

Suppressing circuits

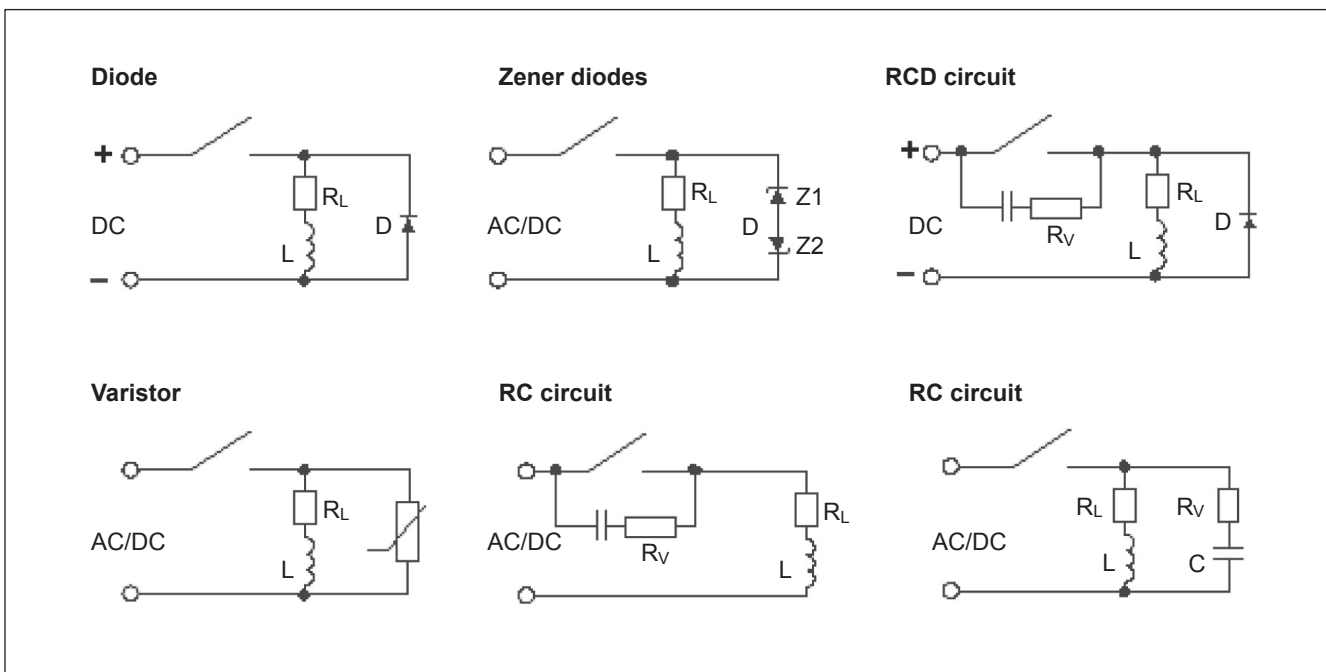
In order to protect contacts against their damage by electric arc, protection circuits are used which are fitted in parallel to contacts of the relay or to the load. Appropriate suppressing elements may also be connected both to the contacts and the load.

The most common method of arc suppression in DC circuits is using a **diode** in parallel to the load. This is an efficient and cost-saving solution applicable at various values of the load. The inverse voltage of the diode should be at least 10 times higher than the rated voltage of the circuit, and the conduction current should be equal to or higher than the load current. It

must be emphasized that diodes prolong the time of switching off the relay considerably, which delays opening of the contacts and this is conducive to their burnout.

In order to decrease the effect of the arc suppressing circuit, on switching off the load, **two Zener diodes** may be used instead of the diode parallel to the load. In such a circuit, the inverse voltage is limited by Zener diode do the regulated voltage. The breakdown voltage of the Zener diode must be higher than the supply voltage of the circuit. The disadvantage of this solution is its lower effectiveness and higher cost.

Fig. 23. Protection circuits



A **varistor** is another protection element of current-voltage characteristics similar to Zener diode. For low voltages it shows high resistance and, then, it is practically disconnected from the circuit whereas when the voltage exceeds certain voltage, characteristic for the given varistor, its resistance decreases quickly and, then, it shunts the inductive load with its internal resistance.

Unlike diode and varistor circuits, **RC circuits** may be connected in parallel both to the load and to the contacts of the relay. When the contact opens, the capacitor connected in parallel starts charging itself and its voltage grows at the time constant of R and C values.

This helps to maintain low voltage on the relay contacts and, thus, diminish the effect of the electric arc. Ehen the contact closes, the capacitor connected in parallel to the capacitor consists limitation of current. Thus, the RC circuit optimizes all the intermittent processes in the course of opening and closing of the contacts. At AC voltages the load impedance must be lower than the RC circuit impedance.

In order to enhance the effectiveness of arc suppression in direct current circuits of high inductiveness of the load, **RCD circuits** may be used, where the RC element is connected in parallel to the relay contact and the diode - in parallel to the load.