



X - CONTROL, PROTECTION, CONNECTION OF CAPACITORS

1) CONTROL DEVICE

In the case of high-speed cycle loads (welding machines, etc.), conventional systems (electro-mechanical contactors) are no longer suitable for controlling capacitors. High-speed switching compensation systems with solid state contactors are required.

ALPES TECHNOLOGIES offers this type of equipment.

The engagement current of a capacitor depends on:

- the power of the capacitor,
- the short-circuit power of the network to which it is connected,
- whether capacitor banks already engaged are present or not.

Given these parameters, it is essential to use quick opening and closing control devices (switches, contactors, etc.).

When selecting the switch gear, the user must be made aware of the choice of equipment (capacitor control).

Contactors are specially designed by contactor manufacturers for capacitor control, particularly for automatically controlled banks.

These contactors are equipped with auxiliary contacts combined with preload resistors used to limit the current requirement during engagement.

If these contactors are not equipped with these preload resistors, an inductance (shock self-induction coil) of a minimum value of 5 microH must be produced with the cable connecting the contactor to the capacitor.



2) PROTECTION

In addition to the internal protective devices incorporated in the capacitor:

- self-healing metallized polypropylene film,
- internal fuses,
- overpressure disconnecting device ;

it is essential to provide an external protective device on the capacitor.

This protection will be provided either:

- by a circuit breaker:
 - . thermal relay, setting between 1.3 and 1.5 In,
 - . magnetic relay, setting between 5 and 10 In.
- by GI type HRC fuses, rating 1.5 to 2 In.

In = Nominal capacitor voltage,

$$I_n = \frac{Q_c}{\sqrt{3} U}$$

E.g.: 50 kvar - 400 V three-phase

$$I_n = \frac{50}{1,732 \times 0,4} = 72 \text{ A}$$

3) CONNECTION (CABLE DESIGN)

Applicable capacitor standards are defined so that capacitors can withstand a permanent excess current of 30%.

These standards also authorise a maximum tolerance of +10% on the nominal capacitance.

Therefore, the cable should be designed at least for:

$I_{\text{cable}} = 1.3 \times 1.1 \cdot (I_{\text{nominal capacitor}})$

i.e. $I_{\text{cable}} = 1.43 \cdot I_{\text{nominal}}$