

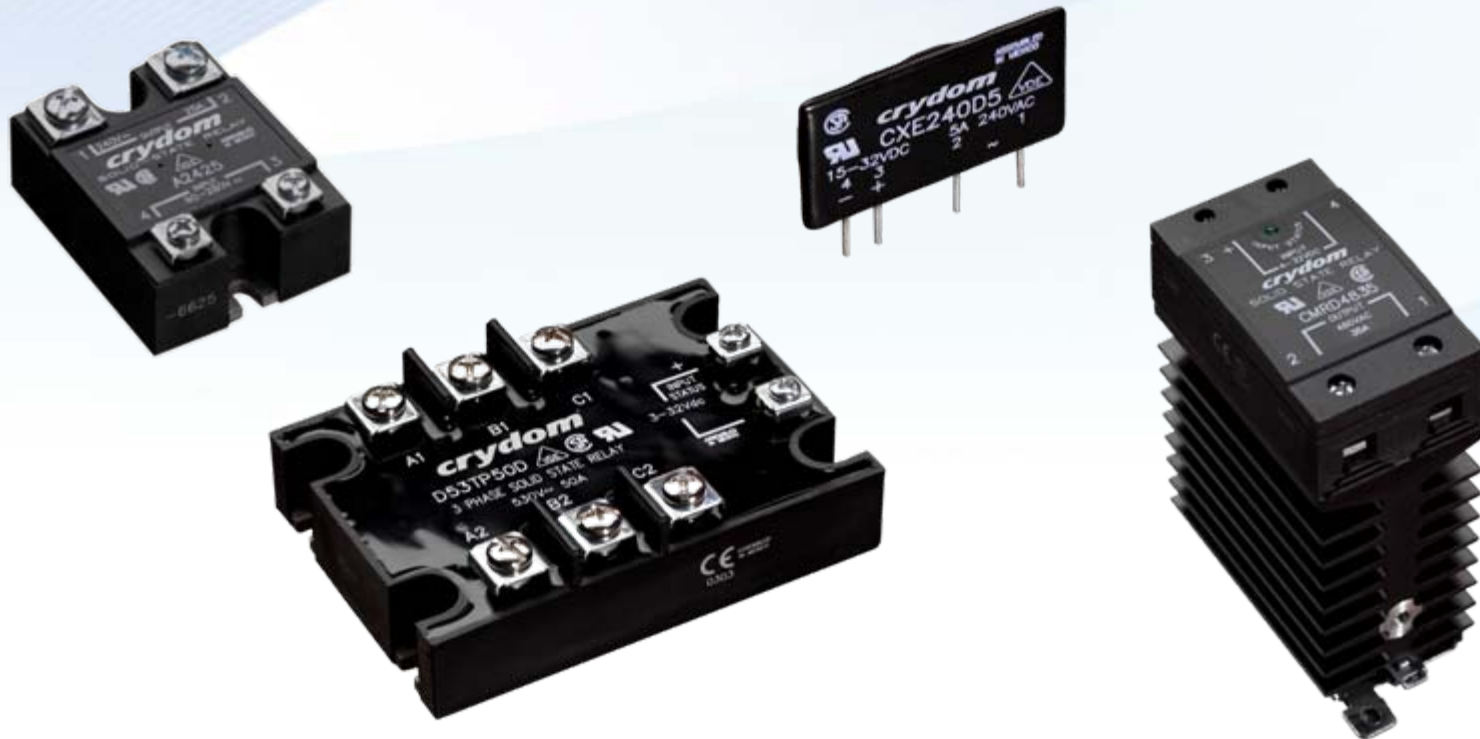


What is an SSR?



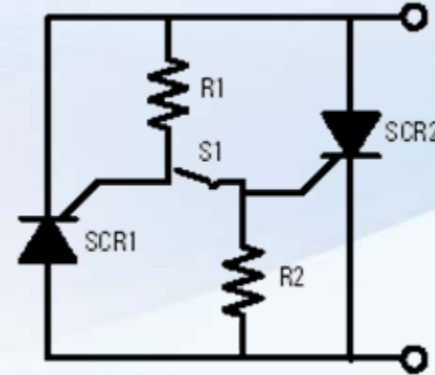
What is a Solid State Relay?

- An electronic switch made up of solid state components.
- No mechanical contacts or moving parts.



Basic Switching Element of the SSR

The SSR is powered by the AC Line itself, by connecting the 2 gates of the output SCR's through a controlled switch.



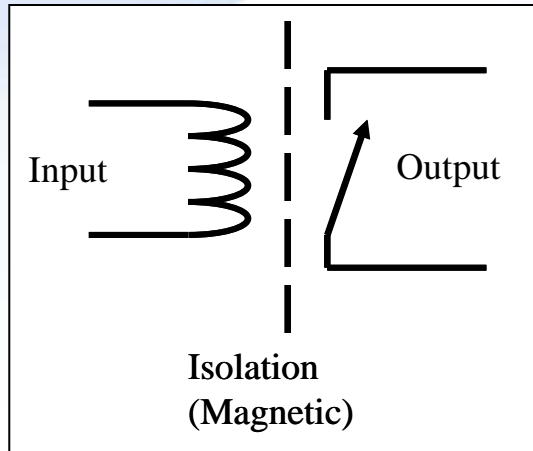
When S1 is closed, current from the AC supply flows into the gate of the forward biased SCR triggering it into conduction.

As long as S1 is closed, this action continues, reversing every half cycle of the AC supply.

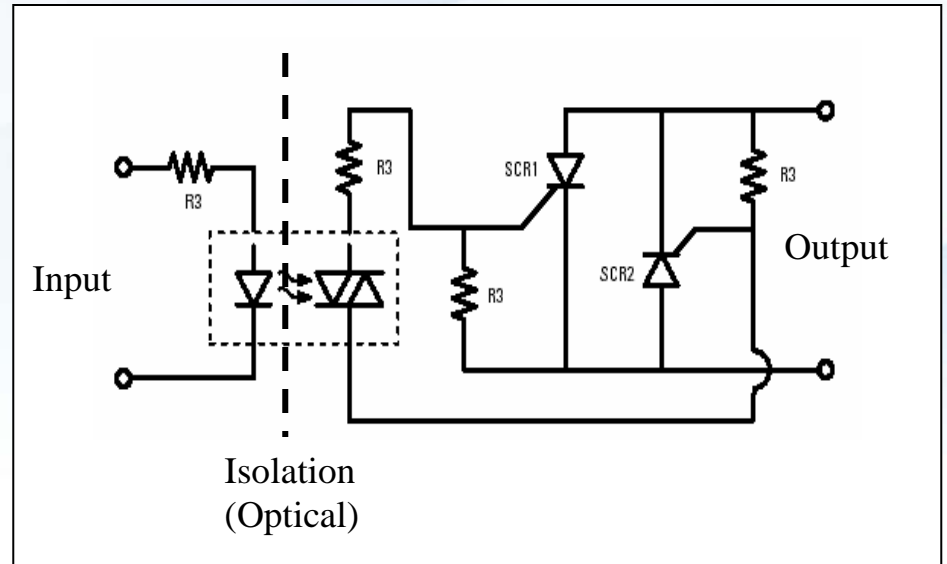
When S1 is opened, the SCR presently in conduction will continue to conduct until the zero current point is reached at which time the SSR will be off.

Electro-Mechanical Relays vs. Solid State Relays

Form, Fit, and Function Comparison...



EMR



SSR

Advantages of SSR's over EMR's

- ▶ Unlimited Life when properly selected and applied
- ▶ No moving contacts to burn, stick, arc, or bounce
- ▶ Very low input current required
- ▶ Very fast response time
- ▶ Ability to switch at AC zero-cross point or randomly
- ▶ Inherent characteristic of turn-off at zero current point
- ▶ No audible noise
- ▶ High surge current capability for severe inrush loads
 - ▶ Capability to >1500 Apk for 1 cycle.

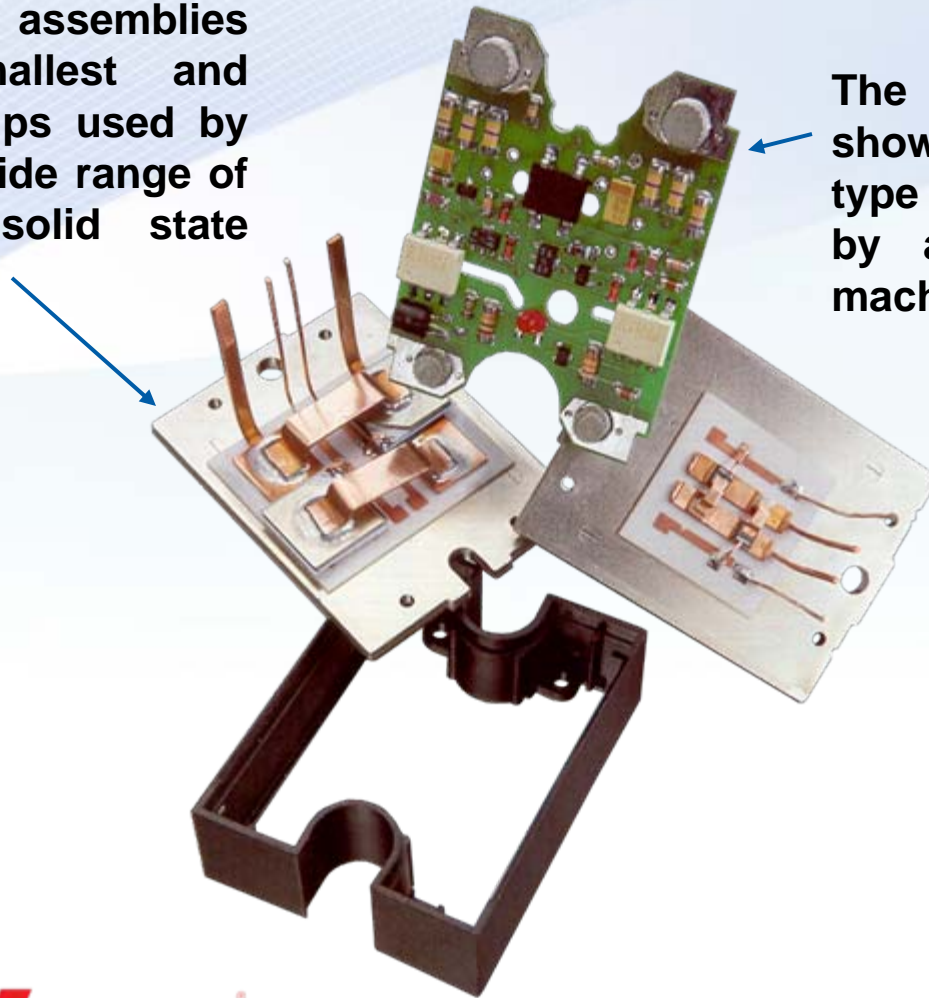
Considerations for SSR Use

- ▶ The V_f drop of the switching silicon will produce internal heating that must be considered in the system design.
- ▶ Off-state leakage. In contrast to EMR's, there is a leakage current through the output in the off state of typically 100 microamps to several milliamps depending upon the specific model.

SSR Construction

The two back-to-back, high voltage, SCR assemblies show the smallest and largest SCR chips used by Crydom in its wide range of panel mount solid state relays

The printed circuit board shown is a complete 1200 V type which was assembled by an automated robotic machine



- • **Triac**
 - –Single silicon chip device. Switches both polarities of the AC line. Economical, but consideration needs to be given to inductive loads that might produce self-commutating effects. (dv/dt)
- **Dual SCR's**
 - –2 physically separate silicon devices connected in an inverse parallel configuration. Much better dv/dt ratings than the Triac.
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➤ Bi-polar Transistor

- Economical, but drawbacks include relatively slow turn-off and high power dissipation.

➤ MOSFET

- With very low R_{ds-on} values available, (vs. the constant V_f of Bi-polar devices), less internal heating is produced.
- MOSFET based SSR's can be easily paralleled for very large current loads.