

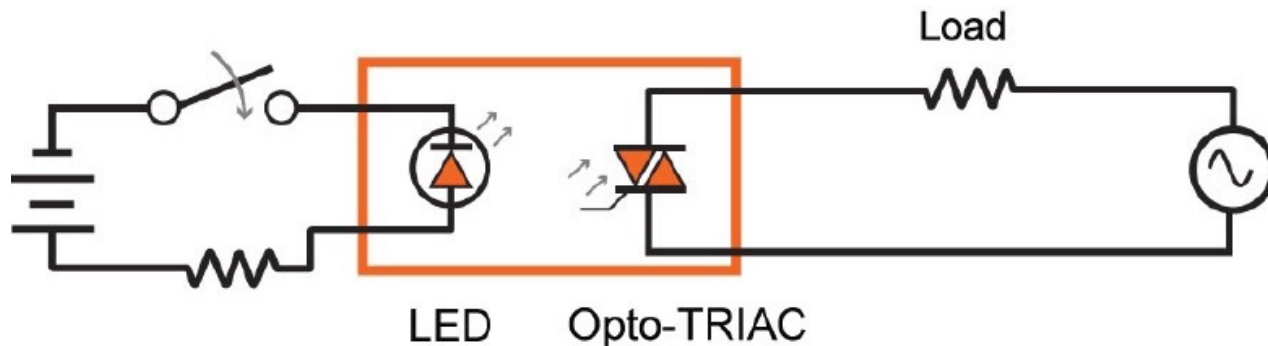


# Solid State Relay Overview

# Solid State Relay Definition

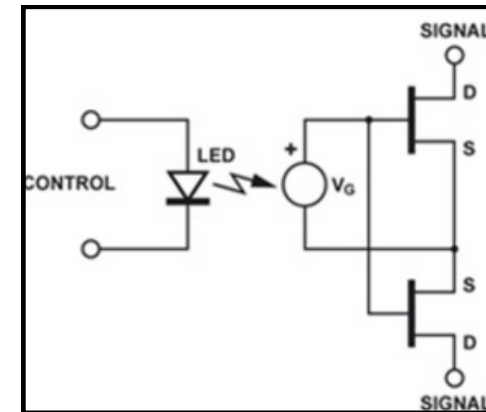
A solid-state relay (SSR) is an electronic switching device, that switches on or off when a small external voltage is applied across its control terminals.

It is very similar to an EMR, electromechanical relay, but with no moving parts.



# Solid State Relay Components

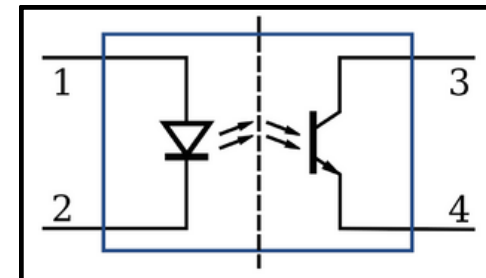
Component	Function
Sensor	Responds to input control signal
Optocoupler	Activates the Relay, contains a photo-sensitive device as well as an LED
Solid-state switching device	Switches power to the load circuitry



Definition:

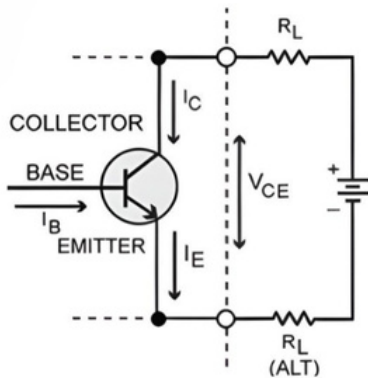
## Opto-coupling:

Transfer of electrical signals between two isolated circuits using light, while preventing effects of high voltage



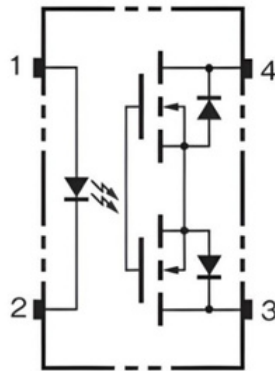
# Types of SSRs

SSRs may use BJTs, MOS transistors, silicon-controlled rectifiers, or TRIACs for the switching device paired with the opto-coupler.



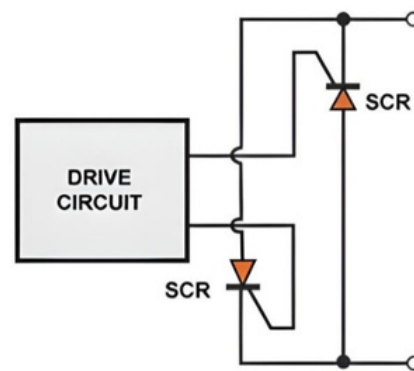
## BJT SSR

(Bipolar Junction Transistor)



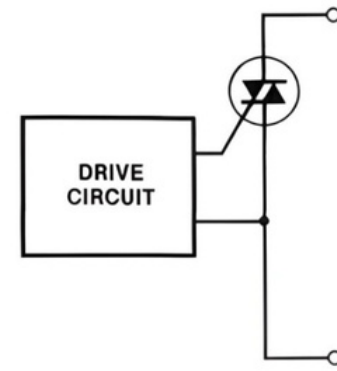
## MO SSR

(MOSFET Transistor)



## SCR SSR

(Silicon Controlled Rectifiers)



## TRIAC SSR

(Triode for Alternating Current)

# Parameters of an SSR

When choosing an SSR for your application, the following parameters should be considered:

- Current rating
- Line voltage (Output)
- Control voltage (Input)
- Switching mode technology\*
- Contact form
- Mounting style
  - PCB, panel mount, or DIN
- Termination options
  - Screw or QC
- Load type
  - Current and surge requirements
- Electrical environment
- Operating temperature



# Switching Mode Technology

Switching mode technology\* has two potential options:

1. Zero Crossing
2. Random Mode

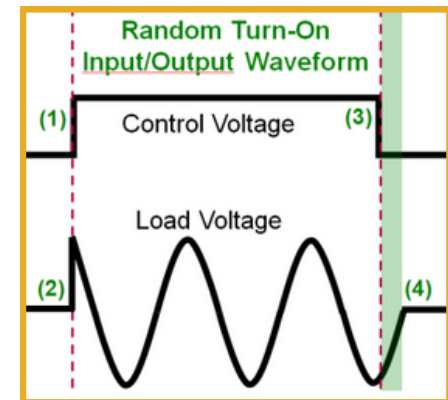
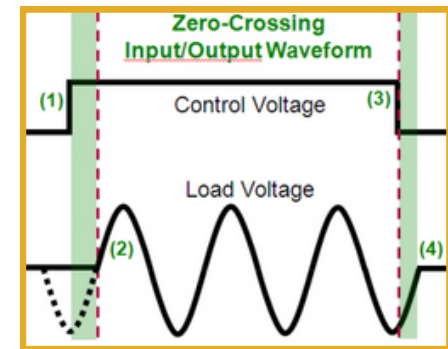
## Zero Crossing

- Most common type, synchronous SSR
- Switch occurs when the AC voltage reaches the zero-crossing point of the sine wave
- Minimizes surge current and conducted emissions

## Random Mode

- Asynchronous SSR, used in phase-control and with inductive loads
- Switch turns on immediately after the application of the control signal

→ In both cases they switch off when the load voltage crosses zero.



# Accessories

Select SSRs are available with IP covers, heat sinks, and thermal pads



**IP Covers**



**Heat Sinks**



**Thermal Pads**

(Heat dissipation is very important for SSRs with medium and higher load power.)

# Applications of SSRs

The SSR has gained popularity where previously only EMRs and contactors were used, particularly in industrial process control applications such as heat/cool temperature control, motors, lamps, solenoids, valves, and transformers.

## The advantages of SSRs:

- No moving parts means it does not wear out
- Faster switching times
- Eliminates electrical noise and transients
- High resistance to Shock & Vibration
- No arc during switching



# Applications of SSRs

## Other applications include:

- Industrial automation
- Electronic appliances
- Industrial appliances
- Packaging machines
- Tooling machines
- Manufacturing equipment
- Food equipment
- Security systems
- Industrial lighting
- Fire and security systems
- Dispensing machines
- Production equipment
- On-board power control
- Traffic control
- Instrumentation systems
- Vending machines
- Test systems
- Office machines
- Medical equipment
- Display lighting
- Elevator control
- Metrology equipment
- Entertainment lighting

INDUSTRIAL  
AUTOMATION



ALARM  
SYSTEMS



ELECTRONIC  
APPLIANCES



INDUSTRIAL  
APPLIANCES



MEDICAL  
EQUIPMENT



PACKING  
MACHINES



TOOLING  
MACHINES

