

Power in AC circuits

In **AC circuits** we can define **three kinds of power**:

- active (P)
- reactive (Q)
- apparent (S)

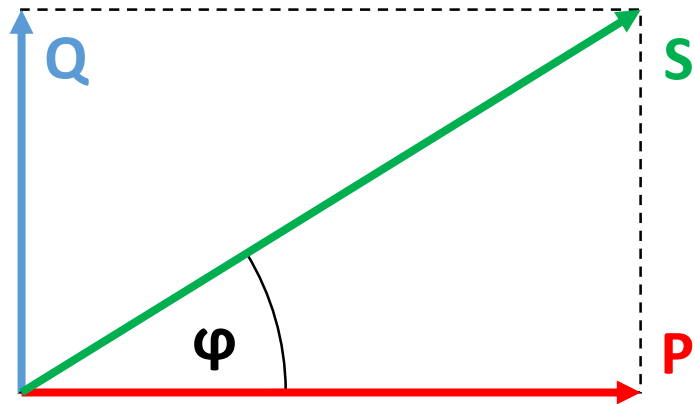
Active power

- dissipated on resistive load
- does useful work
- measured in watt [W]

Apparent power

- total power consumed by the AC circuit
- measured in volt-ampere [VA]

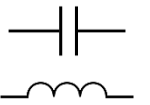
$$S = V_{\text{RMS}} I_{\text{RMS}}$$



$$S^2 = P^2 + Q^2$$

Reactive power

- dissipated on reactive load
- builds up electrical (C) or magnetic (L) field
- causes loss on grid
- can be negative (C) or positive (L)
- can be compensated with power of the opposite sign
- measured in volt-ampere reactive [VAr]



Power factor ($\cos\phi$) is the ratio between active and apparent power.

$$\cos\phi = \frac{P}{S}$$