

FAQ

Incorporating High Power Relays into Solar Power Applications



With the proliferation of the use of solar power systems throughout the country, designers need components that are right for each segment of the system. Understanding what is required and what is available is key to designing a quality system.

Q1: How are relays used in solar power applications?

Solar power is considered a photovoltaic generator and is comprised of one or more solar panels along with an AC grid inverter that is interconnected with the public power grid. These systems may also include batteries for storing solar energy and a battery charger that is integrated with the AC inverter. These systems can vary in size from rooftop systems to utility-scale generation plants.

Q2: How is the DC voltage created from a solar power system converted to AC voltage?

Direct current voltage generated by solar panels is converted into alternating current through the AC converter. This voltage is either fed into the power grid or collected by receivers that are connected directly to the system. The inverter provides voltage to the connected AC

receivers from the solar power system batteries or the power grid and allows it to be redirected directly from the AC grid input to the inverter output. If the absorbed energy by the receivers is greater than the energy supplied by the solar power system batteries, the DC/AC converter works in bypass mode, switching to power from the public grid.

Q3: Where are high-power relays incorporated into a solar power system?

High-power electromagnetic relays used in solar power systems have two main purposes. Relays are used on the DC side to switch DC voltage generated by the photovoltaic cells off and on. On the AC side of the system, high-power relays are used to connect or disconnect the entire system from the power grid (see Figure 1).

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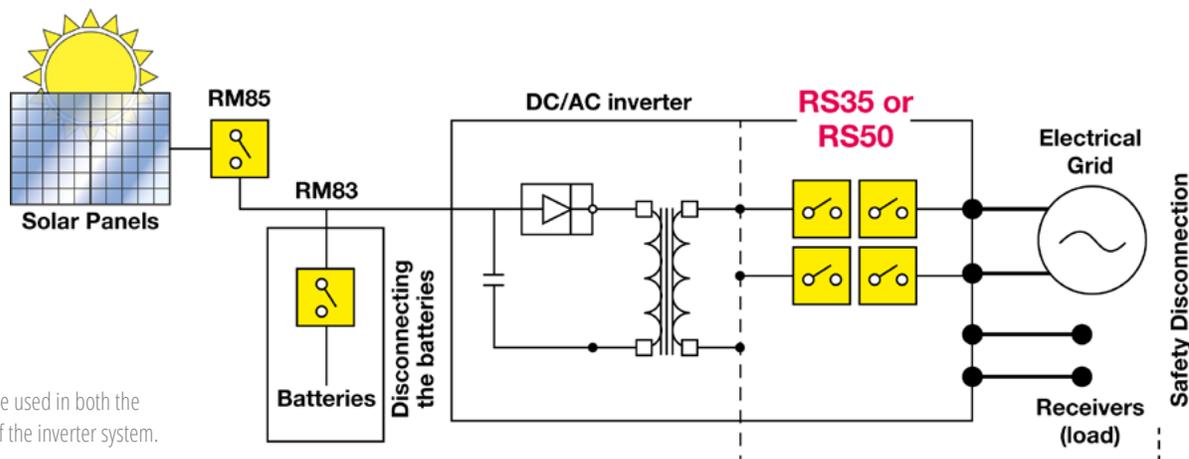


Figure 1: Relays are used in both the DC and AC sides of the inverter system.

Q4: Are there special requirements for relays used in solar power systems?

Any time there is a supply of energy to the public grid, it is susceptible to special requirements relating to the relays being incorporated. Some important requirements include a minimum contact gap of 1.5mm, a minimum open contact dielectric strength of 2500 V rms, low holding power for the coil and a wide temperature rating.

Q5: What is meant by an “automatic system”?

An automatic system refers to safety regulations. A solar power system must be equipped with an automatic system that disconnects the generator from the AC power grid for safety reasons. This protection circuitry is often built into the DC/AC inverter. Two-pole relays are used so that each contact disconnects a separate line during emergencies—the single-phase line and the neutral line in a single-phase application and two phases in a two phase application. Two contacts connected in series are required for each line. The separation of the circuit is therefore carried out by two two-contact high-power relays.

Q6: What relays are recommended for this type of application?

Altech has partnered with Relpol to provide high-power relays for these applications. Their RS35, RS50, and RS80 relays are specifically designed in accordance with the requirements of many safety standards, including the DIN VDE 0126-1-1, to fulfill the needs of users. The RS35 relay, with a switching power rating of 8750 VA, is intended for smaller solar power systems such as those installed in single-family homes. The RS50 relay, with a switching power rating of 12,500 VA and the

RS80 with a switching power of 20,000 VA are designed for larger industrial systems (see Figure 2).



Figure 2: The RS35 and RS50 high-power relays for solar power systems are designed in accordance with the requirements of DIN VDE 0126-1-1.

Q7: Is relay power consumption an important factor in solar power applications?

Yes, that is one of the most important elements. To ensure the highest efficiency of the inverter, the power relay components must have the lowest possible power consumption possible. That is why the RS35/RS50 high power relays are equipped with coils that are rated for only 0.4 Watts of power consumption. Heat emission is also significantly reduced by decreasing the supply voltage of the relay coils after activation. For example, for a relay with a 12V coil, the minimum supply voltage used during continuous operation can be as low as 5V. This means that power consumption is only 85 mW, which translates into high efficiency for the entire device.

Q8: Are their relays available for printed circuit board use?

Yes, the RS35, RS50, and RS80 relays are designed for PCB mounting. In addition to the RS type relays, Altech supplies many other varieties of relays. For example, the company offers the RUC relay line specifically for printed circuit board

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designs—with a contact gap of 3mm. These relays are available in both 2NO and 3NO configurations, which allows them to be used in three-phase designs in addition to single- and two-phase systems.

Q9: What high-power relays are available for DC voltage disconnection?

An array of products are available for all areas of solar power systems, including disconnecting the voltage generated by assemblies of the photovoltaic cells such as on the DC side of the inverter. Disconnecting the system on the DC side is often required for safety reasons—in the event of a failure—as well as during service inspections or for test and measurement purposes. Altech also offers relays for this purpose. Their RM83 and RM85 offer an increased contact gap ideal for these applications (see Figure 3). The relays can also be used to disconnect the battery system or be used in the equipment that calibrates the angle of inclination of the solar panels.



Figure 3: A wide variety of power relays for the solar power industry are available, including Altech's RM83 and RM85 used for DC voltage disconnect.

Q10: What other applications might require high-power relays?

Power relays are a versatile component used in a wide variety of industries, including industrial automation and home automation, telecommunications systems, lighting and safety monitoring, automotive electronics, computer systems, battery testing equipment, elevators, and numerous industrial control applications. High-power relays have become key components in many circuits for a variety of safety reasons, including protecting humans as well as protecting other electrical or electronic equipment.

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In Stock

Altech[®] Relays for High Switching Current Photovoltaic Applications

- UL Recognized, VDE 0126-1-1
- RS35 rated switching power of 8,750 VA (35A)
- RS50 rated switching power of 12,500 VA (50A)
- RS80 rated switching power of 20,000 VA (90A)



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DVE

FEATURES

- High switching current, rated load from 35 A to 90 A
- Large contact gap from $\geq 1,8$ mm to $\geq 4,1$ mm
- Very low holding power 0,1 W
- Very low rated power consumption: 0,48 W
- Power consumption at operating voltage: 0,27 W
- Small footprint on the PCB, only 40 x 25 x 49,2 mm.

APPLICATIONS

Solar inverters	Saunas
UPS Installations	Rectifiers
Industrial Heaters	Compressors
Welding Machines	Energy Storage
EV Charging Stations	Industrial inverters



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