4. Power Factor Improvement

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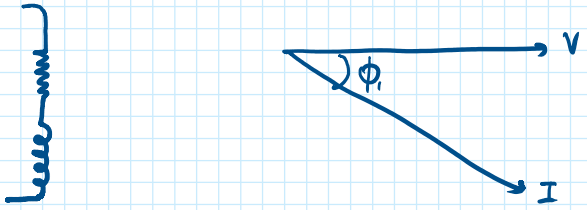
POWER FACTOR

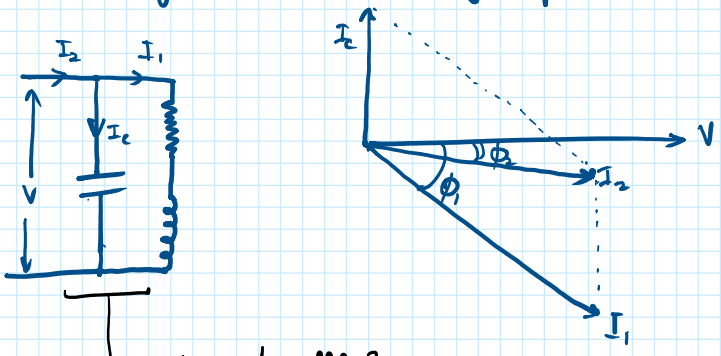
- I^2R losses reduced
- Reactive power reduces
- Higher PF ⟶ utilises higher capacity of electrical system
- Improves performance of the motor

Power factor improvement



Add a capacitor to reduce lag.

Amt. of current drawn by capacitor ⟺ Amount of reactive power reduced



Why parallel ?

Q. The load taken from AC supply consist of a heating load of 15 kW, a motor load of 40 kVA at 0.6 lag and a load of 20 kW at 0.8 lag. Calculate the load from supply in kW and kVA and its power factor. What would be the kVAR rating of a capacitor to bring the power factor to unity and how would it be connected ?

Soln.

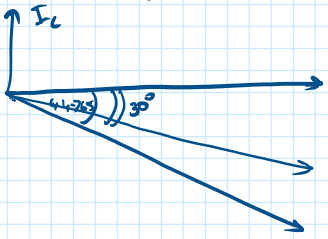
Soln.

Q. The power consumed in the inductive load is 2.5 W at 0.71 lagging power factor. The input voltage is 230 V, 50 Hz. Find the value of the capacitor C which must be placed in parallel, such that the resultant power factor of the input current is 0.866 lagging.

$P_I = 2.5$ W

$\cos\phi_1 = 0.71$

$\phi_1 = 44.765°$



$Q_c = \frac{V^2}{X_c}$

$VI = 3.52$ kVA

Q A network consists of 2 branches, the 1st branch is a coil having resistance of 6Ω and an inductance of 25.46 mH. The 2nd branch has resistance of 8Ω connected in series with a capacitor of 530.52 μF. The supply voltage is 200 V 50Hz. Determine:

(i) Current in each branch

(ii) Source current

(iii) Active and reactive power in branch 1

(iv) Active and reactive power in branch 2

(v) Overall power factor of the circuit