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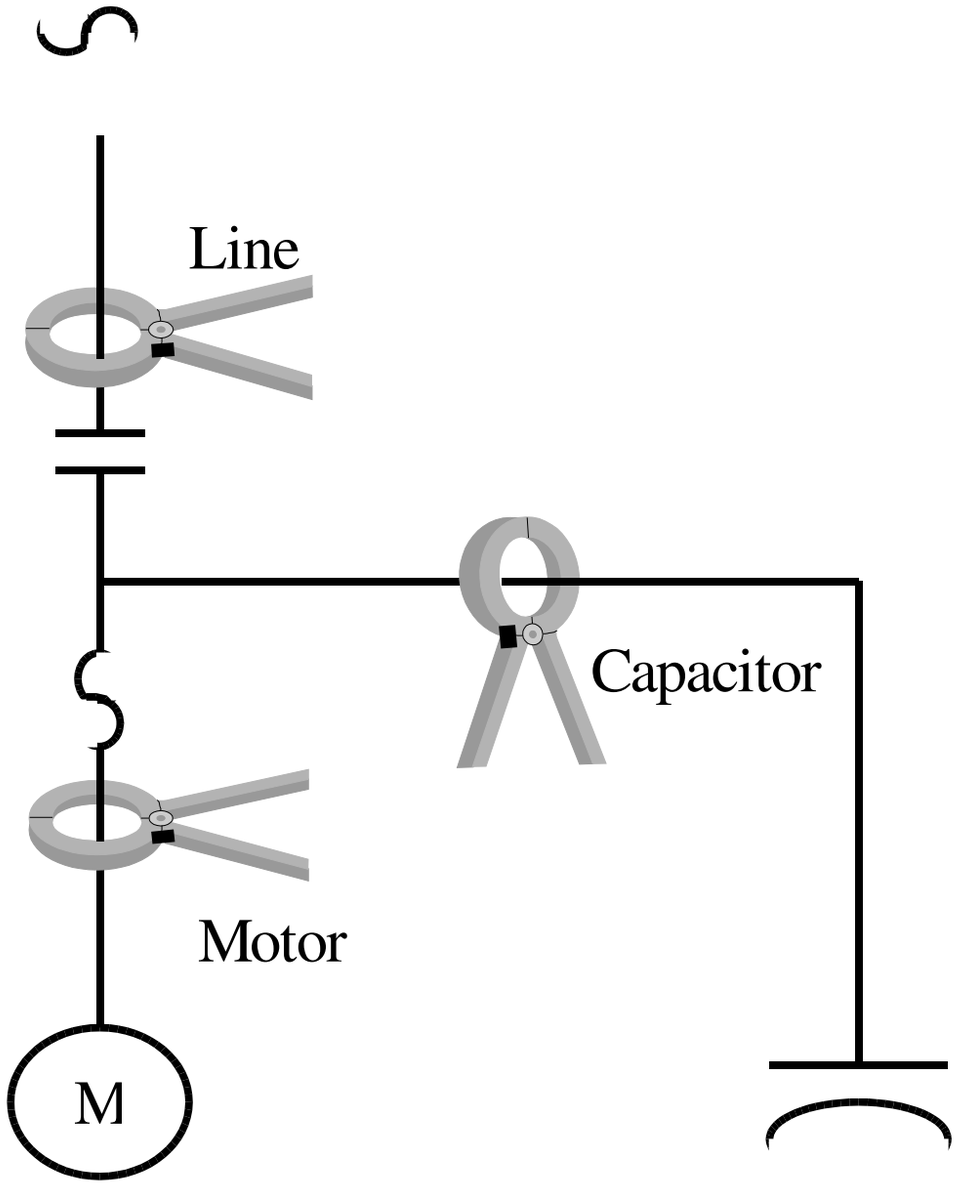
Calculating power factor from amperage

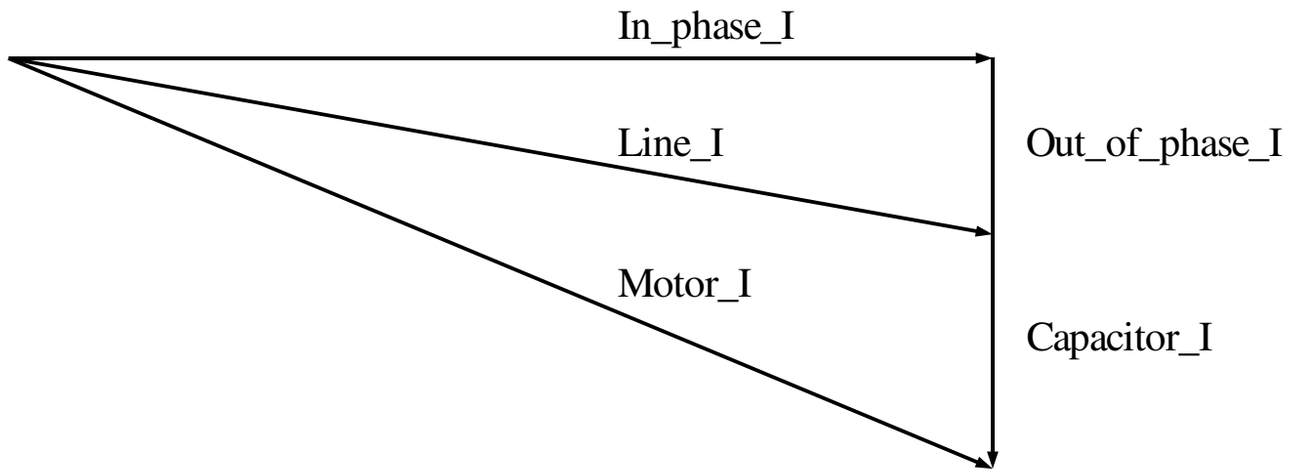
Amperage readings as taken in a motor starter where the capacitor is switched with the motor.



NOTES:

1) If the circuit is three-phase,
   a) the current must be approximately equal on all three phases of the motor, and
   b) the current must be approximately equal on all three phases of the capacitor.
2) The load on the motor must be constant while the three readings are taken.
3) If the load cycles, the cycles must be regular so readings can be obtained using a meter with an averaging function.

Amperage to Power Factor Explanation



Two right angle triangles can be described:
$In\_phase\_I^2 = Line\text{-}I^2 - Out\_of\_phase\_I^2$
$In\_phase\_I^2 = Motor\_I^2 - (Out\_of\_phase\text{-}I + Capacitor\_I)^2$

Written as one statement and simplified:

$Motor\_I^2 - (Out\_of\_phase\_I + Capacitor\_I)^2$	$= Line\ I^2 - Out\_of\_phase\_I^2$
$Motor\_I^2 - Out\_of\_phase\_I^2 - Capacitor\_I^2 - (Out\_of\_phase\_I \times Capacitor\_I \times 2)$	$= Line\_I^2 - Out\_of\_phase\_I^2$
$Motor\_I^2 - Capacitor\_I^2 - (Out\_of\_phase\_I \times Capacitor\_I \times 2)$	$= Line\_I^2$
$Motor\_I^2 - Capacitor\_I^2 - Line\_I^2$	$= Out\_of\_phase\_I \times Capacitor\_I \times 2$
$(Motor\_I^2 - Capacitor\_I^2 - Line\ I^2) \ / \ (Capacitor\_I \times 2)$	$= Out\_of\_phase\_I$

In phase current is calculated:
$Line\_I^2 - Out\_of\_phase\_I^2 = In\_phase\_I^2$

The power factor of the motor:
$In\_phase\_I / Motor\_I = Motor\_power\_factor$

The corrected power factor:
$In\_phase\_I / Line\_I = Line\_power\_factor$