

FAQs

# Understanding Solid-State Relays and their Full Potential

## How does a solid-state relay work and what is it used for?

A solid-state relay (SSR) is an electronically controlled switch used to switch a load on and off. The output circuitry is optically isolated from the input circuitry and there are no moving parts in the device. This enables the relay to switch machines, heating elements, and other devices much faster and quieter than an electromechanical relay or contactor.

## What are some applications SSRs are used in?

These relays are used in such a wide variety of applications that it's difficult to suggest what might be most common. In addition to common electronic applications, they are also used for industrial applications such as HVAC, plastic machinery, food and beverage equipment, packaging and sealing machinery, and dispensing equipment, as well as pumps and other motors.

## What are some of the switching functions available from SSRs?

There are six primary switching functions of SSRs that can be used for a wide variety of loads: Zero Switching, Analog Switching, Analog Full Cycle Switching, Instant-On Switching, Peak Switching, and DC Switching. Each type has its benefits for switching respective loads (see figure).

## How do you go about selecting a solid-state relay for your application?

To properly select a solid-state relay, you need to answer a few basic questions:

- A. What type of load do you have? Is it powered by AC or DC voltage? If AC voltage, is it a single-phase or three-phase load? What is the maximum amperage it will draw? What is the voltage it requires? Once you know the answers to these questions, it is simple to determine the ideal SSR output type for your application requirements.
- B. An input voltage will turn the SSR on or off, will that voltage be an AC or DC voltage signal? Or do you want to proportionally control the SSR with 4-20mA, 0-5VDC or 0-10VDC? Once you know the answers to these questions, you can determine the type of input that will control the SSR.
- C. What is the ambient temperature where the SSR will be mounted? You'll need to know this to properly select a heat sink, which will assist in dissipating the heat created by the SSR away from the device.
- D. What if you don't want to go through the effort of sizing a heat sink and mounting an SSR to it? Good news: Some of the leading SSR manufacturers on the market now offer an out-of-the-box solution, an SSR mounted on an integrated heat sink.

## Are SSRs capable of doing more than simply turning loads on and off?

Yes, innovative and market-leading solid-state relay manufacturers offer optional system monitoring functionality that is capable of detecting several conditions. Some common fault conditions include load voltage loss, load loss, partial load(s) failure, and open SSR output or internal SSR faults. Indication of these



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conditions is achieved with diagnostic LED(s), and in some cases with an alarm transistor output for remote signaling. SSRs with integrated monitoring reduce the number of components that otherwise would have to be used. Therefore they offer panel space savings while simplifying wiring and reducing efforts in troubleshooting, all of which increase machine uptime while minimizing downtime.

## So, can SSRs also provide a systems approach and real-time monitoring through communications protocols?

Absolutely. When a precise measurement of line voltage, load current, or power consumption is needed, customers can either use simple SSRs and external power monitors or they can use SSRs with integrated real-time monitoring and a communications interface. A typical system would be comprised of a master controller that is responsible for communication with external PLC via Modbus, Profinet, Ethernet/IP, or other communications protocol, along with several networked slave SSRs that perform the loading switching and provide the aforementioned measurements.

## What if I need additional information or suggestions for using SSRs in my application?

The simple answer is to get quality help from a manufacturer who has the long-term experience and expertise in designing and manufacturing solid-state relays. Companies such as Carlo Gavazzi have been working in electronics and automation for a long time and have product literature and selector guides on their website that can help engineers select the right product. Furthermore, they are staffed with experienced personnel who are able to assist customers by phone, e-mail, Skype, or in person.

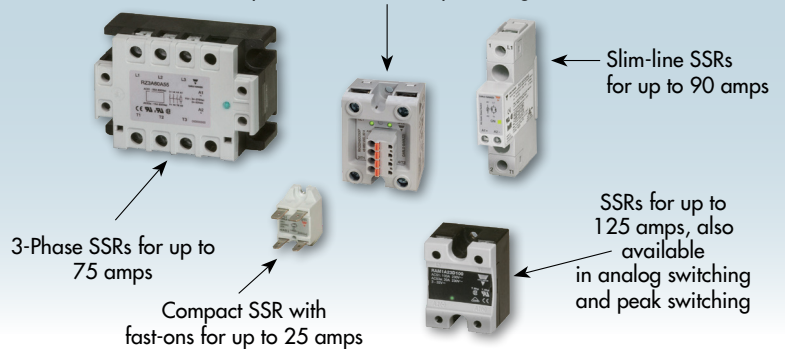
# Solid State Relays and Contactors



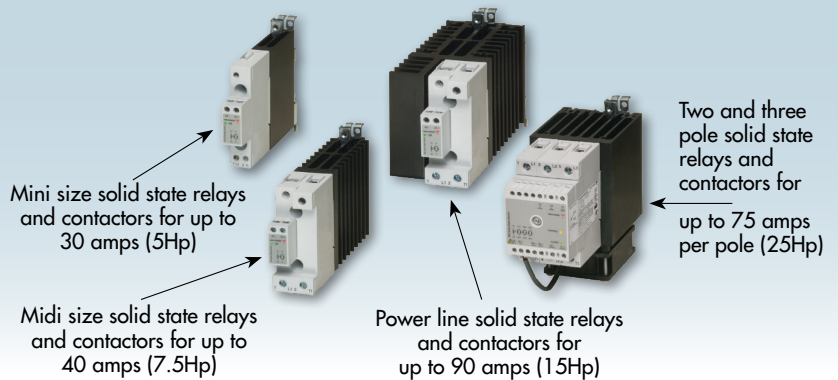
Carlo Gavazzi is one of the fastest growing solid state relay and contactor manufacturers worldwide. One of the key reasons is our comprehensive range of products, which provide unparalleled solutions.

## Chassis Mount Solid State Relays

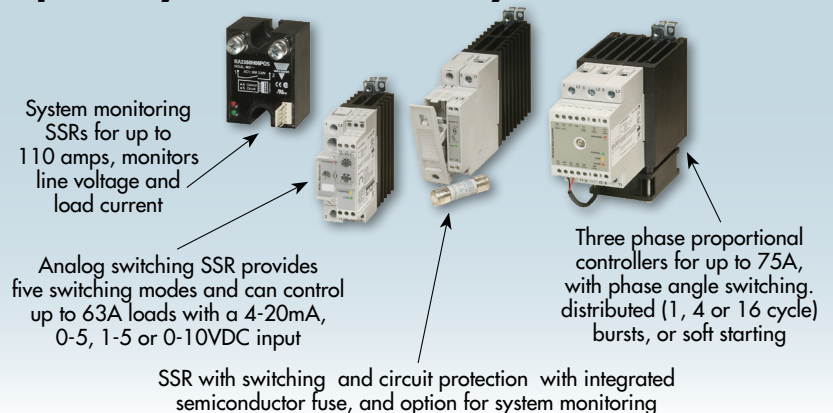
Two Pole SSRs for up to 75 amps per pole with separate or common input voltage



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