



Meter-Treater, Inc.

Quality Surge Protection Devices Since 1986

The Joule Trap: Why Surge Protector Energy Ratings are Pure Marketing

"The amount is entirely dependent on the system impedance, which is different for every installation."

When you're comparing surge protection devices, the **joule rating** is sometimes one of the first numbers on product packaging. Higher joules may look like better protection, but a joule rating isn't a performance test, and it shouldn't carry that much weight on its own. The joule rating is typically advertised as the ability of a product to channel a certain amount of energy stored in a test generator. This energy is deposited in every conductive path in the product, including the MOVs. There is no independent joule test standard; UL doesn't certify joule ratings because testing is unreliable and too dependent on the surrounding system to standardize. **Only individual internal components, like MOVs, can be reasonably tested for joules.**

All joule numbers are marketing driven, and actual product performance will vary greatly depending on the system impedance, source impedance, frequency, duration and amplitude. For example:



RCHW100/120-SP-0-1

2ms	8x20µs
Per Phase	Per Phase
720j	2,500j
1440j – to – 5000j total unit	

Filter capacitors divert a small additional amount of energy away from the device being protected, but the amount is entirely dependent on the system impedance, which is different for

every installation. A joule number calculated under one set of lab conditions won't predict performance under another.

Some of the generator-stored energy is deposited as heat in wiring, board traces, and ancillary circuit paths (filters, LEDs, etc.). That is why a power strip SPD with a long cord will tend to have a higher joule rating when compared to a direct plug-in device. The manufacturer advertises a joule rating, **but it is not independently verified**. The 2ms figure may not be measured on the finished unit: manufacturers may simply multiply the joule rating of a single MOV by the number of MOVs installed. The 8x20µs numbers are closer to an actual test, but are based on empirically driven mathematical predictions that apply only to Meter-Treater's high energy test generator and isn't comparable across manufacturers. Neither number tells you how the device will perform once it's wired into a customer's panel.

What actually predicts performance?

Since joules aren't a reliable comparison point, here's what is worth asking about instead:

- **Voltage Protection Rating (VPR)** or the peak voltage that gets through the protected equipment. It is calculated under a specific test surge. Lower is better, with no real downside to going as low as the device allows.
- **UL 1449 Type rating** confirms that the device meets a recognized, independently tested safety and performance standard for the location it is supposed to go.
- **MCOV (Maximum Continuous Operating Voltage)** confirms the device is rated for the system voltage it's protecting, with enough headroom to avoid tripping on everyday voltage swings.

These are independently tested and consistent across manufacturers, which makes them more useful for actual comparisons. Joules aren't.

Joules make for a good headline. Any manufacturer can publish an impressive joule number; there's nothing stopping them from calculating it favorably. VPR is harder to dress up. Pair joule rating with VPR, a UL 1449 Type rating, and MCOV, and you've got something you can actually compare device to device.