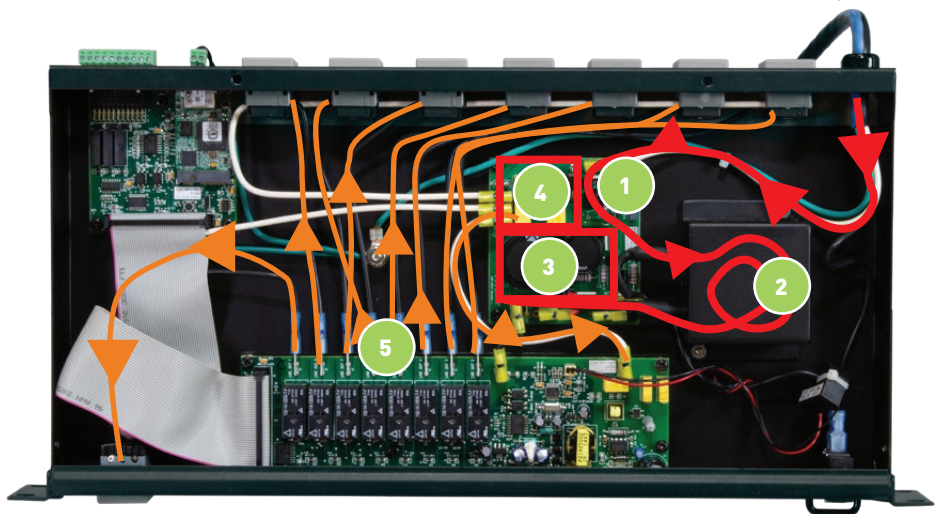
PATENTED CIRCUIT Design

Normal Power Circulation



Power Circulation in a Surge Event

Surge Enters 



- 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 - in
- 4 Power filtering
- 5 Power Distribution back at 120V to input devices at the normal 120V

If not replaced, capacitors can become leaky, or in some cases, fail completely. This is a well-known problem in the audio world, and audiophiles will “re-cap” their amps after a period of time. However, as part of the core for ensuring systems dependability, this is an expensive and inconvenient long-term solution.

Look for solutions that leverage Series Protection to its maximum capabilities, which has been engineered as the best way to manage energy. Middle Atlantic Products invested years of time and resources in its engineering and R&D teams. They went deep into the science of energy and series mode protection to discover ways it could provide a more reliable and enduring solution. The result is Series Protection, the industry’s fastest responding, long-lasting patented surge protection technology that benefits all AV components. Series Protection is designed to deliver superior series mode protection through two unique capabilities.

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 a surge event takes place. 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.**

| PRODUCT CATEGORY | PART # | FORM FACTOR | AMPERAGE | OUTLETS | TYPICAL APPLICATIONS |
|--------------------------------|----------------|-------------|----------|-----------|---|
| Basic Power Distribution | PD-915R-SP | Horizontal | 15A | 9 | In-rack installations |
| | PD-920R-SP | Horizontal | 20A | 9 | |
| | PD-28-SP | Compact | 15A | 2 | Digital Signage, Kiosks, Carts/Stands |
| | PD-415R-SP | Compact | 15A | 4 | |
| | PD-420R-SP | Compact | 20A | 4 | |
| | PD-HW15-SP | Compact | 15A | Hardwired | |
| Intelligent Power Distribution | RLNK-P915R-SP | Horizontal | 15A | 9 | AVaaS, AV Applications requiring energy management and/or system health monitoring |
| | RLNK-P920R-SP | Horizontal | 20A | 9 | |
| | RLNK-SW820R-SP | Horizontal | 20A | 8 | In-rack installations requiring power data monitoring and control |
| | RLNK-SW815R-SP | Horizontal | 15A | 8 | |
| | RLNK-SW415R-SP | Compact | 15A | 4 | |
| Modular Power Distribution | RLM-15A-SP | Modular | 15A | 2 | Modules for vertical MPR raceway (field configurable; designd for in-rack installs) requiring remote or local control via dry contact |
| | RLM-20A-SP | Modular | 20A | 2 | |
| | M-15A-SP | Modular | 15A | 2 | |
| | M-20A-SP | Modular | 20A | 2 | |

SO MUCH Over-Voltage Talk...

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.





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