

How to select the size of a relay protection switch



Overview

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Key Takeaways

The ideal switch size for relay protection depends on the relay's contact ratings, the load current, and the type of load, with a margin for surge and inrush currents. Key Considerations

1. Match Switch Ratings to Relay Contacts The switch controlling a relay should have a voltage and current rating equal to or higher than the relay coil's requirements. Electromechanical relays often handle higher surge currents, so the switch must accommodate the inrush current without excessive wear or arcing. For sensitive electronics, ensure galvanic isolation between the switch and load to prevent voltage spikes from damaging components.

2. Account for Load Type

- Resistive loads (heaters, incandescent lamps) are easier on contacts.

- Inductive loads (motors, solenoids, transformers) generate high voltage spikes when switched, requiring switches with higher surge capacity or the use of RC snubber circuits, MOVs, or flyback diodes to suppress arcing .

3. Consider Mechanical and Electrical Durability Smaller switches are suitable for compact assemblies but may have lower surge tolerance and shorter lifespans. Larger switches with robust contacts handle repeated operations and high inrush currents better, extending relay and switch life . Reed relays offer fast switching and high mechanical lifetime but are more prone to electrical damage from arcing, so switch sizing must consider both current and voltage stresses .

4. Coordination with Protective Devices Switches should be coordinated with overload relays, fuses, or circuit breakers. The switch rating must allow the protective device to operate correctly during overcurrent events without being damaged . For motor circuits, select switches that can handle locked rotor currents and short-term surges while ensuring the overload relay trips appropriately.

5. Environmental and Installation Factors Sealed or high-temperature switches may be required in harsh environments. Vertical mounting can reduce dust accumulation on contacts, and adequate spacing prevents heat buildup in densely packed assemblies .

Practical Guidelines

- Determine the relay coil voltage and current.
- Identify the maximum load current and type (resistive or inductive).
- Choose a switch with current and voltage ratings exceeding the maximum expected load, including surge or inrush.
- Use arc suppression techniques for inductive loads.
- Ensure compatibility with protective devices to maintain system safety and reliability. By carefully matching the switch size to the relay and load characteristics, you ensure long-term reliability, reduced maintenance, and effective protection of both the relay and the controlled circuit.

Article Content

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