



A CSW Industrials Company

## RSH™ Series Residential HVAC Surge Protection - Best Practices

### Application Considerations

The general rule for surge protection is to install the surge protector as close as possible to the equipment being protected. Surges and power disturbances can get on any metallic conductor and travel either direction, so you want to limit the distance between the surge protector and the connected equipment. An example of this would be using a whole-house surge protector installed at the circuit breaker panel to protect the AC system outside the home. External, damaging, and frequent power disturbances like proximity lightning strikes cannot be prevented by a surge protector installed inside the home.

Additionally, in some large homes, the circuit breaker panel could be more than 100 feet from the AC system increasing the risk of surges getting on electrical lines exiting the home and feeding outdoor equipment or equipment spaced further away in the home.



### Application and Installation Opportunities

#### AC Disconnect Protection:

An unprotected AC system presents many risks, including system downtime, loss of investment, and other unexpected, additional costs. Installing a surge protector at the AC disconnect will minimize this risk by protecting expensive and sensitive electronic parts, including capacitors, contractors, relays, motors, and circuit boards. Most critically, ECM motors and inverter boards are extremely susceptible to power fluctuations and disturbances – events which a surge protector is designed to eliminate. Be sure you are using a Type 1 rated surge protector, which, by code, allows you to install the device anywhere in the electrical system, including inside the condenser outdoors.

#### Furnace/Air-handler Protection:

The sensitive control boards and circuit boards inside an air handler or furnace are susceptible to surges, noise, and other power disturbances. The distance rule applies here to provide the most effective protection and install the surge protector as close as possible to the connected equipment. The ON/OFF switch or the junction box is the ideal place for this installation.



RectorSeal has an excellent source of surge protection and HVAC training courses at [rectorseal.com/academy](http://rectorseal.com/academy)

Access free and unlimited expert-led courses anytime on your own schedule and desired platform. Additionally, users receive customized course recommendations and a certificate of completion for each finished course.



### Whole-House Equipment Protection:

Individual plug-in suppressors cannot protect electronics that are not plugged in but are hard-wired instead. Many expensive electrical devices, including major appliances like stoves, washers, and dishwashers, as well as garage door openers, are hard-wired directly into your home's electrical circuits. Security systems, sprinkler systems, and exterior lighting are hard-wired too. Only a whole-house suppressor which protects all circuits from exterior-originating surges protects these expensive appliances.

### Safety – UL 1449 4<sup>th</sup> Edition Certification

The surge protector should be tested to and comply with UL 1449 4th Edition standards and display the UL 1449 logo. As a generalization, UL addresses electrical product safety in areas that involve a risk of fire, electric shock, or injury to persons. UL verifies the safe operation of SPDs through a listing or component recognition process, including a series of stringent destructive and non-destructive tests. These ensure safe operation during normal operation and at the unit's end of life. End-of-life characteristics are essential because SPDs are placed in harm's way and can affect the rest of the electrical distribution system. Areas of interest include fault current testing, thermal issues, touch safety, etc.



### Performance – Energy Handling Characteristics

- Maximum surge current rating (UL I<sub>max</sub>): the surge protector should be able to withstand a single hit of at least 50,000 amps of surge current and continue to operate as designed.
- Nominal discharge current rating (UL I<sub>n</sub>): the surge protector should be able to withstand 15 repetitive hits of a minimum of 10,000 to 20,000 amps of surge current and continue to operate as designed.
- Short Circuit Current Rating (UL SCCR): the surge protector should withstand the 200,000-amp short circuit current test without causing a shock or fire hazard.
- Voltage Protection Rating (UL VPR): the surge protector should let through no more than 700V-800V to the connected equipment after the surge protector has reacted.
- UL Type: the surge protector should be rated Type 1 by UL, allowing it to be installed on the line-side and the load-side of the equipment. Type 1 devices are dual-rated for Type 2 applications and provide the highest ratings available for installation at the service entrance. Type 1 devices are also allowable by code to be installed inside the condenser outdoors.

### Diagnostic Indicators – Visual and Audible

The surge protectors should have some type of diagnostic circuit indicating their operational status. Typically, a green LED is used and will illuminate when the unit is first installed and will stay illuminated while the unit is operational and protecting. However, if the surge protector sacrifices itself or fails, the green LED will extinguish, indicating the unit is no longer operational and needs to be replaced.

Since surge protectors are typically installed parallel to the circuit, a failed surge protector will not cut off power to the connected equipment. Therefore, making it necessary to check the green LED status as part of the maintenance routine to determine if you are still protected. If checking the diagnostic light is not practical, or the surge protector is installed in a location with minimal accessibility, it is recommended to install a surge protector with an audible alarm to provide audible notification of a compromised surge protection device.

### Additional Design Considerations

The surge protector should be filled with a potting compound providing a high level of containment from catastrophic surge energy, ensuring the device is watertight and weather resistant, preventing moisture from compromising the electrical circuit.

### Grounding Practices

The surge protector's ground circuit and ground wire are used to remove harmful power disturbances from the electrical system before they reach the connected equipment. The lower the resistance on the homeowner/business owner's ground, the easier this unwanted energy will flow out of the system. Articles 100 and 250 of the NATIONAL ELECTRIC CODE (NEC) describe an acceptable ground as being rated at 25 ohms of resistance or less. The optimum performance of surge protectors is achieved at 5 ohms or below.



## Warranties – Product and Connected Equipment

The surge protector's Product Replacement Warranty should be a limited lifetime warranty and should state, "The manufacturer will, at its sole discretion, repair or replace any Surge Protective Device (SPD) that is defective or is damaged by an electrical surge (including those caused by lightning) for the lifetime of the product from the date of installation by the original owner or owner of record of premises at no cost to the owner.

The surge protector's connected equipment warranty should be for a minimum period of 5-years and a minimum dollar amount of \$5,000. In addition, the warranty should state, "Manufacturer will repair or replace (whichever is less) heating, ventilation and air conditioning equipment that is damaged by a surge event. However, coverage is applicable only if the SPD (1) was fully functional immediately before the claim event, and properly installed per the installation instructions (2) sustained surge damage as a result of the claim event". Additional terms and conditions may also be stated. Registration should not be required to activate warranty programs.

For more info on the RSH series, visit [rectorseal.com/surgeprotection](http://rectorseal.com/surgeprotection).



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RectorSeal 2601 Spenwick Drive - Houston, TX 77055 800-231-3345 [rectorseal.com](http://rectorseal.com) A CSW Industrials Company

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