Introduction to Silicon Controlled Rectifier (SCR) Power Controllers

Features and Benefits of SCRs

- **High reliability**  
  Because the SCR power controller is a solid-state device, it provides virtually limitless, trouble-free operation with a minimum of maintenance.

- **Infinite resolution**  
  Power, current or voltage can be controlled from zero to 100% with infinite resolution.

- **Extremely fast response**  
  The SCR controller can toggle-load power on and off rapidly, providing the means to respond quickly to command, load and power supply changes.

The SCR

The SCR has two states, **On** and **Off**, and allows current to flow in only one direction. An SCR unit is composed of two SCRs arranged to control AC power. SCRs can remain in the off state even though the applied potential may be several thousand volts; in the on state, they can pass several thousand amperes. When a small signal is applied the SCR will turn on in 10-100 microseconds. Once turned on it will remain on until the current through it is reduced below a very low value called the holding current.

Basically, an SCR power controller consists of the following:

- Semiconductor power devices (SCRs and diodes)
- A control circuit normally referred to as the firing circuit
- A means to dissipate the generated heat
- Protective circuits (fuses and transient suppressors)

**True Power Regulation / Current Limit**  
It uses output voltage, current, conduction angle, phase shift, and power factor to monitor and regulate the output. It will provide output power that is constant, regulated and linear to the command signal. This option includes an RMS current limit (adjustable from 35 to 125% of the unit’s rating) and has a 0-5 VDC output that is proportional to the load power.

**Over-Current Trip**  
Tempco’s over-current trip is peak current sensing. The circuit will shut down the SCR within a half-cycle of AC current. It includes an automatic or manual reset that allows the user to select the reset mode after an alarm. A relay output is available for alarming or shutdown. Adjustable from 100 to 300% of the unit’s rating.

**RMS Current Regulation / Over-Current Trip**  
It will hold the output current constant regardless of the load resistance, based upon the command signal input. This option includes an RMS current trip adjustable from 35 to 125% of the unit’s rating.

**RMS Current Limit / Over-Current Trip**  
The output current can be adjusted to automatically limit or clamp the maximum RMS current available from the SCR power control. It is settable from 35 to 125% of the unit’s rating. This option includes an RMS current trip adjustable from 35 to 125% of the unit’s rating.

**Over-Temperature Thermostat**  
These are bi-metal snap action thermostats that open or close when the heat sink’s temperature exceeds its maximum operating temperature. Standard on all SCR power controls starting at 90 Amps. Specify NO or NC when ordering, or a NO thermostat will be included.

**Load Unbalance Alarm**  
The unbalance alarm monitors and compares the current in each of the three phases. If the current deviates more than the setpoint allows, an alarm relay is actuated.

**SCR Module Failure Alarm**  
This option monitors the voltage drop across each of the SCRs. Since most SCRs fail shorted (zero voltage drop) this is the most accurate method to detect a failed SCR module. A relay output is provided.

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