MOTOR POWER FACTOR CORRECTION

CALCULATIONS

REACTIVE OUTPUTS FOR DIFFERENT CONNECTIONS

\[
\frac{V_n I_L}{1000} \quad \frac{2 \pi f C V^2 n}{10^3}
\]

\[
\sqrt{3} \frac{V_n I_L}{1000} \quad \frac{4 \pi f C V^2 n}{10^3}
\]

Where
- \( f \) = Rated frequency
- \( V_n \) = Rated voltage
- \( C \) = Capacitance (microfarads)
- \( I_L \) = Line Current

MOTOR CAPACITOR FORMULAS

Nomenclature:
- \( C \) = Capacitance in \( \mu F \)
- \( V \) = Voltage
- \( A \) = Current
- \( K \) = 1000

A. Additional Data
1. Simplified Voltage Rise:
   \[ \% \text{L.R.} = \frac{\text{kVAR (Cap.)} \times \% \text{Transformer Reactance}}{\text{kVAR (Transformer)}} \]
2. Losses Reduction:
   \[ \% \text{L.R.} = 100 - 100 \left( \frac{\text{Original PF}}{\text{Improved PF}} \right)^2 \]
3. Operation at other than rated voltage and frequency
   \[ \text{Note: Use of voltages and frequencies above the rated values can be dangerous. Consult the factory for any unusual operating conditions.} \]
   a. Reduced Voltage:
      \[ \text{Actual kVAR (Output)} = \text{Rated kVAR} \left( \frac{\text{Actual Voltage}}{\text{Rated Voltage}} \right)^2 \]
   b. Reduced Frequency:
      \[ \text{Actual kVAR} = \text{Rated kVAR} \left( \frac{\text{Actual Freq.}}{\text{Rated Freq.}} \right)^2 \]
   c. Examples:
      (a) Voltage Reduction:
         \[ \text{kVAR (208)} = \text{kVAR (240)} \left( \frac{208}{240} \right)^2 = 0.75 \]
         \[ (10 \text{kVAR @ 240V} = 7.5 \text{kVAR @ 208V}) \]
         \[ \text{kVAR (120)} = \text{kVAR (240)} \left( \frac{120}{240} \right)^2 = 0.25 \]
         \[ (10 \text{kVAR @ 240V} = 2.5 \text{kVAR @ 120V}) \]
      (b) Frequency Reduction:
         \[ \text{kVAR (50 Hz)} = \text{kVAR (60 Hz)} \left( \frac{50}{60} \right)^2 = 0.83 \]
         \[ (60 \text{kVAR @ 480V 60 Hz} = 50 \text{kVAR, 480V, 50 Hz}) \]