DESIGN CHECKLIST
ENGINEERING WITH SCR POWER CONTROLLERS

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.

100kA SHORT CIRCUIT CURRENT RATING

☐ 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.

☐ 7 **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.

☐ 8 **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

☐ 9 **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.

☐ 10 **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

☐ 11 **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.

☐ 12 **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.

☐ 13 **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.

☐ 14 **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.

ENVIRONMENTAL CONDITIONS

☐ 15 **Confirm adequate clearance around the controller for air flow.**
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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