

# Questions and Answers for Uni-Directional Relays

## 1) Can uni-directional solid state relays be used in lieu of mechanical relays?

The short answer is “it depends.” Instead of a moving, arc’ing, mechanical connection, POWER-GATE solid state uni-directional relays use semiconductors called MOSFETS to silently conduct current. MOSFET’s have a “body diode” layer that can conduct current through the MOSFET, even if the MOSFET is not technically “on.” This can cause the MOSFET’s to overheat and fail under some conditions, which is why the direction of current flow is critical. A POWER-GATE uni-directional relay is designed to sit between and source of voltage/current, and a load....full stop. If there’s a circumstance where voltage on the output can exceed voltage on the input, the MOSFET’s might be compromised and a uni-directional configuration is not suitable; rather a bi-directional device.

## 2) Why are solid state relay more desirable than mechanical relays?

Most subscribe to the concept that a device with no moving parts will last longer than a device with moving parts. When switching current under load, contact degradation takes place due to the electrical arc generated when the contact surfaces make and break. Over time, contact surface pitting occurs and what started as a clean and efficient surface for transferring power degrades to a pitted, rough, high-resistance connection yielding significant enough heat to eventually kill the mechanical relay.

Solid state relays have no moving parts, and no contact surface area to degrade. This means far greater longevity and consistent performance over millions of cycles. SSR’s require dramatically less current to “turn-on” versus their mechanical counterparts. Solid state relays require the use of a printed circuit board and the high current devices we manufacture require a large grid of MOSFET’s to achieve peak performance. As such solid state relays tend to cost more than mechanical relays, but they offer a level performance, reliability, efficiency, and customization not found in mechanical relays.

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