QAS ARC SUPPRESSION APPLICATION NOTES

Spark Arc Suppression circuits (RC networks), are designed to reduce arcing and noise generated and produced in switches, mechanical relays, and Solid Stated Devices.

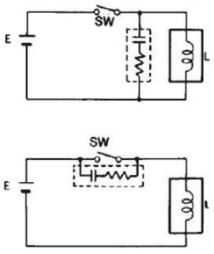
When these devices open a circuit, an arc can develop across the contacts, eroding the contacts and or damaging the solid-state components over time. To prevent this phenomenon, an RC network is placed across the contacts and or across the inductive load depending on the application.

How arc suppression works

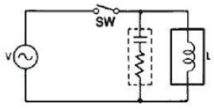
1. When the contacts in an arc suppression circuit open, the applied voltage is placed across the capacitor, not the contacts.
2. The capacitor charges at a rate faster than the contacts open which prevents an arc from forming across the contacts.
3. When the contacts close, the inrush current from the charged capacitor and source can be substantially higher than the contacts can safely conduct, causing the contacts to deteriorate. This is why it is important to have a resistor in series with the capacitor.
4. The resistor acts as a current limiter which reduces the inrush current by a significant amount. The arc produced at the contact closure is greatly reduced, thus extending the service life of the contacts.

   For DC voltage application typically the RC network will be connected across the relay contacts, and for AC voltage application it will be connected across the load. See right

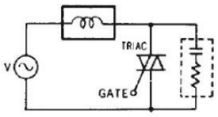
Application Examples



Standard example in DC circuits.



Standard example in AC circuits.



For phase control circuits employing SCR or TRIAC, etc.

Calculating arc suppression circuits

The values of required capacitance and resistance of an arc suppression circuit can be approximated from the formulas developed by C.C. Bates in his paper titled “Contact Protection of Electromagnetic Relays.” (Electro-mechanical Design, August, 1966.)

$$C = \frac{I^2}{10}$$

$$R = \frac{V}{10\left(1 + \frac{50}{V}\right)}$$

C= capacitance in µF
I = Current before contact opens (Load Current in amps).
R = Resistance in Ohms
V = Voltage Source

If one cannot find the exact calculated values, don’t worry approximate values will also work, or contact us for further assistance.

The best method of finding the values is with a storage oscilloscope and using different combination values of resistors and capacitors while observing the amount of spike reduction on the scope. Then one should change the values or R and C until the desired spike reduction is achieved.