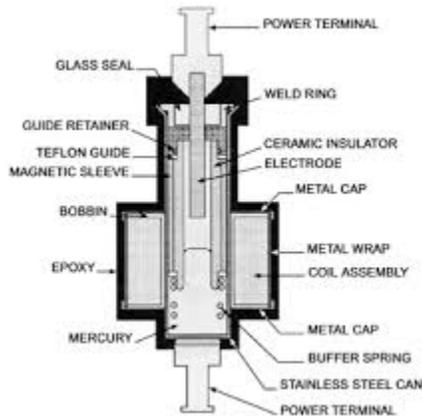




## Four Basic Relays for Switching Power Loads:



### Mercury Displacement Relay (MDR) or Contactor



The Mercury Displacement Relay works by isolating the load terminals from each other. The "plunger assembly," which includes a ceramic insulator, a magnetic sleeve and other related parts, floats on top of the mercury pool. When the coil is powered causing a magnetic field, the plunger assembly is pulled down into the mercury pool which is in turn displaced and moved up to make contact with the electrode, closing the circuit between the top and bottom load terminals. This relay must be mounted vertically and is good for millions of cycles.



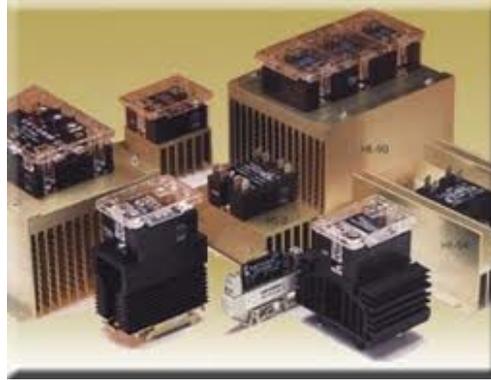
## Electromechanical Relay or Contactor



The Electromechanical Contactor, or relay is an electrical and mechanical device with moving parts. When power is applied to the relay solenoid, contact closure is created through movement of the relay's "common" contact. Because this contactor has moving parts, it is susceptible to vibration or mechanical failure. The closure of the contacts when powered results in contact failure through burning and pitting, which, in fact, is the primary reason for failure of an electromechanical relay. Electromechanical contactors provide a positive circuit break. This is important in many circuits. This contrasts with solid state devices which almost always have a small amount of leakage current flow. Electromechanical contactors can be mounted in almost any position and are much easier to install and service than many solid state switches. They are offered with normally open and normally closed contacts, with a very slight cost difference for both contacts.



## Solid State Relays (SSR's)



Solid State switching devices (SSR's) have no moving parts and consequently, no mechanical failures. Solid state switches are resistant to shock and vibration. The absence of moving parts also makes them noise-free (they produce no audible sounds). The most important factor affecting service life is its ambient operating temperature. Solid state devices are very durable, if they are operated within tolerable ambient temperatures and are properly fused. Failure to dissipate the heat generated by any solid state component will quickly destroy it. Fusing (fast clearing  $I^2t$ ), location and heat sinking must be adequate. Because solid state relays can operate at much faster cycle time than electromechanical relays, they should be employed where extremely tight process control is required. Disadvantages of solid state relays include the inability to provide a positive circuit break and the failure mode when misapplied or subjected to overrated conditions.



## Silicone Controller Rectifiers (SCR's)-Power Controllers



The SCR (silicon controlled rectifier) is a solid state switching device that can switch up to a 1200amp load. A correctly chosen SCR can reduce system cost by improving heater life and process controllability. SCR power controllers typically accept two types of input signals: time proportioned (or on-off) and process signals (either 4-20mA or 1-5V (dc) from any temperature control. SCRs accepting time proportioned (or on-off) signals are generally called "power contactors." SCRs accepting process signals (4-20mA or 1-5VDC) are generally called "power controllers." They control the power by two methods of firing, phase angle and variable time base burst firing. The primary advantages of SCR power controllers are their flexible input options, lack of moving parts, long life, improved controllability and tremendous current handling capability. SCRs can improve system performance with increased heater life through the rapid switching an SCR provides. All SCRs require a proper heat sink and fast clearing fuses (2 millisecond). Location is also an important consideration.



**Inquiries & Technical Support**  
Telephone: 905-859-8225      Facsimile: 905-859-4691  
[sales@nph heaters.com](mailto:sales@nph heaters.com)  
Toll Free: 1-877-674-9744

