DESIGN & INSTALLATION

1. Use mechanical safety disconnects for feeder circuits
   A contactor, circuit breaker, or mechanical disconnect should be used ahead of the fusing and SCR power controller to serve as a mechanical safety disconnect. Outputs of SCR power controllers are live whenever voltage is present on the controller inputs!

2. Verify orientation for natural convection cooled power controllers.
   Passively cooled SCR power controllers rely on natural convection. The controller needs to be oriented so the cooling fins run vertical in order to dissipate the rated heat properly. Failure to do so will shorten the life of the SCR and may cause an unintended system shutdown.

3. Keep contactors upstream of an SCR
   Always keep contactors upstream of the SCR power controller to prevent damaging voltage kickback during opening of the contacts.

4. Size current of power controllers and load for the lowest voltage your facility may see.
   Dips in facility power may cause your power controller to run at a higher current output than planned in order to achieve the desired power output. This may also lead to extra heat load within the electrical enclosure.

5. Understand certification requirements at your customer’s location.
   Check with your customer to verify local code requirements before planning your electrical panel. If the final destination is within the US, pay special attention to Short Circuit Current Rating (SCCR) and available fault current at the facility. SCR power controllers require specific design considerations in order to meet SCCR requirements in the panel.

6. Protect the controller from dust, metal shavings, or screws
   During system installation, small metal shavings can drop into the top of the controllers. This may cause short circuits or arcing. Cover the unit or wait to mount controllers until holes have already been drilled in the enclosure.
Check system thoroughly after installation and mounting
Make sure all lugs are torqued to proper torque specifications. Inspect for frayed wires. Follow recommended strip length for terminals.

Test all system fault and recovery scenarios during startup
Verify system design is capable of handling and recovering from all fault scenarios:
- Over current trip
- Communications failure
- Over temperature
- Shorted SCR
- Phase lock
- Phase loss (3 Phase)
- Load imbalance (3 Phase)
- Limits: voltage, current, or power

FUSING

Use High Speed Class J or Class T fuses to avoid nuisance tripping
Size fuses with the formula: 1.25 x SCR frame rating (Amps)
- Phase Angle: Select closest standard fuse size.
- Zero-Cross: Select next largest size.

Fuse all legs
For single phase loads, fuse both legs. For three phase loads, fuse all three legs, regardless of whether it is 2-leg or 3-leg control.

TRANSFORMERS

Use contactors upstream of the SCR
If the SCR is being used to control the primary of a transformer, there should be no contactors between SCR and the primary of the transformer as well as no contactors on the secondary.

SCRs do not parallel or load share.
i.e. You cannot use two 50A controllers in parallel to power a 100A load. Either split the load into two 50A loads, or use a single 100A power controller.

Isolation transformers with electrostatic shields are recommended.
An electrostatic shield will shunt the capacitive coupling across the transformer and prevent common mode line voltage to ground on the transformer outputs. Without the shield, you may see line voltage potential with up to several hundred milliamps of current on the output taps.

Maintain a minimum load
When firing into a transformer, maintain a minimum load of 1 amp on the primary to prevent a misfire and saturation of the transformer. A dummy load may be required to maintain proper operation for inductive loads or magnetrons.
ENVIROMENTAL CONDITIONS

15. Confirm adequate clearance around the controller for airflow.
A three inch clearance above and below the controller is required.

16. Check the temperature of the air surrounding the controller
Size enclosure and provide adequate cooling so that the air surrounding the controller
does not exceed its thermal rating. Use an enclosure heater if the environment can reach
below 0 degrees C. SCRs require more gate current as the temperature decreases and will
eventually exceed the drive capability causing a misfire.

17. Prevent radio interference
SCR power controllers are susceptible to radio
interference from hand held radios and repeaters and
can potentially misfire during radio transmissions. Keep
the controller in a metal enclosure to prevent radio
interference. Use grounded metal screen mesh over air
louvers and cabinet openings to prevent radio signals
from interfering with your equipment.

18. Use a grounding rod in noisy environments
This may be beneficial if you have a bad system ground.

19. Use a sealed enclosure or alternative cooled power controllers for dirty and dusty
environments
For heavy dirt or dusty environments, a sealed cabinet with air conditioning or filters is
recommended. Alternatively, select a SCR manufacturer that offers external mount or liquid
cooled heatsinks to allow you to maintain a sealed environment in order to obtain maximum
product life.

20. De-rate controller for installations above 6000 feet.
As the air thins at increased elevations, natural convection and forced air cooling becomes
less efficient. Follow the manufacturer’s recommendations for de-rating the SCR power
controller above 6000 feet altitude.

Talk with the experts and learn more! Our application engineers are available
to answer questions and solve problems.

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