Why Use Solid State Relays?

As the name indicates, a solid state relay is an electrical switch comprising solid state or electronic components. Owing to their nature, solid state relays contain no moving parts. Because no mechanical contacts are opened or closed within the relay, there is no arcing or pitting of contact surfaces, thus no wear-out mechanism. As aresult, solid state relays can operate for many millions of turn on/turn off cycles with no deterioration in performance. In addition, with no mechanical movement inside, accoustical noise is eliminated. A big advantage in power cabinets that can contain dozens of relays.

AC output solid state relays are used to control the flow of electrical energy in alternating current power systems. The control (equivalent to electro-mechanical relay coil) voltages can be either AC or DC. The majority of solid state relays require much less power than electromechanical types to turn them on and are easily interfaced to PLCs. For example, solid state relays can be constructed to turn on with a control current as low as 1 milliAmp, although 5 to 15 milliAmps is more typical for most standard types, at control voltages as low as 3 Vdc.

Another advantage of having no moving parts: solid state relays offer avery fast response time with absolutely no contact bounce. For instantaneous turn-on types, the time between applying a command signal to the control circuit and the output circuit turning on is typically 20 microseconds, although usually this time is specified at 100 microseconds. Alternatively, because of the nature of the electronic control circuitry, it is possible to delay the turn-on of a solid state relay until the next voltage zero of the AC supply.

This enables AC output solid state relays with two types of turn-on response: instantaneous (also known as phase control or random turn-on) and zero cross (where the solid state relay will turn on at, or close to, AC supply voltage zero).

All AC output solid state relays – which use Silicon Controlled Rectifiers (SCRs) or triacs as the output switch – will turn off at the next current zero, after the removal of the control signal. The relay may conduct for an additional half cycle of the AC supply frequency if the control signal is removed within 200 microseconds of the next current zero.

Because of the response time of solid state relays, power to a load can be applied and removed very precisely.

This is especially important when applications involve the switching of highly capacitive loads, and a major advantage over electromechanical switching.

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