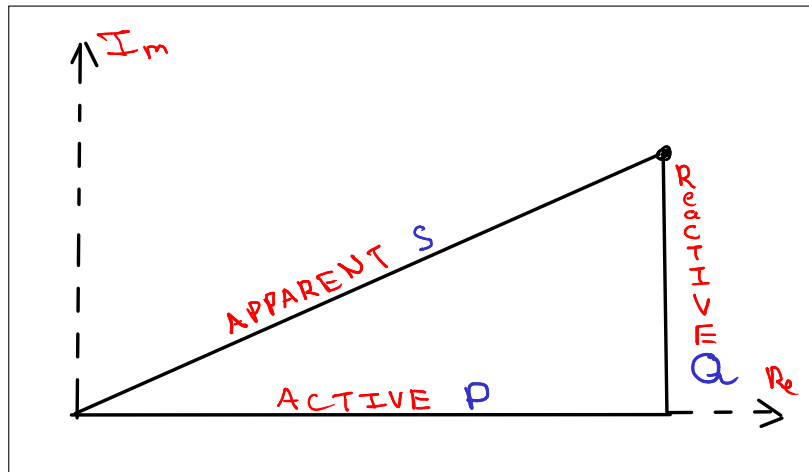


# Formula Sheet EE2E11

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## 1 Power



Name	Type	Symbol	Unit
Complex Power	Complex Value	$S$	VA
Active Power	$\text{Re}(S)$	$P$	W
Reactive Power	$\text{Im}(S)$	$Q$	VAr
Apparent Power	$ S $	$ S $	VA

### 1.1 Factors

Power Factor	$\frac{\text{Active Power}}{\text{Apparent Power}} = \text{Distortion Factor} * \text{Displacement Factor}$
Distortion Factor	$\frac{\text{RMS of fundamental}}{\text{RMS of total}} = 1$ (when no harmonics)
Displacement Factor	$\cos \phi$ , where $\phi$ is phase difference between voltage and current

## 2 Three-phase

Property	Y	$\Delta$
Voltage	$V_{LL} = \sqrt{3}V_\phi$	$V_{LL} = V_\phi$
Current	$I_L = I_\phi$	$I_L = \sqrt{3}I_\phi$
Phase	$V_{ab}$ leads $V_a$ by $30^\circ$ $I_a$ lags $I_{ab}$ by $30^\circ$	
Active Power	$P = \sqrt{3}V_{LL}I_L \cos \phi$	
Reactive Power	$Q = \sqrt{3}V_{LL}I_L \sin \phi$	
Apparent Power	$ S  = \sqrt{3}V_\phi I_\phi$	

- All powers are given as total power (  $3 * \text{Power of single load/coil}$  )
- $V_\phi$  is voltage across one coil.
- $I_\phi$  is current through one coil.
- $\phi$  is phase difference between voltage and current (conventionally, voltage has 0 phase offset).

**Parama's equation**     $P = \frac{V}{I}$      $V$  is voltage,  $I$  is current,  $P$  is power.