comat RELECO

Application Report

High inrush currents with Electronic ballasts

Area Building technology

Building Technology

Capacitive inrush currents

Zero crossing circuit

Service contacts

Lighting technology has been in a state of flux for several years now. Classic incandescent lamps are increasingly being replaced by more energy-efficient light sources light sources such as fluorescent lamps or LEDs. These light sources have one thing in common: their operation requires the use of electronic ballasts (EBs). If conventional relays are used for control, the contacts wear out after a short time.

ComatReleco products in operation

- CHI14 / CHI34 - Installation relay
- RIC40 / RIC63 - Installation contactor
- C7-W10 - Industrial relay

The switching of electronic ballasts and energy-saving lamps with integrated electronic ballasts places increased demands on the upstream equipment such as relays or contactors, which must already be taken into account when planning a new installation. The new conditions must also be taken into account when retrofitting an existing lighting system; the switching components must be adapted to the new loads. But be careful: the problem does not only arise in connection with light sources. The design of modern switched-mode power supplies of many devices brings the same problem to other areas of electrical engineering and installation. The low operating current of current devices contrasts with a very high inrush current, which must be taken into account when dimensioning the switching devices.

Switch-on behaviour of ECG

ECGs and switching power supplies cause an inrush current peak at the moment of switch-on. The cause of high inrush currents is to be found in the capacitors that are used used in electronic ballasts after the rectifier stage for smoothing and as energy storage. If the capacitor is completely discharged, a charging current similar to a short circuit can occur during the first microseconds when switching on. Our example with an ECG for 2×24W T5 fluorescent lamps shows that peak currents of over 22A - measured at phase maximum - and a half-life of 305µs can indeed occur. In normal operation, this ballast only draws a current of 220mA. This means that the inrush current is 100 times higher than the rated current. A look at the data sheets of well-known ballast manufacturers shows that inrush currents of 60A are also possible - with a lamp wattage of just under 100W. In practice, complete lighting groups are usually connected together. Thus, the effect of the high inrush currents accumulates even more.

High demands on relays

Common relay types use silver alloys, such as silver-nickel (AgNi), as contact materials. These are not designed for inrush currents that exceed the rated current many times over. Due to the resulting thermal stresses, the contact pills can weld after only a few switching cycles. The result: The consumer can no longer be switched off. When the relay is switched, an arc is created at the moment the contact tongues approach each other. This is intensified by the contact bounce that occurs with mechanical contacts. The effect is mainly influenced by the level and half-life of the inrush current. The resulting temperatures may well exceed the melting point of the contact alloy, which leads to welding of the contact tongues. In order to dimension the relays correctly, a look at the data sheets of the manufacturers of relays and consumers is helpful as a first step. Often the values of the inrush current and the duration of the peak are disclosed. With disproportionately high inrush currents, the risk of welding is extremely high, which is why the contact material must meet increased requirements. You will find information on dimensioning in the data sheets of our products.

Relay for high inrush currents up to 800 A

Especially for inrush currents up to 800 A the ComatReleco has developed the power relays of the CHI series. The CHI14 is equipped with one, and the CHI34 with three tungsten leading contacts (W/AgSnO2). Compared to conventional silver alloys, this contact material has a higher melting point, which allows switching of inrush currents up to 800 A during 200 µS and 165 A for 20 ms. Another special feature of these high-tech products is the zero-voltage switching. This reduces the inrush current many times over. With 16 A rated current and a DIN housing with a mounting width of 17.5 mm for the CHI14 and 35 mm for the CHI34, these devices are suitable for distribution board installation and for retrofitting existing installations. Thanks to almost noiseless switching, use in living areas is possible without any problems. In addition to the three power contacts, the three-phase CHI34 also has a feedback contact and a service switch for manual operation of the relay. The CIM14 multifunction time relay, which is identical in construction to the CHI14, provides ten additional time functions, including a step switch and staircase timer. The contactors of the RIC series have double-breaking contacts with a large contact area. Thanks to AgSnO2 contacts, the RIC40 and RIC63 types are able to switch currents of up to 150 A for 100 ms. The RAC versions with on-off-auto function and the RBC step switches are also interesting for the installation sector. For the industrial sector, the pluggable relay C7-W10 is available. With the tungsten pre-contact (W/AgSnO2), inrush currents of up to 500A can be handled for 2.5ms.

ComatReleco AG | Bernstrasse 4 | 3076 Worb | Switzerland
Phone +41 31 838 55 77 | Fax +41 31 838 55 99
info@comatreleco.com | comatreleco.com | WorldofRelays.com