Chapter 11, Solution 91

The nameplate of an electric motor has the following information:

Line voltage: 220 V rms
Line current: 15 A rms
Line frequency: 60 Hz
Power: 2700 W

Determine the power factor (lagging) of the motor. Find the value of the capacitance *C* that must be connected across the motor to raise the pf to unity.

Solution

I = V/Z which leads to Z = [220/15]$\angle\theta$ = 14.6667$\angle\theta$, S = (220)(15)$\angle\theta$ = 3.3$\angle\theta$ kVA, where $\cos^{-1}(2700/3300) = \cos^{-1}(0.818182) = 35.097°$, and X_L = 3300sin(35.097°) = 1897.38 = X_C. This leads to C = 1/[377(1897.38)] = **1.398 µF**.

pf = **0.8182** (lagging)

C = **1.398 µF**

0.8182 (lagging), **1.398 µF**