

# Three-Phase Power

Electrical Engineering

Line and phase quantities, and exactly where the  $\sqrt{3}$  belongs in each expression.

**In a balanced three-phase system the instantaneous total power is constant, not pulsating.**

$$P = \sqrt{3} V_L I_L \cos \varphi \cdot \text{Star: } V_L = \sqrt{3} V_{ph}$$

**400 V, 10 A, pf 0.9**

$\sqrt{3} V_L I_L \cos \varphi$ .

**$P \approx 6.2 \text{ kW}$**

**Star at 400 V line**

$400 \div \sqrt{3}$ .

**231 V per phase**

**Delta at 400 V line**

Line equals phase.

**400 V per phase**

## THE COMMON MISTAKE

✗ **Mixing line and phase values in one formula**

✓ **Keeping the two sets strictly apart**

Both routes give the same answer only if the quantities are consistent. Mixing them applies the  $\sqrt{3}$  twice, or not at all.

Educational reference. Three-phase systems carry lethal energy; qualified supervision and local electrical regulations govern practical