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## Frequently Asked Questions

### 1. How does an SCR power controller work?

Phase angle controllers work like a light dimmer. The load voltage is varied by varying the time within each electrical half-cycle during which voltage is applied to the load.

Zero-cross is analogous to a very fast contactor that "makes" only at the beginning of each electrical half-cycle and always "breaks" at the end of the electrical half-cycle.

### 2. When should phase angle be used and when should zero-cross be used?

Phase angle can be used to control all loads. Phase angle must be used to power transformer coupled loads and fast heating loads like infrared lamps.

Zero-cross has the advantages of being lower in price, slightly more reliable and generates substantially less harmonics than phase angle controllers.

### 3. What are the advantages of SCR controllers verses mechanical contactors?

- Infinite resolution
- No inherent wear out modes
- Often less expensive
- Voltage compensation, current limiting and over current trip are often in the SCR controller design.

### 4. How should a controller be fused?

Control Concepts recommends that a class "T" fuse be used to protect the SCR. Control Concepts has found that the class T fuse is an excellent compromise between protection and premature fuse failure.

### 5. How much heat does the SCR controller generate?

Approximately 1.2 watt's per amp switched per power line controlled by an SCR.



## **6. What command signals will the SCR controllers operate on?**

All of the commonly available command signals of the various temperature controllers and PLC outputs such as; analog signals 4-20mA, 0-5Vdc, 0-10Vdc, Potentiometer and on/off 3-32Vdc, 0-24Vdc, 0-120Vac or 0-240Vac.

Other command signals can be ordered to match with older control signals like 2-12mA, 12-20mA, 1.2-6Vdc.

## **7. Can I put parallel loads on one controller?**

In most cases yes, as long as the total load current is not more than the SCR controller is rated to handle.

## **8. What size of fuse should I use on a 30-amp single-phase load?**

Size the fuses to be 25% over the full load current. In this case, fuse the SCR controller at 40 Amps with a very fast fuse, "Type T" or faster.

## **9. Do controllers generate harmonics on the electrical lines?**

- Yes they do generate harmonics on the power lines.
- A zero cross controller generates most of its harmonics below 50/60 cycles.
- Phase angle controllers generate harmonics above 50/60 cycles with the largest distortions at 3rd, 5th & 7th harmonics for single phase controllers. For three phase controllers, the third, and multiples of the third, are not created.

## **10. What are the effects of harmonics and should I be concerned?**

Harmonics can cause overheating of inductive equipment, such as transformers, motors, etc. However, actual occurrences of this problem from harmonics are essentially non-existent.

## **11. Are the controllers listed or recognized by a national testing lab?**

Most controllers manufactured by Control Concepts have been tested by Underwriters Labs to UL and CSA standards and carry the UL and CUL marking.

## **12. How do I derate Control Concepts, Inc SCR power control?**

While derating is necessary with most manufacturer's controllers, starting at as little as 25 degrees C (room temperature), our controllers are rated at 55 degrees C (130 degrees F). So in most cases, no derating is required. Consider the cost savings: with many controllers, in order to control 120 amps at 55 degree C, you would need to order a 200 amp controller (because of their derating curve). With power controllers from Control Concepts ([www.ccipower.com](http://www.ccipower.com)), you can order a 120 amp controller and actually control 120 amps.