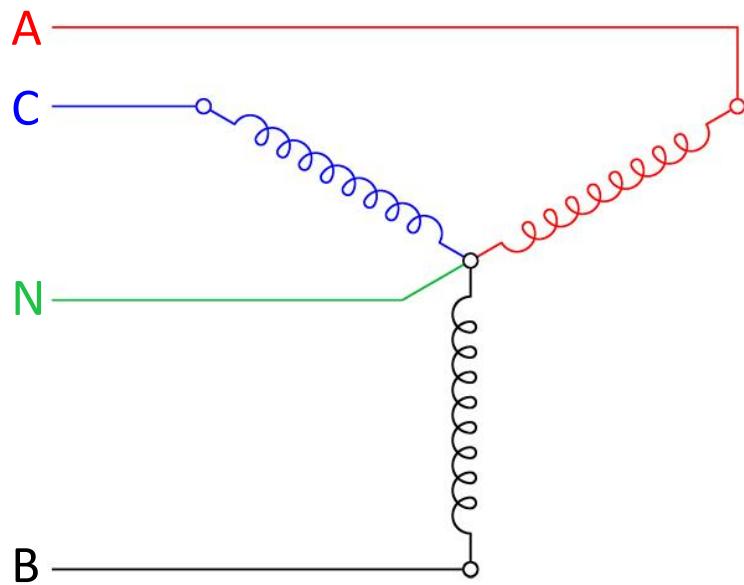


# Calculating the Neutral Current on an Unbalanced Non-Unity Power Factor 3φ, 4-wire Wye System

One single-phase motor is connected in each phase of a 3φ, 4-wire system with values indicated below. Calculate the current in the Neutral.



$M_1$  is connected to  $V_{AN}$  and draws 20 A at a 0.866 pf (30°).

$M_2$  is connected to  $V_{BN}$  and draws 15 A at a 0.707 pf (45°).

$M_3$  is connected to  $V_{CN}$  and draws 10 A at a 0.5 pf (60°).

Item	Horizontal	Vertical
$M_1 = 20 \text{ A} @ 330^\circ (0^\circ - 30^\circ)$	$\cos(330) \times 20 = 17.321$	$\sin(330) \times 20 = -10.000$
$M_2 = 15 \text{ A} @ 195^\circ (240^\circ - 45^\circ)$	$\cos(195) \times 15 = -14.489$	$\sin(195) \times 15 = -3.882$
$M_3 = 10 \text{ A} @ 60^\circ (120^\circ - 60^\circ)$	$\cos(60) \times 10 = 5.000$	$\sin(90) \times 10 = 8.660$
Totals:	7.832	-5.222

$$I_N = \sqrt{7.832^2 + -5.222^2}$$

$$I_N = 9.413$$