

AC 3 Phase Power

By G8MNY

(Updated Aug 08)

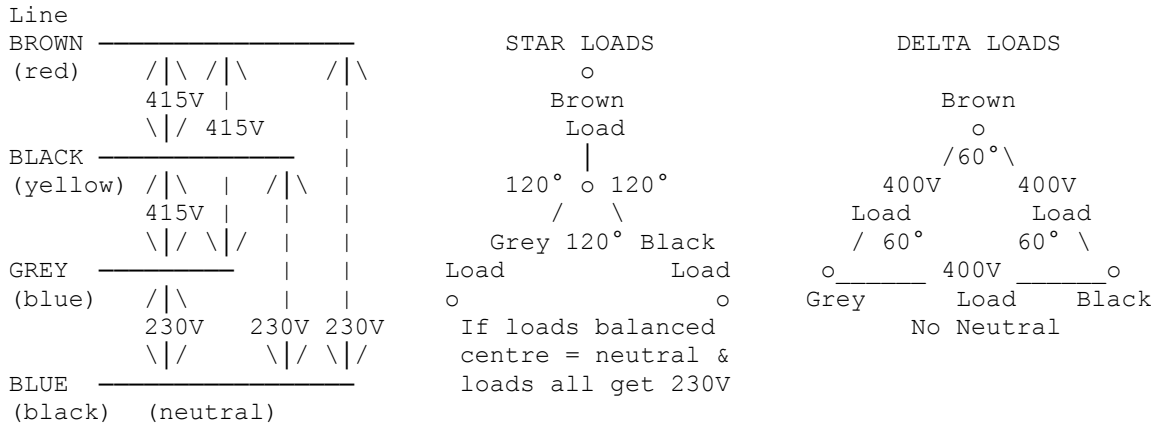
)

3 PHASE POWER

This is how AC power is normally generated & distributed, it is more efficient than other AC systems, except for DC that is the most efficient, but difficult & costly to transform the voltage at high power.

The wire colour scheme may differ between countries & also the voltage!

The phase angle between phases is 120°, because of this the voltages are added up vectorially, so at first sight 2x 230V does not make 415V between 2 lives. You divide by √3 (1.732) to get the line to neutral voltage.



The 3 line currents are normally loaded up to be as equal as possible to reduce the current in the neutral cable normal the same gauge. But Philip M1EUR reports that Neutral cable may need to be 2x the gauge (CSA) if electronic loads with very high harmonic current are used!

NEW COLOUR HAZARDS !

New EU colours are Brown Black Grey for Lives & Blue Neutral  
 replace red yellow blue for Lives & black Neutral. Green/Yel earth.

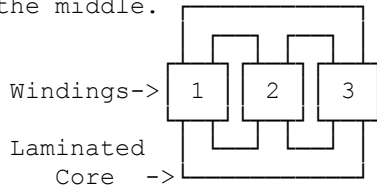
N.B. the lethal change for both BLACK & BLUE colours!

Also note the colour layout of new 3 phase 4 core cable means, that a joint can not be straight to an old cable & bigger joints casings will be needed to allow for at least 2 cores to be bridged!

Single phase will change from Red live, Black Neutral to Brown & Blue respectfully. But highly confusing in a 3 phase board with both old black wire loads for Neutrals & Black Bus feed for live! Brown & Blue sleeves are to be used over Red & Black wires!

3 PHASE TRANSFORMERS  
difference

being that 3 legs of the transformer carry the windings rather than just the middle.



The winding connections can be either STAR or DELTA or combinations of both.

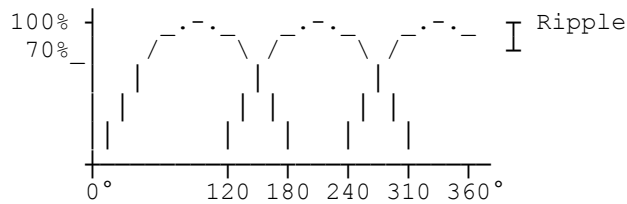
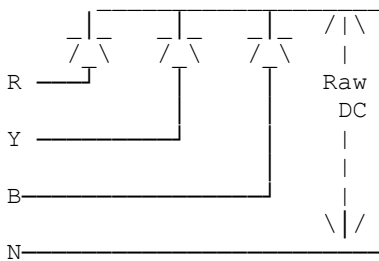
When cross connected star-delta a rotation of 90° in phase occurs. (eg 30° from other phases)



(due to magneto striction audio the hum given off from the steel is @ 300Hz)

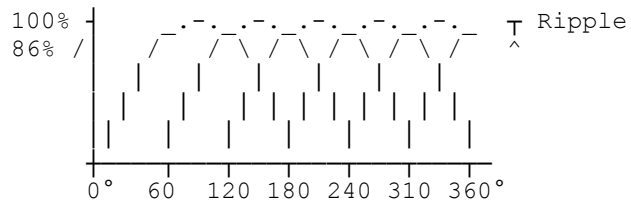
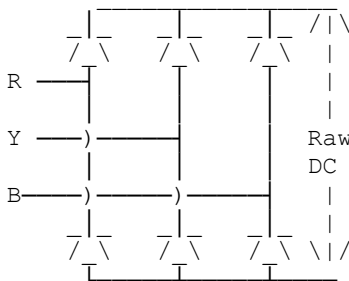
3 PHASE RECTIFICATION

With rectification 3 diodes gives about 30% ripple at 150Hz (3x supply) the ripple is not much as single phase, as some of the 120° voltages overlap.



3 PHASE BRIDGE RECTIFIERS

Only 6 diodes produce a 3 phase bridge & that gives about 14% @ 300Hz (6x supply) ripple peak to peak, as more of the 60° voltages overlap.

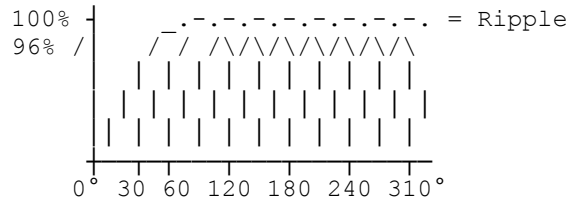
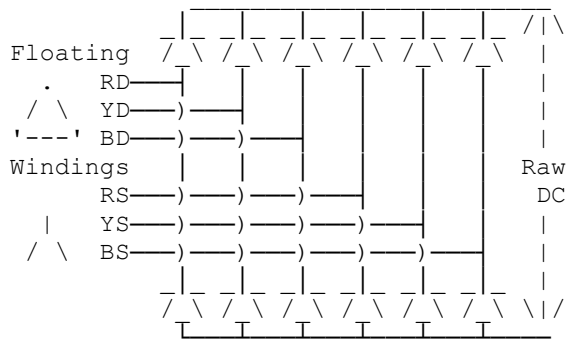


12 PHASE RECTIFIERS

With push pull or 3 phase bridge system, & using both star & delta windings there can effectively be 12 lines that are only 30° apart. This can also be achieved with push pull phase on each leg of the transformer.



Using 2x 3 phase bridges or 12 winding & diodes the resultant ripple is only about 3.6% @ 600Hz, assuming all the voltages are equal! Very little filtering is then needed for say a 100kW Tx HT supply.



Why Don't U send an interesting bul?

73 De John, G8MNY @ GB7CIP