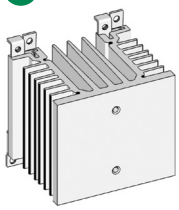
Solid State Relays Installation Instructions
PANEL OR HEATSINK MOUNT STANDARD PRODUCTS

Mounting Instructions

STEP 1: Choose the Mounting Surface

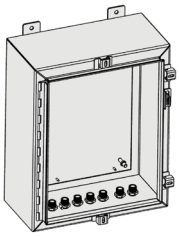
A



On a Heatsink (preferred method)

Look at the thermal curves in the product datasheet to find the best heat sink for your needs. The right heatsink size depends of the current to handle and the expected ambient temperature.

B

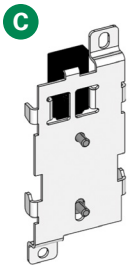


On a back panel of electrical cabinet or metal surface within a machine (Method to use only if the load to switch is under 5A-8A)

Identify the location where you intend to install the SSR. The chosen surface should be made of metal, with aluminum being the easiest and preferred option. If you opt for different metals like steel or copper, consider their unique thermal conductivity and corrosion properties. Ensure the surface is flat (0.004 in/in recommended) and verify that is not coated or painted. It must be clean and free from oxidation.

BE CAREFUL: never mount the SSR on surfaces made of plastic, wood, or any other flammable material.

C



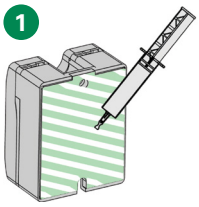
On a DIN Rail Bracket

Select a DIN Rail bracket designed explicitly for installing a standard hockey-puck sized SSR. This bracket is specially crafted to ensure secure and proper installation to a DIN Rail. Make sure to operate the SSR within the specified current rating as if it were not equipped with a heat sink.

STEP 2: Apply Thermal Interface Material

To make sure the SSR and the Mounting Surface (heat sink / panel / bracket) work together properly and efficiently disperse heat, you need to use a thermal interface material (TIM). You have three options:

1

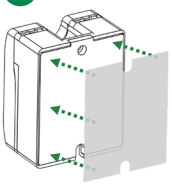


Liquid TIM

Apply a thin layer (0.006" to 0.010" or 0.15-0.25 mm) of liquid TIM (also called thermal compound or thermal grease) evenly across the entire base of the SSR.

BE CAREFUL: Do not use synthetic thermal compound, as it can harm the housing material.

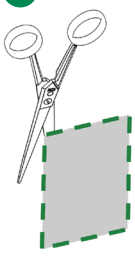
2



TIM Adhesive Pad

Cut pad (also called adhesive thermal pad) to exactly match the baseplate of the SSR. Apply adhesive side of TIM to the baseplate of the SSR.

3



TIM Pad

Cut pad (also called thermal pad) to exactly match the baseplate of the SSR. Position sheet on baseplate of SSR and align with Heatsink mounting holes.

NOTE: The thinner the layer and higher the thermal conductivity value of the TIM, the better the thermal performance of the SSR and Heatsink.

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Mounting Instructions (Continued)

STEP 3: Screw the SSR to the Mounting Surface

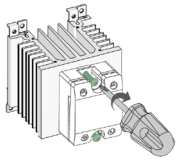
1



Select screws

The slots on the SSR are 0.18 inches (4.5 mm) wide. You'll need two screws, either with a size of 8-32 (UNC standard system) or M4/M5 (metric system), to attach the SSR to the Mounting Surface (heat sink / panel / bracket). Choose the screw length based on the depth of the mounting surface holes, keeping in mind that the SSR baseplate is 0.125 inches (3.2 mm) thick.

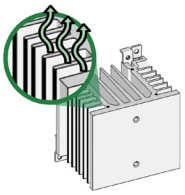
2



Tighten the screws

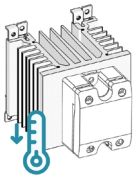
Tighten the screws gradually and evenly in an alternating pattern to 6.6 lb-in (0.75 Nm) until they touch the SSR's baseplate. Then, tighten them to the recommended torque for your SSR, which is typically around 18-20 lb-in (2.0-2.2 Nm). Make sure there's no gap between the SSR and the Mounting Surface (heat sink / panel / bracket).

Remarks



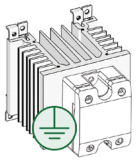
Position Heatsink Fins

When mounting on a Heat Sink, position fins for optimal performance: To keep the SSR as cool as possible and working well, have the heat sink fins arranged vertically. This way, they won't block the air passing through the heat sink, and natural airflow can effectively dissipate heat.



Let cool before handling

The SSR and Mounting Surface (heat sink / panel / bracket) can get hot while running, so wait for them to cool down before handling.



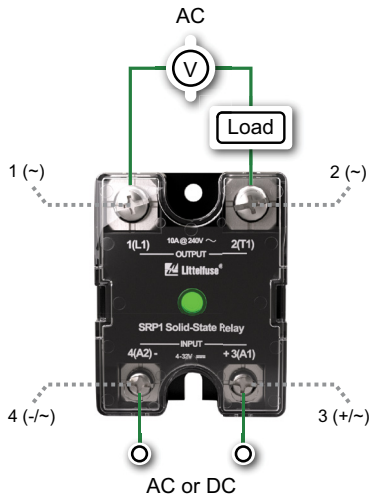
Protective Earth

When you attach the SSR to the heat sink, make sure the heat sink is properly connected to a protective earth (PE) for safety.

Wiring Instructions

Wiring Diagrams

The wiring diagram below applies only to the SRP1 Standard Series solid-state relay. For wiring instructions for other panel-mount SSR series, refer to the datasheet for the applicable series. The relay has four terminals:



- Terminals 1 (~) and 2 (~): These are the output terminals connected to the load. Since these terminals are for AC loads, there is no polarity (positive or negative).
- Terminals 3 (+/~) and 4 (-/~): These terminals are used for the input connections. You can connect either an AC or DC power source, depending on the model. If using a DC power source, then Terminal 3 is for the positive input, and terminal 4 is for the negative input.

Ensure all connections are secured within the specified torque range to maintain optimal performance and safety.

Output Wiring

Screw Thread Size:	M5 x 0.8	
Screw Torque Range:	2-2.2 (18-20)	Nm (in-lb)

Input Wiring

Screw Thread Size:	M4 x 0.7	
Screw Torque Range:	1.5-1.7 (13-15)	Nm (in-lb)

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Short-Circuit Protection by Fuse

To safeguard solid-state relays (SSRs) against load short circuits, the use of fuses is essential, especially fast-acting ones. Here are the key considerations:



- Fuse Selection: The I^2t value (energy withstand capability) of the fuse should be less than half of the I^2t value of the relay. Standard fuses are inadequate because they cannot react swiftly enough to prevent fault currents from exceeding the maximum levels that thyristors (used in SSRs) can handle. Therefore, we strongly recommend employing ultra-fast fuses.
- Fuse Placement: Position the fuse in front of the SSR in the circuit. This strategic placement ensures that if the relay must unexpectedly break the earth insulation (due to overheating, case damage, or leakage with the heatsink), the fuse will protect the entire circuit from firing.
- Resource for Fuse Options: For the most suitable fuse options, consider checking the Littelfuse website.

Load Considerations

Littelfuse SSRs are versatile and can handle different types of loads, such as light, motors, and others. However, the maximum continuous current value given in this datasheet is only for resistive loads (specifically AC-1 type), which are mainly used for heating control.

Thermal Derating Curves

To operate the Solid-State Relay (SSR) at its specified ratings, the use of a heatsink or metal plate is mandatory. The thermal derating curves provided in the datasheet illustrate the maximum load current that our SSRs can manage under varying ambient temperatures and C/W values. It is crucial to select a heatsink that is most suitable for your specific application.

SSR Switching Type

In applications requiring precise temperature management, solid-state relays (SSRs) play a crucial role. Specifically, the Zero Cross Switching type of SSR is commonly employed to regulate heaters based on signals from a temperature controller. This technology proves particularly valuable in scenarios where high-frequency switching occurs—such as when a heater cycles on and off frequently over short intervals for extended periods.

Inrush Current

It's essential to recognize that variations exist between different types of heating elements, especially in hot or cold conditions. While it is generally expected that heating elements exhibit no inrush current, in certain heating elements cold conditions can lead to an inrush current equivalent to 1.4 times the nominal current. To mitigate this, we highly recommend oversizing the current rating and ensuring an appropriately sized heatsink. Doing so improves the relay's thermal endurance and extends its operational lifespan. So, when selecting an SSR, consider using one with a capacity approximately 1.4 times that of the heater or operating the SSR at only 75%-80% of its maximum capacity.

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Warning Information

Electrical Protection and Transient Voltage

AC power lines can carry transient voltages, which may affect the SSR's performance and the connected load. This relay includes built-in protection against voltage spikes up to 1600V (refer to the product datasheet for exact specifications). For added protection, consider installing external transient voltage suppression devices.

Heat Management

Be cautious of the heatsink, which can become extremely hot during operation. To avoid burns or heat-related damage, ensure heat-sensitive materials and people do not come into contact with it. Proper airflow around the solid-state relay (SSR) is essential for cooling. Insufficient air circulation can cause overheating. If multiple SSRs are installed closely, reduce the load current to minimize heat buildup. Using forced cooling, such as a fan inside the cabinet, significantly improves thermal performance. Ensure the heatsink temperature does not exceed 90°C to avoid damage.

Safety Guidelines

Only qualified personnel should install, operate, or maintain this equipment. Improper handling can result in injury or equipment damage. Always check that the input and output voltage levels are within the specified operational ranges for safe use.

The SSR's side panels can become very hot during operation. Allow the device to cool down before handling to prevent burns. Ensure that the mounting instructions are followed precisely to avoid damage to the equipment or injury.

Warning Information

Caution: Material Damage, Electric Shock, and Arc Flash Hazard. Before installing or working with this equipment, take the following precautions:

1. **Disconnect all power:** Ensure that all power sources are disconnected.
2. **Verify connections:** Double-check all connections.

Failure to adhere to these instructions may lead to **serious injury or damage** of equipment.

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