

# Selection guide JEL System Solid State Relays



株式会社 ジェルシステム  
JEL SYSTEM CO., LTD.

## Selection guide

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## What is a SSR?

**Solid State Relays (SSRs):** SSRs are semiconductor devices that can be used instead of mechanical relays to switch electricity to a load in several applications.

They are purely electronic devices, normally composed of a low current control side and a high current load side (switching side). SSRs feature electrical isolation in thousands of volts between the control and the load side.

This is achieved through optical isolation using an optoelectronic device, such as a photo coupler.

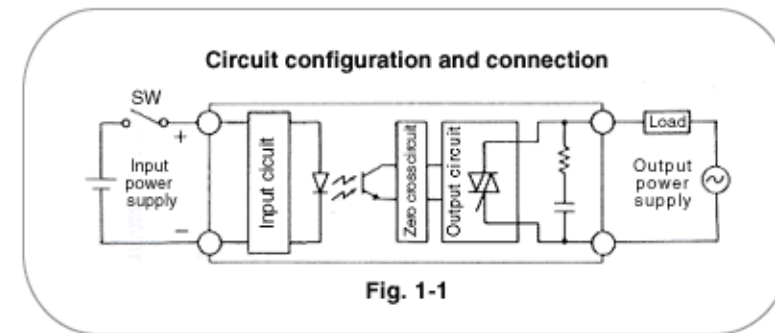
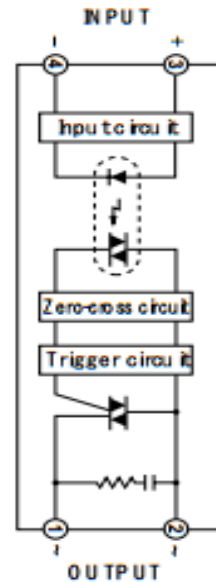


Fig. 1-1



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## Why use? Advantages – Limitations of SSR

### Advantages:

- Long life and reliability
- High switching frequency
- No contact arcing and bounce
- Maximum switching capacity
- Vibration and shock resistance
- No electromechanical noise
- Electromagnetic noise resistance
- Phase angle control mode
- High switching speed
- Logic compatibility
- Low input current

- No moving parts, no mechanical wear and tear
- Detect high switching signals
- Do not generate sparks or arcs
- Designed for AC and DC
- Withstand shock and vibration compared with EMR
- No moving parts
- Reduced electro magnetic noise (EMI)
- Fine resolution of power for dimming - soft starting
- Very fast switching capability -  $\mu\text{s}$ – $\text{ns}$
- Can be switched on and off by a digital system
- Switching of large loads via a low level logic signal

### Limitations:

- Higher cost
- Thermal dissipation
- Off-state leakage current

- Compared with EMR
- They require heat sink
- When switch is open or OFF

In a technical context, the SSR is almost always preferred to the EMR.

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## Select an SSR?

Please also refer to our web page: [Precautions on Use of SSR](#)

### Identify the load voltage

Determine whether you need to switch **AC or DC** voltage, and please select the SSR of the load voltage range according to the load voltage connected to the output side of SSR.

### Load current

Choose an SSR with of rated current is greater than or equal to the current value flowing to the output side of the SSR. ※SSR generates heat due to characteristics (voltage drop) of the semiconductor. Therefore, the current value that can flow depending on the ambient temperature of the SSR changes. Attention must be paid to the load current characteristics of each product.

### Surge current

At the moment the SSR turns ON and the load operates, a much larger current than the steady state called surge current may flow. Especially inductive loads such as motors and pumps, and capacitive loads such as incandescent lamps generate surge current. Do not exceed the surge current rating of each SSR.

### Zero cross function

when controlling inductive loads such as solenoid valves and motors, the SSR with zero cross function may malfunction due to the phase shift between the voltage and the current. When controlling the inductive load, zero cross not built in type will be recommended.

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## Applications

Heating control



Lighting control



Motion control



Miscellaneous and future applications



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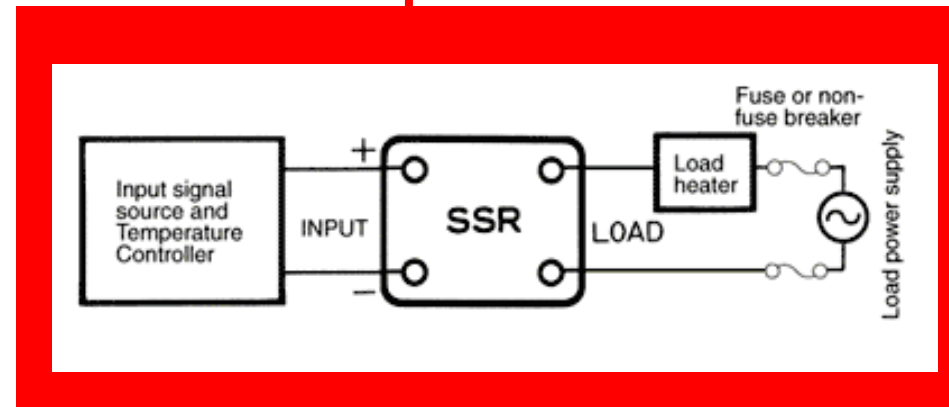
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## Heating applications

### Heating control

**Benefits:** Temperature accuracy, soft start, safe, long life, no maintenance, easy to interface

Air conditioning  
Commercial / industrial cooking equipment  
Commercial coffee machines  
Drying machine  
Furnaces, home heating, infrared heating  
Industrial cleaning equipment  
Industrial cooling – heating of liquids  
Packaging machine  
Plastic injection molding / thermoforming  
Railroad signals  
Solder Wave / Reflow Systems  
Sterilization machine  
Testing equipment – temperature chamber  
Textile machines  
Etc.



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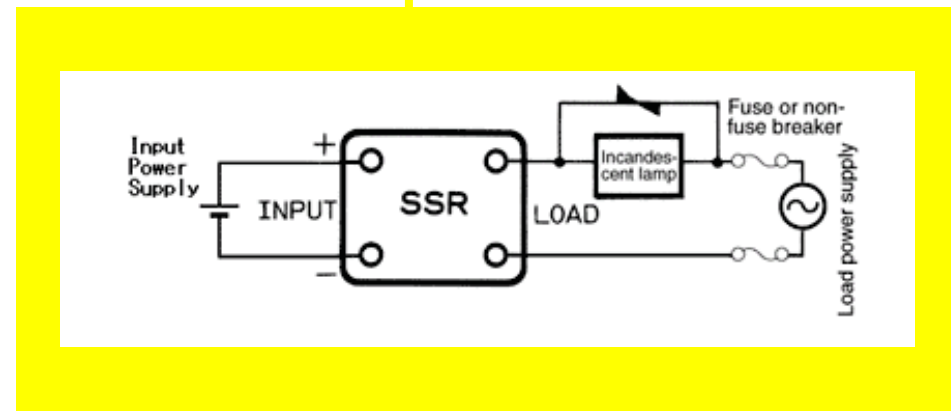
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## Lighting applications

### Lighting control

**Benefits:** Silent operation, dimming, safe, long life, no maintenance, easy to interface, fast switching

Airport runway lamps  
Cinema lighting  
Display lighting  
Dramatic theatrical effects  
Mobile stage shows  
Motorway information systems  
Public lighting  
Road lighting  
Theatre lamps  
Traffic signal systems  
Etc.



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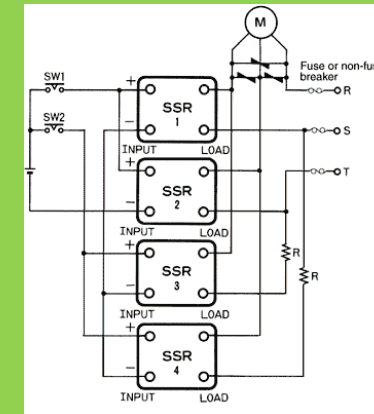
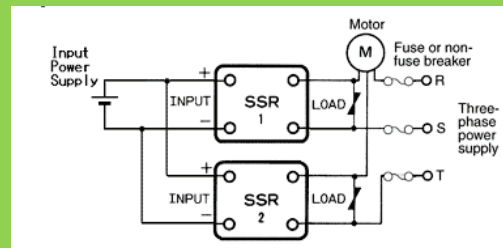
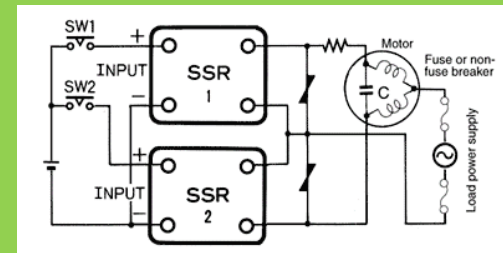
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## Motion applications

### Motion control

**Benefits:** Long life, shock + vibration resistance, soft start, reversing, no maintenance, easy to interface, no arcing, fast switching

Amusement machine  
Automatic door operation  
Automatic ticket gate  
Change maker / money machine  
Compressors  
Conveyors belts  
Lifts + Escalators  
Packaging machines  
Printing machines  
Pumps / Valves  
Robots  
Semi-conductor manufacturing  
Tooling machines  
Etc.





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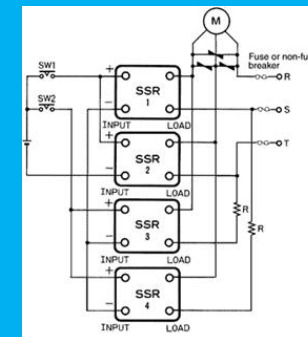
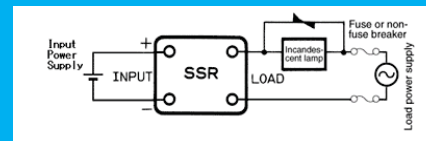
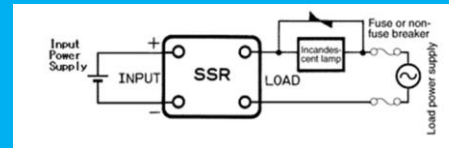
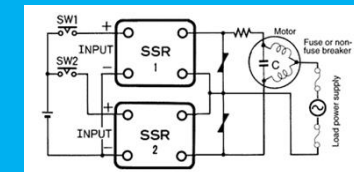
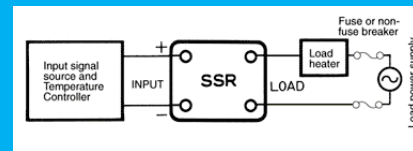
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## Miscellaneous

### Miscellaneous and future applications

**Future demand:** reduced switching times, increased efficiency and high voltage levels of up to 60 KV

Aerospace  
Consumer electronics  
Defense equipment  
Driverless vehicles  
GPS system  
Medical equipment  
Power factor corrector  
Security equipment  
Transformer starting  
Transportation  
Uninterrupted power supplies  
X-ray machine  
Etc.



# Selection Chart

## AC SSR

For PCBs

compact · small capacity

### J1N Series

1.5A

- Extremely small, suitable for I / O relay
- Non-zero cross type



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### JCP Series

1.7A

- Input resistance availability, snubber circuit, non-zero cross available



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### J2 Series

2A

- Small slim case type
- Non-zero cross type available



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more capacity

### A5C-A6C Series

2~4A

- Input voltage wide type
- Standard package of PCB mounted SSR



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### P5-P6 Series

2~3A

- Slim resin mold.
- Low cost type
- Non-zero cross type available



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### A5P-A6P Series

3A

- 400V
- Input voltage wide type



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more than 5A

### P8 Series

15A

- High capacity PCB type
- Non-zero cross type available



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### JT208-216 Series

8~16A

- Ultra compact and high capacity PCB mounting
- Non-zero cross type available



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Control Board Mounted

ultra compact · tab terminal

built in heat sink

### S5 Series

15~25A

- Extremely small.
- Tab terminal
- Non-zero cross type available



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### F2 Series

15~45A

- Ultra slim design
- DIN rail mounting possible



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screw terminal

high capacity · High breakdown voltage

### S1 Series

15~45A

- High capacity
- Low cost type
- Non-zero cross type available



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### S3 Series

15~45A

- Built-in a varistor
- 400 V, AC input type available



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### F1 Series

15~60A

- 400 V, AC input type available
- DIN rail mounting possible



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## DC SSR

For PCBs

compact

### JCPD Series

1.2A

- Extremely small.
- The same shape as JCP series for AC load



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more capacity

### D3P Series

2~4A

- High capacity with board mounting type



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Control Board Mounted

ultra compact · tab terminal

### S5D-1005

5A

- High withstand voltage of DC150V
- Extremely small. Ideal for replacing hard relays



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screw terminal

DIN rail

### S1D Series

5~40A

- Extensive line up including high capacity 40 A type
- high withstand voltage 450 V



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### S5D-2005-HS

5A

- DIN rail mounting possible
- maximum load voltage High280V



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## Approved Standards

