



FUSING CONSIDERATIONS FOR SCR POWER CONTROLS

Protection of systems for controlling electric heaters, require two types of fusing to protect both the system and the Silicon Controlled Rectifiers (SCR's).

Branch Circuit Fuses are required by National Electrical Code (NEC) to protect the heaters and the wiring. Branch circuit fuses do not respond quick enough to protect SCR's.

A branch circuit fuse must open in one minute at 125 percent of the fuse's nameplate rating.

The fuse must also be rated at a minimum of 125 percent of the connected load to prevent nuisance failures.

When changing to smaller wire, or splitting up the load, it may be necessary to add additional fusing for smaller wire. See the Tap Rule article in NEC 240.21.

Semiconductor Fuses are a specialty fuse, or sometimes called a supplemental fuse, that are only used to protect the SCR's. They can open in tenths of a millisecond on a high fault current short, yet they are not adequate to protect the heater or wiring, as they do not have a defined overload rating. They can operate for hours at more than 200 percent of their RMS rating.

Semiconductor fuses have thin silver links to open quickly. They are packed in silica sand that will turn to glass from the heat generated when the fuse opens. This will quench the arc produced and eliminate destroying the SCR's from delta voltage / delta time (DV/DT).

Semiconductor fuses must also be rated at 125 percent of connected load for the RMS rating, and must be rated in current squared multiplied by time called the I²T rating.

To protect the SCR, the I²T rating of the fuse must be equal or lower than the I²T rating of the SCR.

Some products include semiconductor fuses, while others the fuses are ordered separately. Manufacturer's warranty may be voided if semiconductor fuses are not utilized on all controlled legs.