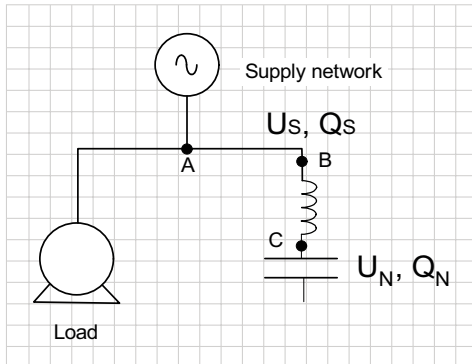


Capacitors rated voltage with Detuned Reactor



Refer to the picture above and consider the following:

- U_S : system voltage (V),
- Q_S : requested reactive power (kvar)
- U_N : capacitor rated voltage (V)
- Q_N : capacitor rated power (kvar)

User Tip:

Use VarSelect V1.0 software to select components for given step size

VarPlus or EasyCan capacitors when used along with detuned reactors have to be selected with a rated voltage higher than network service voltage (U_S).

The recommended rated voltage of capacitors to be used in detuned filter applications with respect to different network service voltage (U_S) and relative impedance is given in the table below. These values ensure a safe operation in the most stringent operating conditions.

Less conservative values may be adopted, but a case by case analysis is necessary.

Capacitor Rated Voltage (U_N) V		Network Service Voltage (U_S) V				
		50Hz		60Hz		
		400	690	400	480	600
Relative Impedance (%)	5.7%					
	7%	480	830	480	575	690
	14%	480		480		

Example of Capacitor Selection with a Detuned Reactor

Case: For a 400V 50Hz system, It is required to connect a VarPlus Can of 25kvar reactive power with a detuned reactor with 7% relative impedance P (Tuning factor = 3.8).

$$Q_S = 25\text{kvar},$$

$$U_S = 400\text{V},$$

$$P = 0.07$$

Step 1: Calculation of the capacitor rated voltage

The voltage applied to the capacitor is given by the formula:

$$U_C = U_S / (1 - P)$$

$$U_C = 400 / (1 - 0.07) = 430.1 \text{ V}$$

The Capacitor will be chosen with $U_N = 480\text{V}$. (Less Stringent values can be adopted based on the network conditions)

Step 2: Calculation of capacitor reactive power

1. Reactive power delivered by the capacitor in the capacitor reactor combination at system voltage is(Q_C) is

$$Q_C = (1-P) \times Q_S = (1-0.07) \times 25 = 23.25\text{kvar}$$

at the network voltage (U_N) the capacitor will deliver 23.25kvar.

2. Rated power of capacitor at rated capacitor voltage (Q_N)

Rated capacitor voltage (U_N) = 480V

Capacitor delivered power at Network voltage (U_S) = 23.25kvar

Capacitor power at capacitor rated voltage (Q_N)

$$Q_N = Q_C \times (U_N/U_S)^2 = 23.25 \times (480/400)^2 = 33.5\text{kvar}$$

The capacitor will be chosen for 33.5 kvar at 480V for delivering 25kvar with a 7% reactor in a 400V 50Hz system. Use Reference number BLRCH339A407B48

Combination of capacitor with part number **BLRCH339A407B48** and detuned reactor with part number **LVR07250A40T** will give 25kvar at Point B (Refer picture above).