

Arc discharge and surge suppression at breaking operation of a magnetic relay.

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Abstract

In a switching circuit with the inductive load, the arc discharge and the surge generated at breaking operation are big problems. We proposed the electric method for the arc discharge suppression by using the timely controlled transient current switch and the capacitor, which are parallel to the energizing switch. In this paper, we propose the improvement. We separated the capacitor into two functions. One is to suppress the arc ignition and the other is to suppress the surge. Using the equivalent circuit analysis, the adequate capacitance values and series resistance are numerically derived. The capacitance to suppress the arc ignition does not depend on the load inductance but depend on only its resistance. However, the capacitance and its series resistance to suppress the surge depend on the load inductance and its resistance. For the break operation (50V/8A) of a conventional magnetic relay (HH62P) with a inductive load (84mH), a capacitor of 1 μ F can suppress the arc ignition and a capacitor of 100 μ F and a resistance of 8 Ω is sufficient to suppress the surge within 4ms. No arc ignition and controlled surge less than 200V were experimentally confirmed.