

## General information

### Options for correcting power factor

#### Options for Correcting Power Factor

There are three primary methods of correcting power factor:

- **Individual Capacitor Units** - One capacitor unit for each inductive load.
- **Banks of Capacitor Units** - Large Capacitor System connected to the line at some central point in the distribution system.
- **Combination of Above** - Where individual capacitors are installed on the larger inductive loads and banks are installed on main feeders or switchboards, etc.

#### Individual Capacitor Units

Power factor correction is best achieved with individual capacitor units located directly at the inductive load (in most cases a motor). This has many of the advantages of capacitor bank installations including some advantages capacitor bank installations cannot offer.

##### Advantages of individual capacitor units:

- **Increased Distribution System Capacity** - Only individual capacitor units can improve power consumption efficiency throughout the entire distribution system all the way to the load! Therefore, where wiring is being overloaded by induction motors, increased system capacity can be obtained by reducing the load and adding individual power factor correction units.
- **Stabilized Voltage Levels** - Voltage drops to individual inductive load are reduced thereby decreasing heat damage caused by excessive currents.
- **Lower Losses** - When individual capacitor units are installed directly at the terminals of an inductive load such as a motor or transformer, the line losses are reduced.
- **Capacitor & Load Can Be Switched ON/OFF Together** This ensures that the motor cannot operate without the capacitor; and also ensures that the capacitor only operates when needed.

#### Fixed and Automatic Capacitor Banks

Group installation of capacitors is achieved in two ways:

- **Fixed Capacitor Banks** - Individual capacitors racked in a common enclosure with no switching or stepping capability.
- **Automatic Capacitor Banks** - Individual capacitors racked in a common enclosure with switching capability. The capacitors are turned on and off by a micro-processor based controller. The controller also provides network data and alarm conditions to the user. Network data consists of power factor, volts, amps and harmonic distortion.

##### Advantages of fixed or automatic bank systems

- **More Economical** - Capacitor banks are more economical than individual capacitor units when the main reason for power factor correction is to reduce utility power bills and/or reduce the current in primary feeders from a main generator or transformer. Large banks or racks of capacitors are installed at the main switchboard or at the substation thereby increasing power factor and obtaining the advantages of lower power consumption.
- **Lower Installation Costs** - The cost of installing one fixed or automatic capacitor bank unit will be less than installing a number of individual capacitors at inductive loads.



- **Switching** - Automatic capacitor banks can switch all or part of the capacitance automatically depending on load requirements. This way, only as much power factor correction as needed for the given load is provided. (This switching capability is a primary advantage over fixed capacitor banks where over-capacitance, leading power factor and resulting overvoltages can occur should the load decrease.)
- **Monitoring** - Automatic capacitor bank controllers provide network data and alarm conditions to the user. Network data consists of power factor, volts, amps and harmonic distortions.