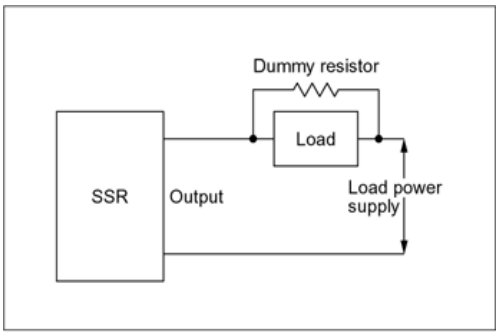
SOLID STATE RELAYS
LOAD SELECTION CRITERIA

1. Heaters (Resistive Load)
The SSR is best suited to resistive loads. Noise levels can be drastically lowered with zero-crossing switching.

2. Lamps
Tungsten or halogen lamps draw a high iinrush current when turned on (approximately 7 to 8 times the steady-state current
for zero-crossing SSRs;approximately 9 to 12 times, in the worst case, for non zero-crossing SSRs). Choose an SSR so the peak of the inrush

3. Solenoids
AC-driven solenoid contactors or solenoid valves also draw inrush current when they are activated. Choose an SSR such that the peak of the inrush current does not exceed 50% of the SSR surge-on current.For small solenoid valves and AC relays in particular, a leakage current may cause the load to malfunction after the SSR turns off due to I_{ho}. In such an event, use a dummy resistor in parallel with the load.

• *Using an SSR below the Specified Load*



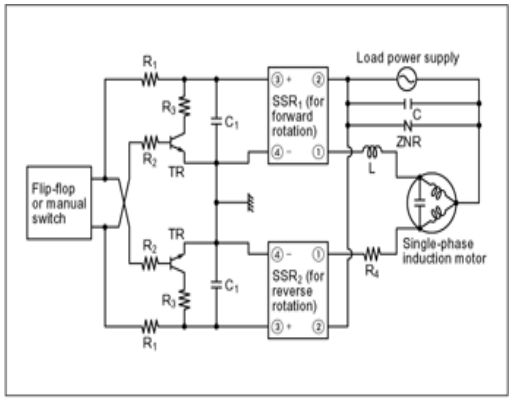
4. Motors
When starting, an electric motor draws a symmetrical AC starting current some 5 to 10 times the steady-state load current, superimposed on a DC current. The starting time during which this high starting current is sustained depends on the capacities of the load and load power supply. Measure t

he starting current and time under the motor's actual operating conditions and choose an SSR so the peak of the starting current does not exceed 50% of the SSR
surge-on current. When the motor load is deactivated, a voltage exceeding the load supply voltage is applied to the SSR due to counter-EMF. This voltage is approximately 1.3 times the load supply voltage for induction motors, and approximately 2 times that for synchronous motors.

• Reversible Motor Control

When the direction of motor rotation is reversed, the transient current and time required for the reversal far exceed those required for simple starting. The reversing current and time should also be measured under actual operating conditions. For a capacitor-starting, single-phase induction motor, a capacitive discharge current appears during the reversal process. Be sure to use a current limiting resistor or
reactor in series with the SSR. Also, the SSR should have a high marginal voltage rating, since a voltage twice as high as the load supply voltage develops across the SSR in the reversal process. (For reversible control on a 100 V AC line, use SSRs with a 200 V rating; for use on a 200 V AC line, contact your nearest our representative for further information.) For reversible motor control, carefully design the driver circuit so the forward and reverse SSRs do not turn on at the same time.

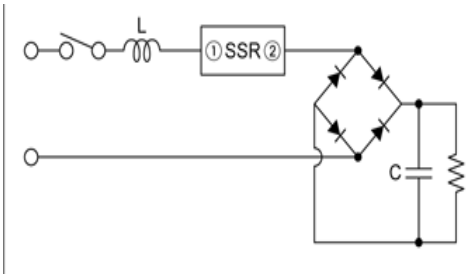
Transistor-driven reversible motor control circuit



5. Capacitive Load

A capacitive load (switching regulator,etc.) draws an inrush current to charge the load capacitor when the SSR turns on. Choose an SSR so the peak of the inrush current does not exceed 50% of the SSR surge-on current. A timing error of up to one cycle can occur when a switch used in series with the SSR is opened or closed. If this is a problem, use an inductor (200 to 500 m H) in series to the SSR to suppress dv/dt error.

Connection guidlines

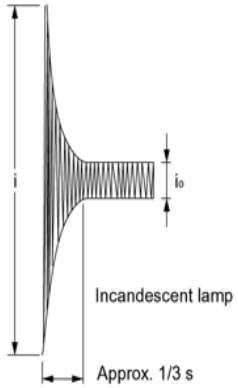


6. Other Electronic Equipment

In general, electronic equipment uses line filters in the primary supply circuit. The capacitors used in the line filters may cause the SSR to malfunction due to dv/dt turn on when the equipment is turned on or off. In such an event, use an inductor (200 to 500 mH) in series with the SSR to suppress dv/dt turn on.

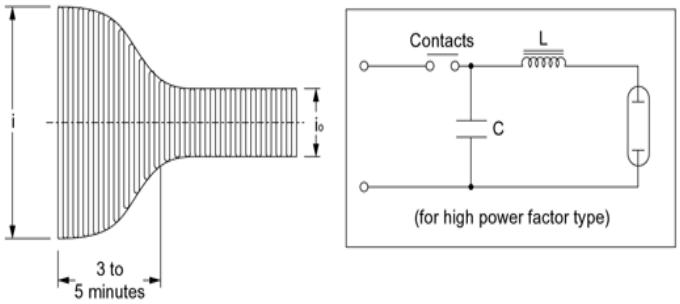
TRANSIENT LOAD CURRENT FOR DIFFERENT TYPE OF LOADS

(1) Incandescent Lamp Load



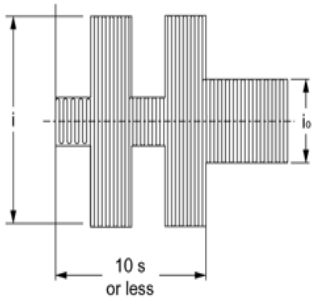
Inrush current/rated current = i/i_o = 10 to 15 times

(2) Mercury Lamp Load i/i_o = 3 times

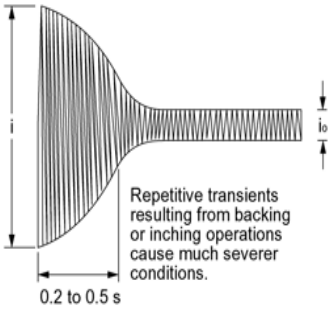


In general, discharge lamp circuits use a combination of a discharge tube, transformer, choke coils, and capacitors. Note that the lamp may draw an inrush current may be 20 to 40 times the steady-state current, especially if the supply impedance is low in the high power factor type.

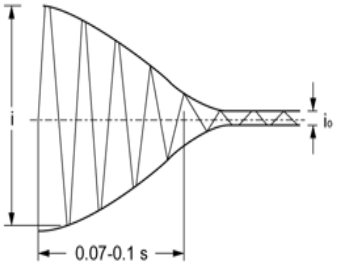
(3) Fluorescent Lamp Load i/i_o = 5 to 10 times



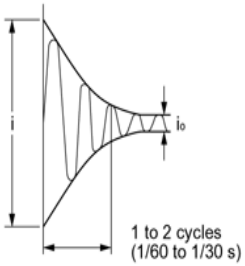
(4) Motor Load i/i_o = 5 to 10 times



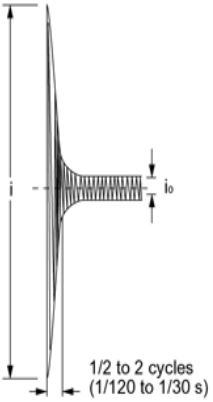
(5) Solenoid Load i/i_o = 10 to 20 times



(6) Electromagnetic Contact Load i/i_o = 3 to 10 times



(7) Capacitive Load i/i_o = 20 to 40 times



Load charecteristics curves are for reference only, all data is reference data.