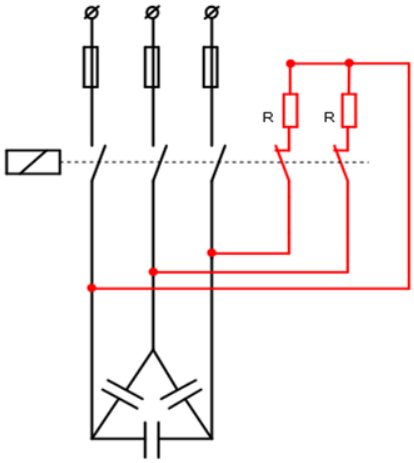
FAST DISCHARGE RESISTORS

Connection of power capacitors in Automatic capacitor banks can produce high transitories of connection (see **TS 03-012I: Selection of contactors**). If, besides, the capacitor being connected is not enough discharged, transitory of connection increases considerably and it can damage both, contactors and capacitors.



IEC 831 Standard establishes that power capacitors must have a residual voltage lower than 10% their rated voltage at the moment of their connection. This voltage value cannot be achieved in capacitors only having conventional discharge resistors, due to the so small delay times used by the reactive power controllers.

In consequence, in the case of automatic capacitor banks it is imperative to use those named fast discharge resistors. Fast discharge resistors (see enclosed diagram) have a more reduced ohmic value than conventional resistors and they are connected by means of two auxiliary contacts (normally closed) of the contactor, acting at the moment the capacitor is being disconnected.

Calculation of fast discharge resistors

For the dimensioning of fast discharge resistors it is followed a similar procedure to the one used for the usual discharge resistors (see **TS 03-010I**), taking into account, however, the requirement of discharge at 10 % of the rated voltage ($U_R = 0.1U_N$):

$$R \leq \frac{t}{3 * \mathrm{C} * \log_e * \left(U_N\sqrt{2} \,/\, U_R\right)} = \frac{\mathrm{t}}{\mathrm{C} * 7{,}947}$$

By knowing the necessary discharge time (which must be smaller to the retard time of the controller used), value of the necessary resistors can be easily calculated.

Fast discharge resistors FDR series

International Capacitors has a range of fast discharge resistors that cover a wide field of application. To facilitate their installation, both two resistors are offered mounted over one single body of ceramics material strongly resistant to temperature.
In the table are shown the available values, as well as capacitor rated powers to which they can be applied.
(T time pointed is the approximated discharge time to achieve 0.1 U_N, either at 50 or 60 Hz).

Reference	Resistor R	U_N = 220/230/240 V	U_N = 380/400/440 V	U_N = 460/480 V	T (s)
FDR40025	2 x 1500 ≤ 10 W	Q_C ≤ 10 kvar	Q_C ≤ 25 kvar	Q_C ≤ 30 kvar	2 s
FDR40060	2 x 1000 ≤ 10 W	Q_C ≤ 20 kvar	Q_C ≤ 60 kvar	Q_C ≤ 80 kvar	3 s
FDR40100	2 x 1000 ≤ 18 W	Q_C ≤ 40 kvar	Q_C ≤ 100 kvar	Q_C ≤ 100 kvar	6 s