Apparent Power Control Systems

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REACTIVE POWER

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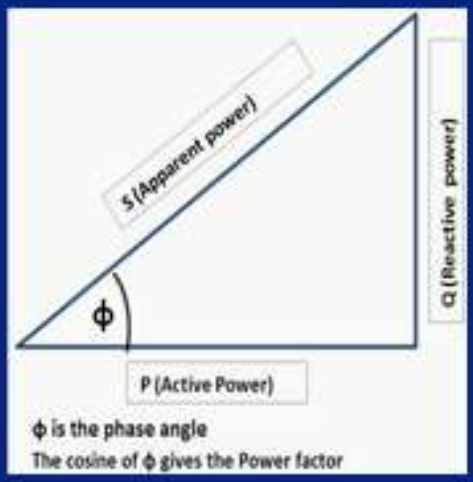
• While active power is the energy supplied to run a motor heat a home, or illuminate an electric light bulb,and reactive power provides the important function of regulating voltage.
• If voltage on the system is not high enough active power cannot be supplied.
• Reactive power is used to provide the voltage levels necessary for active power to do useful work.

NECESSITY OF REACTIVE POWER COMPENSATION

•AC power source generates the reactive power.
• In the first quarter part of AC cycle, capacitor stores the (VAR) and in the next quarter cycle, the reactive power gets returned back to AC the power source.
• Thus the reactive power moves back & forth between AC source and Capacitor or reactor at frequency double the rated frequency.



NECESSITY OF REACTIVE POWER

• Reactive power plays a very important role while we transmit active power through transmission lines.
• This reactive power used to improve power factor of the system.
.• Sometimes receiving end voltage goes higher than the sending end voltage, which makes the voltage regulation negative.
• This effect is termed as Ferranti effect.
•If the voltage drops too low some generator will disconnect automatically to protect them -selves.

PROBLEMS OF REACTIVE POWER

• It increases drawn current for the same loadlevel,which in the turn increase lossses, maintenance and cost of the power system operation.
• Since the current flowing through your electrical system is higher than that of necessary to do the required work.
• If the reactive power exists excess amounts will greatly reduce system power factors.

METHODS OF REACTIVE POWER SHUNT COMPENSATION

• Shunt Compensation.
• Series Compensation.
• Static VAR compensators (SVC).
• Self - commutated VAR compensator.
• Static Synchronous Compensator (STATCOM)

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$$\text{Apparent Power} = v\ (\text{True power}^2 + \text{Reactive Power}^2)$$

$$kVA = v\ (kW^2 + kVAR^2)$$