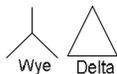




Q. Why do motor manufacturers offer the same HP motors as Wye connected and Delta connected. Are there any advantages one over the other. Also should such motors be fed from a Wye or Delta connected power source?



Industrial Manufacturing Plants in the USA are supplied with their 3 phase power from transformers that are connected on their secondaries (low voltage side) either in a wye (star) or delta configuration.

If your plant is supplied from a transformer that is wye connected, then this power supply provides not only 3 equal line to line voltages but also provides 3 equal line to neutral voltages. This latter condition occurs because the neutral of the wye connected transformer is connected to ground. In a 3 phase wye connected transformer @ 208 volts line you have 3 equal line to line voltages of 208v and 3 equal line to neutral voltages of 120v.

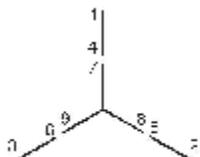
If your plant is supplied from a transformer that is delta configured 480v, then this power supply provides only 3 equal line to line voltages of 480v. Sometimes the delta configured transformer is grounded at the center point of one phase and in this case you would have the 3 equal line to line voltages of 480v plus 2 equal line to ground voltages of 240v and one 'high' leg to ground of 416v. If the above transformer was delta configured 240v, then you would have a high leg of 208v and 2 equal line to ground voltages of 120v

If a motor is connected to a wye or a delta configured transformer power supply it cannot tell the difference between them as long as the voltage of the motor matches the voltage of the power supply. So it does not matter to the motor whether it is connected to a wye or delta configured transformer.

In the USA we find that some motors are supplied connected in a wye configuration for normal operation and some come configured needing a delta connection. **The performance of both motors would be the same and there is no performance difference between them.** Also most motors are dual voltage rated ie 230/460v This 1:2 voltage ratio lends itself to the 9 lead winding.

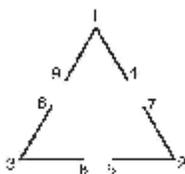
NEMA NOMENCLATURE—9 LEADS

DUAL VOLTAGE WYE-CONNECTED



VOLTAGE	L1	L2	L3	JOIN
HIGH	1	2	3	4,7,5&8,6&9
LOW	1,7	2,8	3,9	4&5,6&9

DUAL VOLTAGE DELTA-CONNECTED



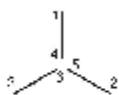
VOLTAGE	L1	L2	L3	JOIN
HIGH	1	2	3	4,7,5,8,6,9
LOW	1,6,7	2,4,8	3,5,9	

The delta connection is predominantly used on higher horsepower motors, where traditionally the number of turns needed in the winding is a small number. To allow the designer some latitude in his design he will use the delta connection because the Delta turns are 1.73 x the Wye turns of an equivalent winding, so instead of, say, a Wye connected motor needing 7 turns per coil the same flux could be produced with a Delta connection with 12 turns per coil, which also permits less total wire area in hand for the coil.

NEMA NOMENCLATURE—6 LEADS

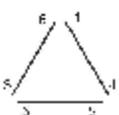
SINGLE VOLTAGE EXTERNAL WYE CONNECTION

L1	L2	L3	JOIN
1	2	3	4,5,6



SINGLE VOLTAGE EXTERNAL DELTA CONNECTION

L1	L2	L3
1,6	2,4	3,5



In the rest of the world they use the Wye/Delta dual voltage system but in this case the voltage ratio is not 1:2 but is 1:1.732

Common voltage ratings are 220/380v, 50Hz and 240/415v, 50Hz

Motors are commonly supplied with 6 leads which can be connected in Wye for High Voltage And Delta for Low Voltage.

Also it is common for motors to be set up for Wye Start /Delta Run. This allows a cushioned soft start which is very popular in Europe. In the USA most smaller motors are run across the line at full voltage.

Example: Take a 220/380v motor. It will run across the line on 220v as a Delta connection but on start up the motor will be connected Wye as if for 380v operation. Since we are still only supplying the motor with 220v we effectively are putting 220v on a 380v winding so the winding is weak and starts slowly, after a few seconds the motor is connected Delta and runs

across the line at 220v.

The delta connection has inherent circulating currents which are usually not significant and the use of equalized parallel circuits can minimize these.

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