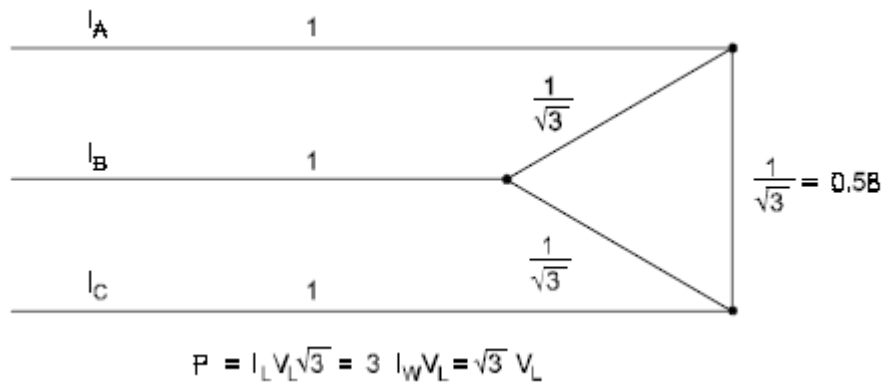




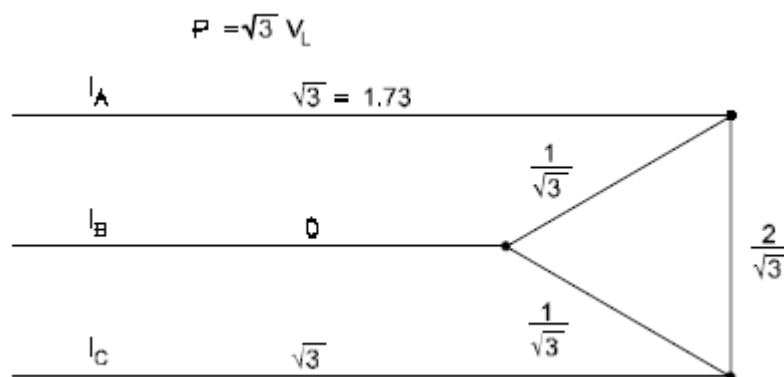
## TECHNICAL INFORMATION

## TITLE: SINGLE PHASING

Following is a simplified example that shows why an overload relay must measure phase unbalance to protect a motor when single phasing occurs. Assume 100% efficiency, unity power factor, and normalize line current to the balanced condition.



Line current  $I_L$  is the same as the overload current and winding current  $I_W = 0.58$ . Now assume that line B opens and that the motor continues to supply the same output shaft power.



Overload current increases from 1 to 1.73 to maintain the same output shaft power. Current in the windings connected to the open phase remains the same and current in the third winding doubles. Since heating is proportional to  $I^2$ , the heating anticipated by the overload is 3/4 of the actual heating in the third winding. Consequently, an overload relay must measure phase unbalance to protect a motor when single phasing occurs.

DATE	REV	AUTHOR	DOCUMENT LOCATION	PAGE
1996-Oct-07	1	GP	<a href="http://www.startco.ca/library/techinfo/section4/4.17.pdf">http://www.startco.ca/library/techinfo/section4/4.17.pdf</a>	1 of 1