Welcome to Electrical

Generation & Distribution

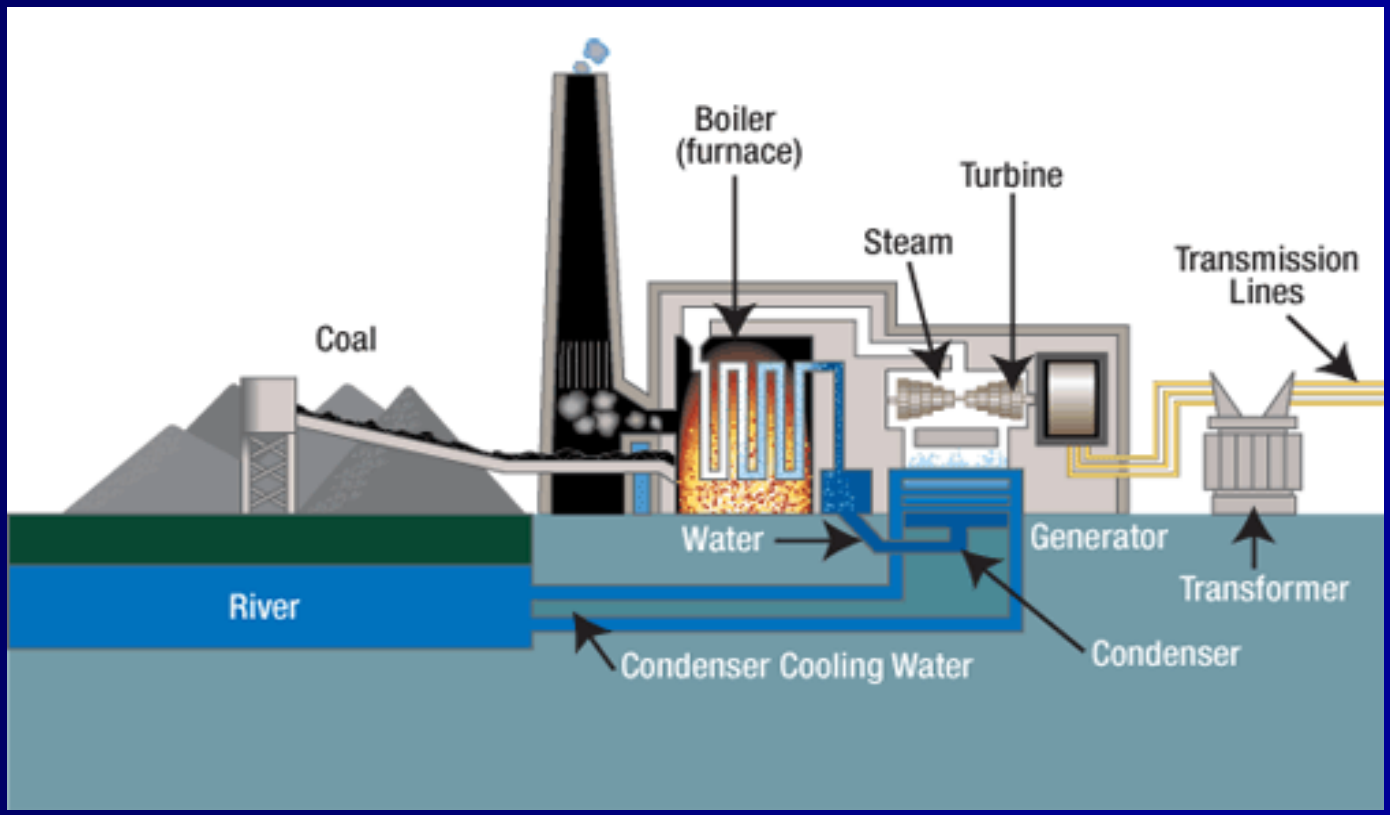
Generation

Electricity may be generated by using the following:

Fossil fuel resources
Coal, Gas & Oil.
Nuclear.
Natural resource, Wind Farms.
Geothermal.
Wave Energy.
Pumped Storage.
Solar.

Generation

Fossil fuelled power plants operate by burning fuel to heat water & produce steam to turn the turbine.



Generation

The turbine is attached to the generator shaft.

Coils attached to the generator shaft are connected to a d.c. supply & become electro-magnets.

The rotating coils induce a high voltage in the fixed coils which surround them.

Generated voltages vary between 16kV & 25kV at 50 Hz.

Voltage is transmitted to “Step-up” transformers for supply to the National or Super Grid systems.

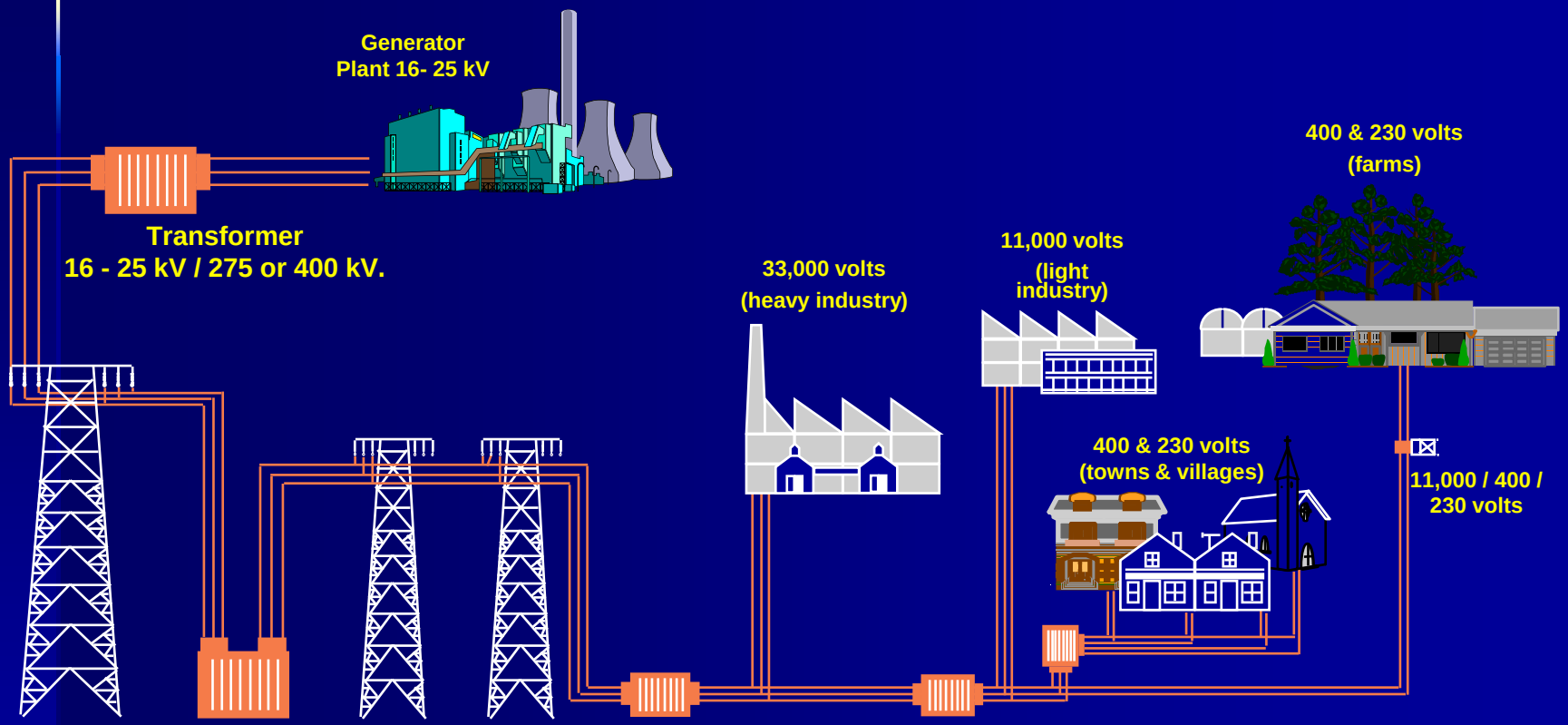
Generation

Choice of transmission voltage depends upon the length of the line.

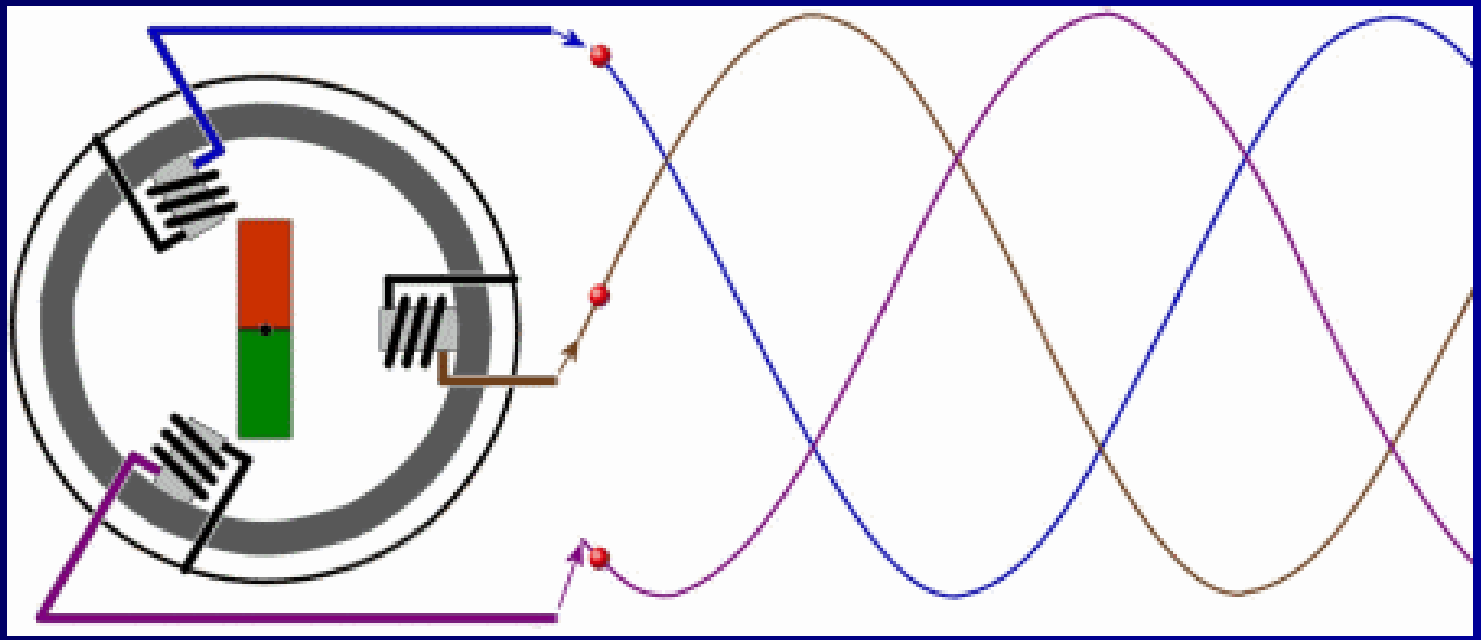
Current flowing through a line results in power losses (I^2R) the higher the voltage the lower the current hence lower power losses.

This saving of losses has to be balanced against the extra cost of HV lines, transformers & switchgear.

Distribution (U.K.)



Three Phase Generation



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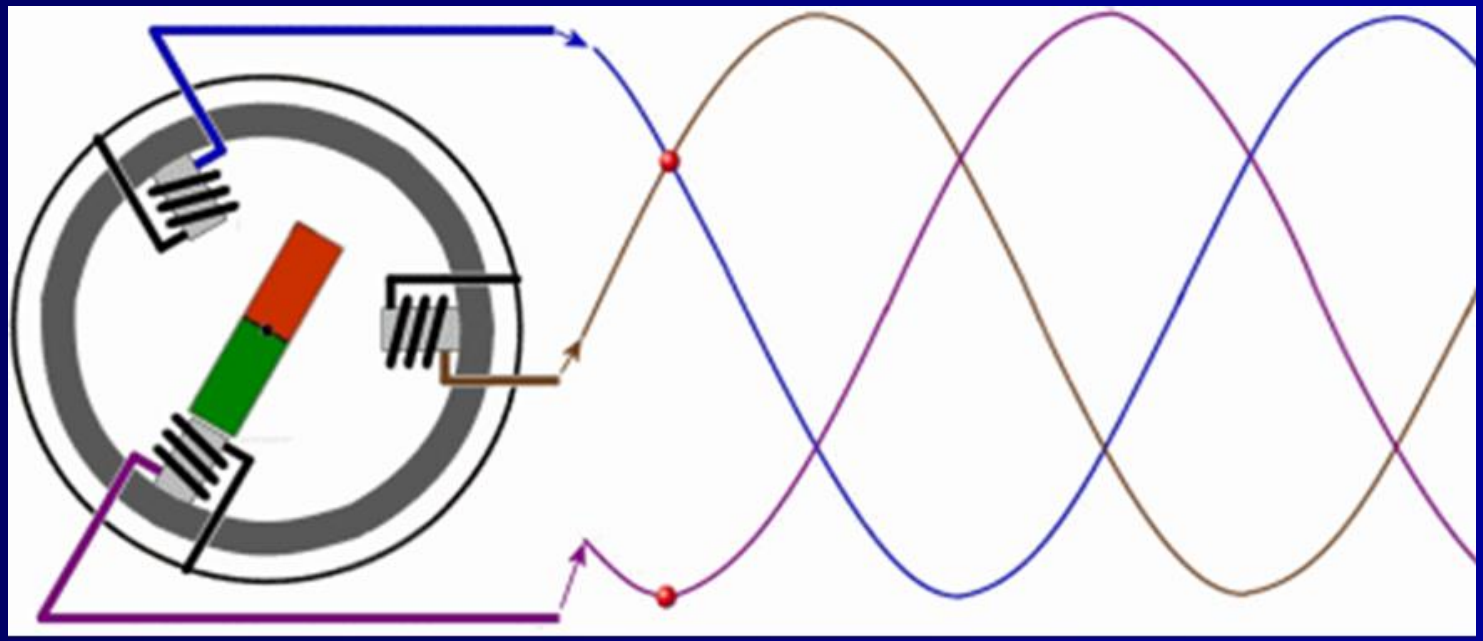

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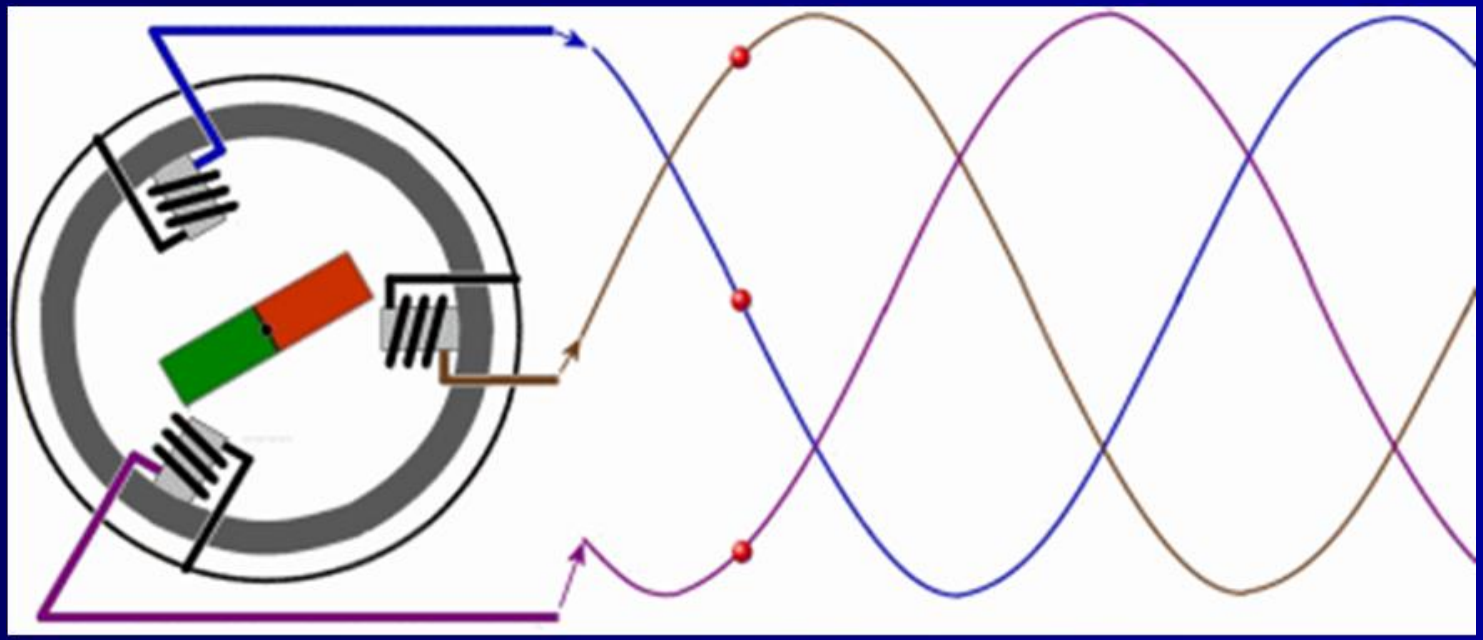
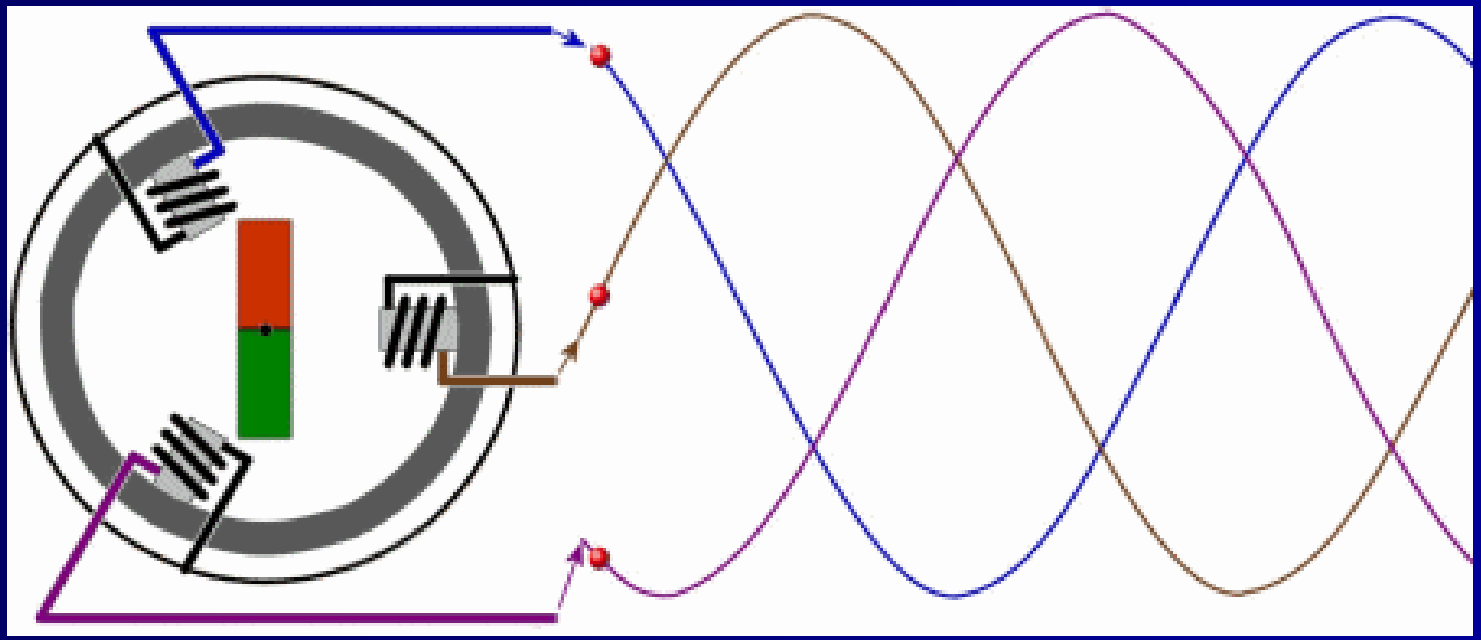
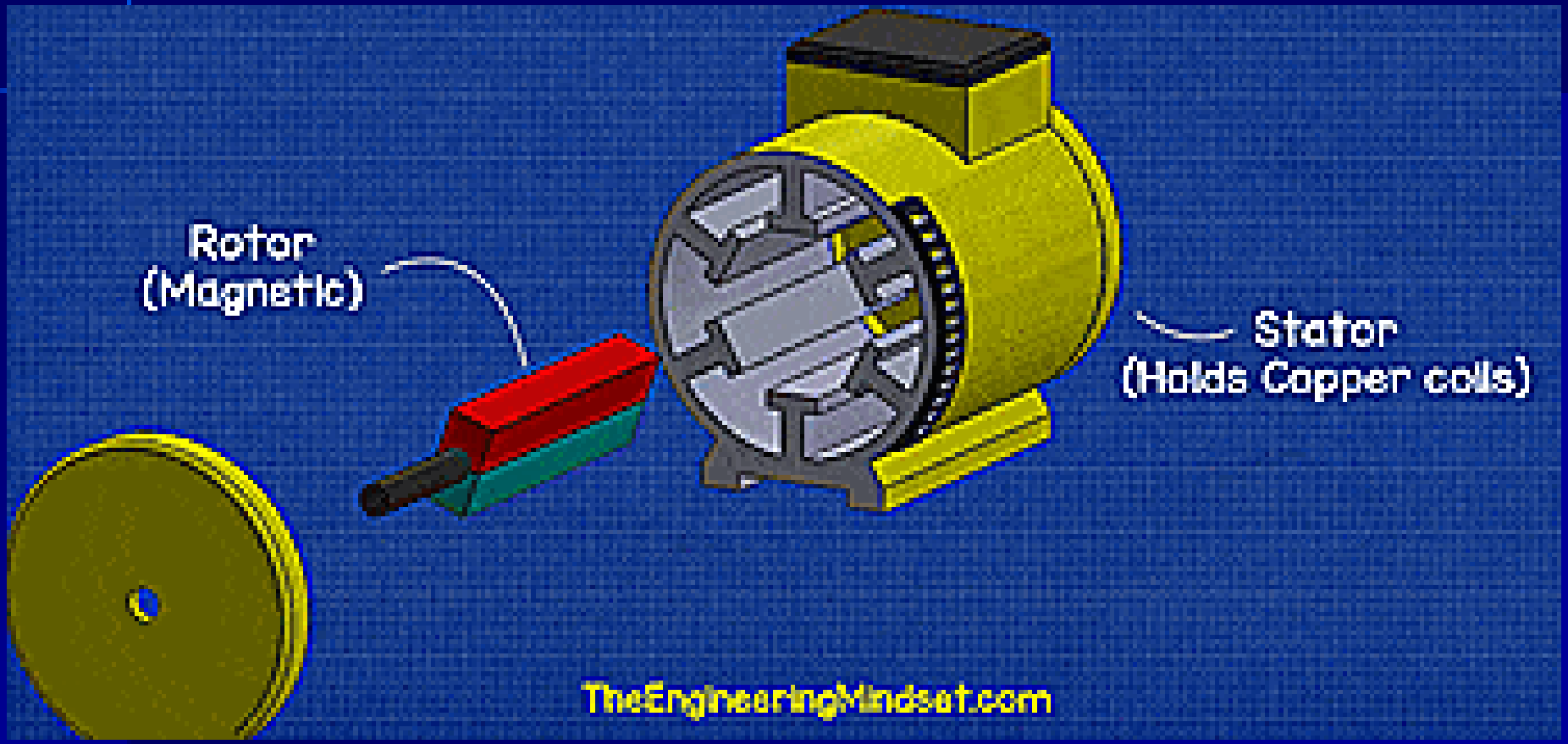
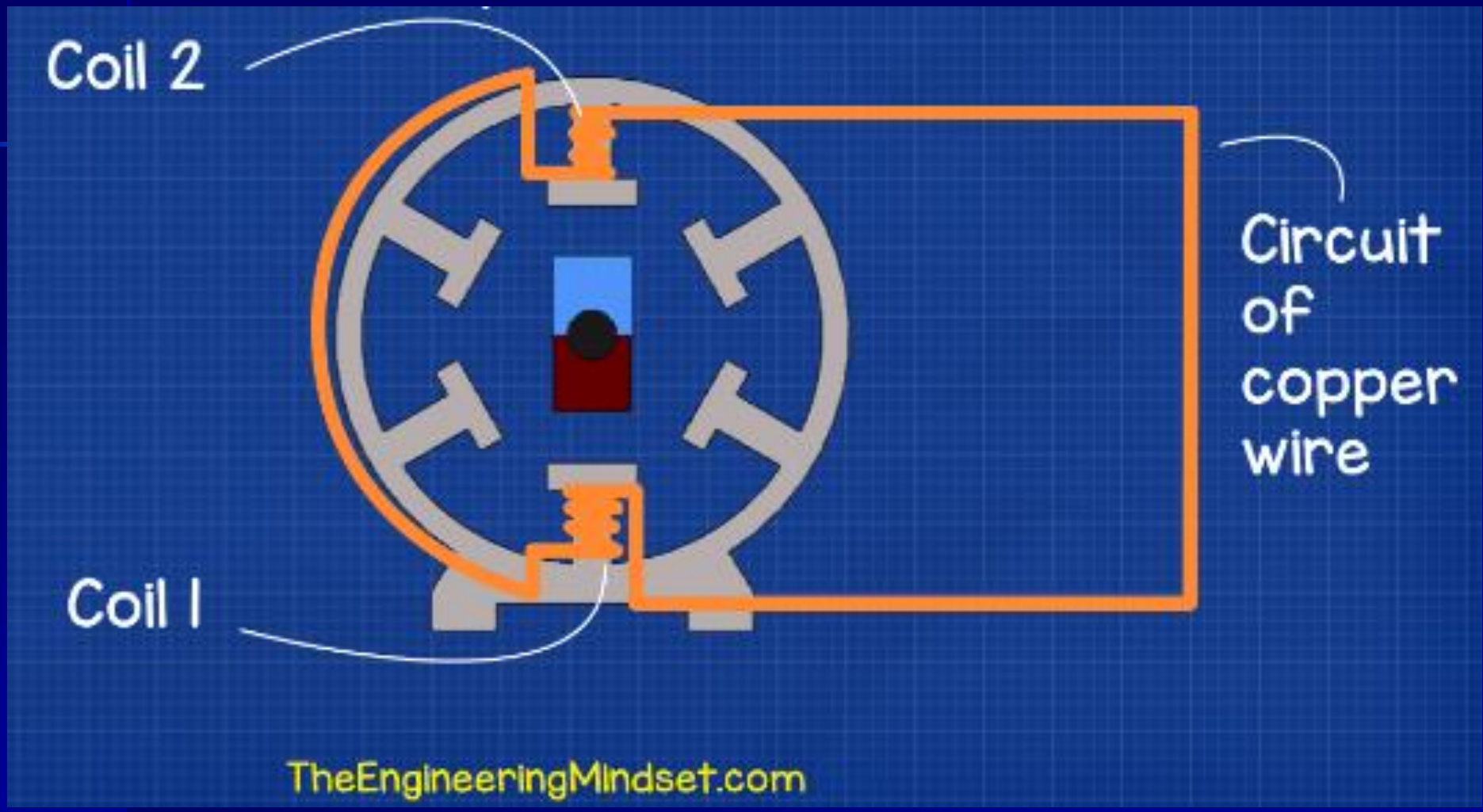
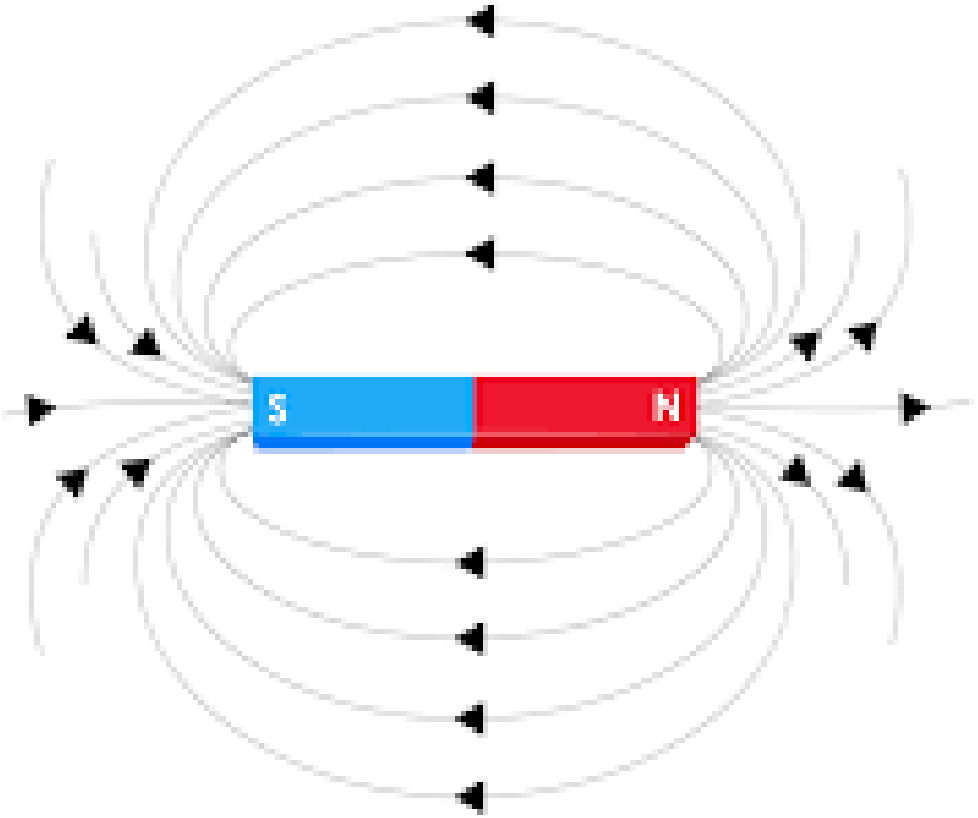


Three Phase Generation



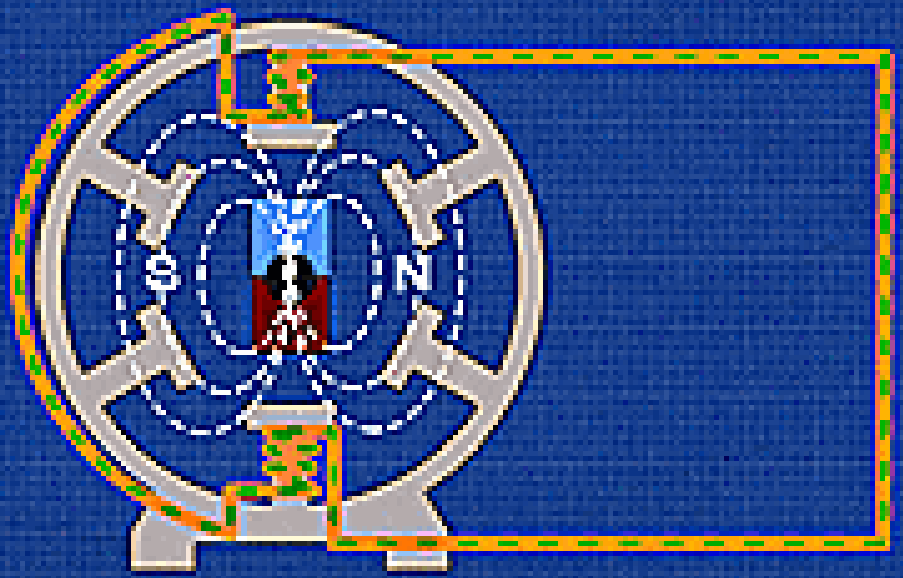






Three Phase Electricity

Explained



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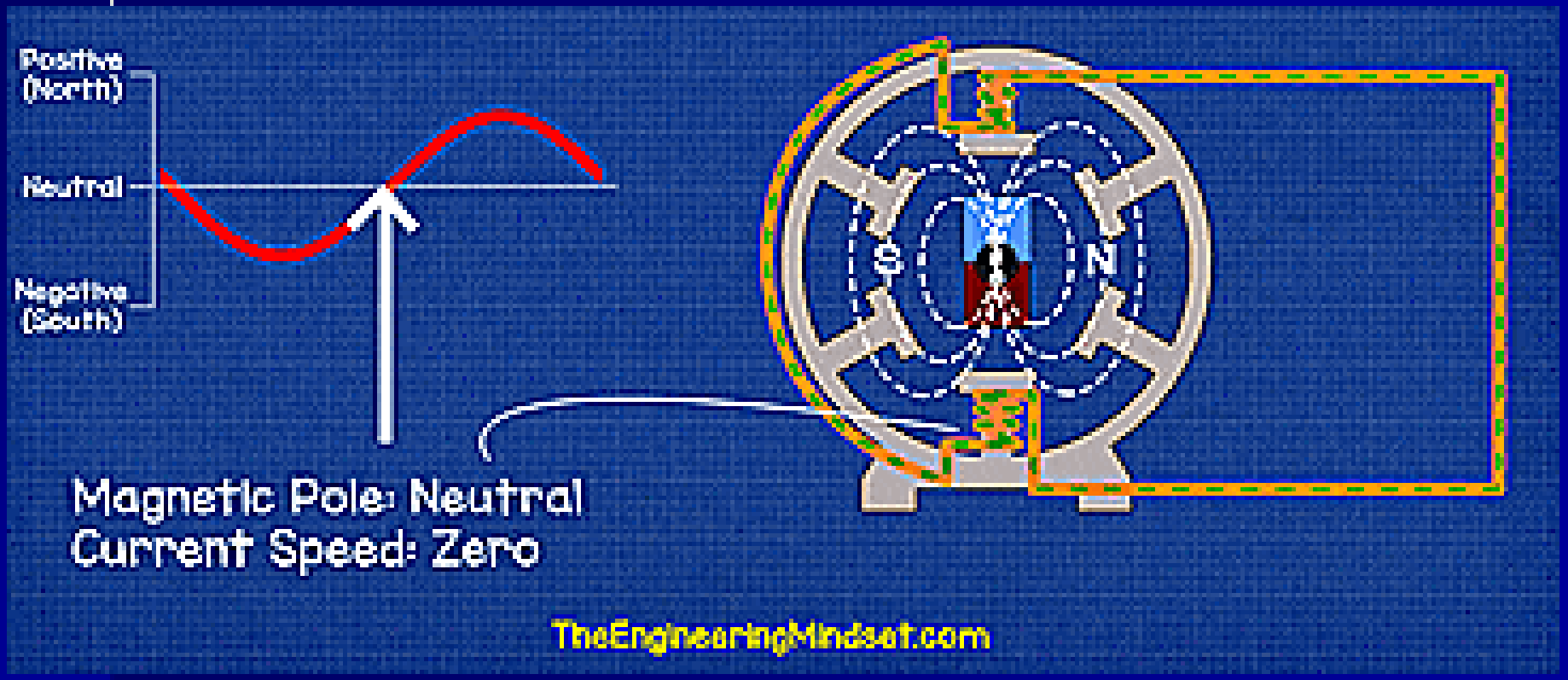

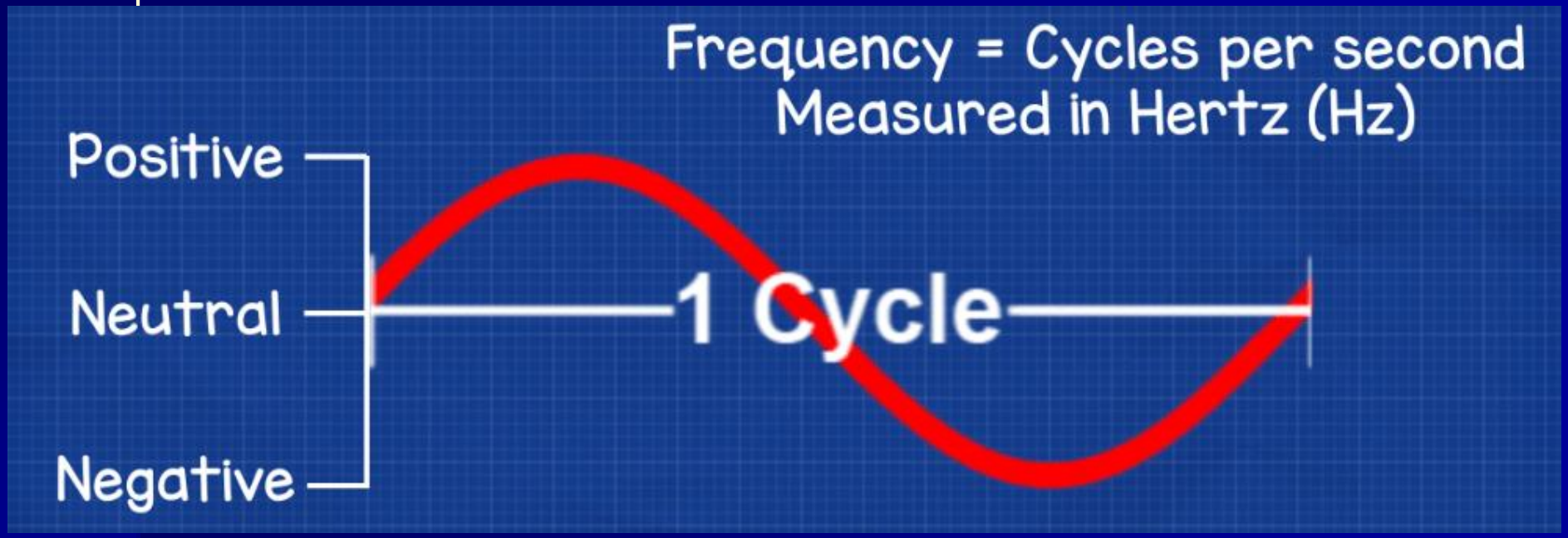

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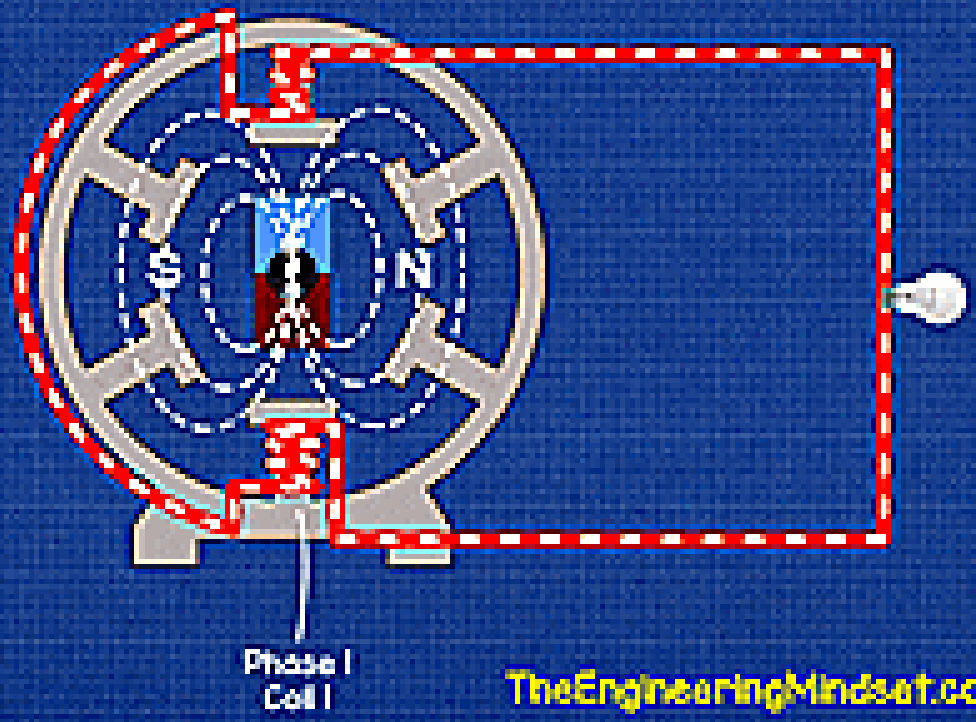
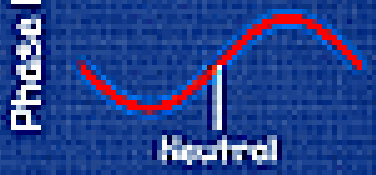
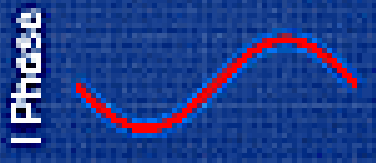


Lamp is off





Phase colours vary by country

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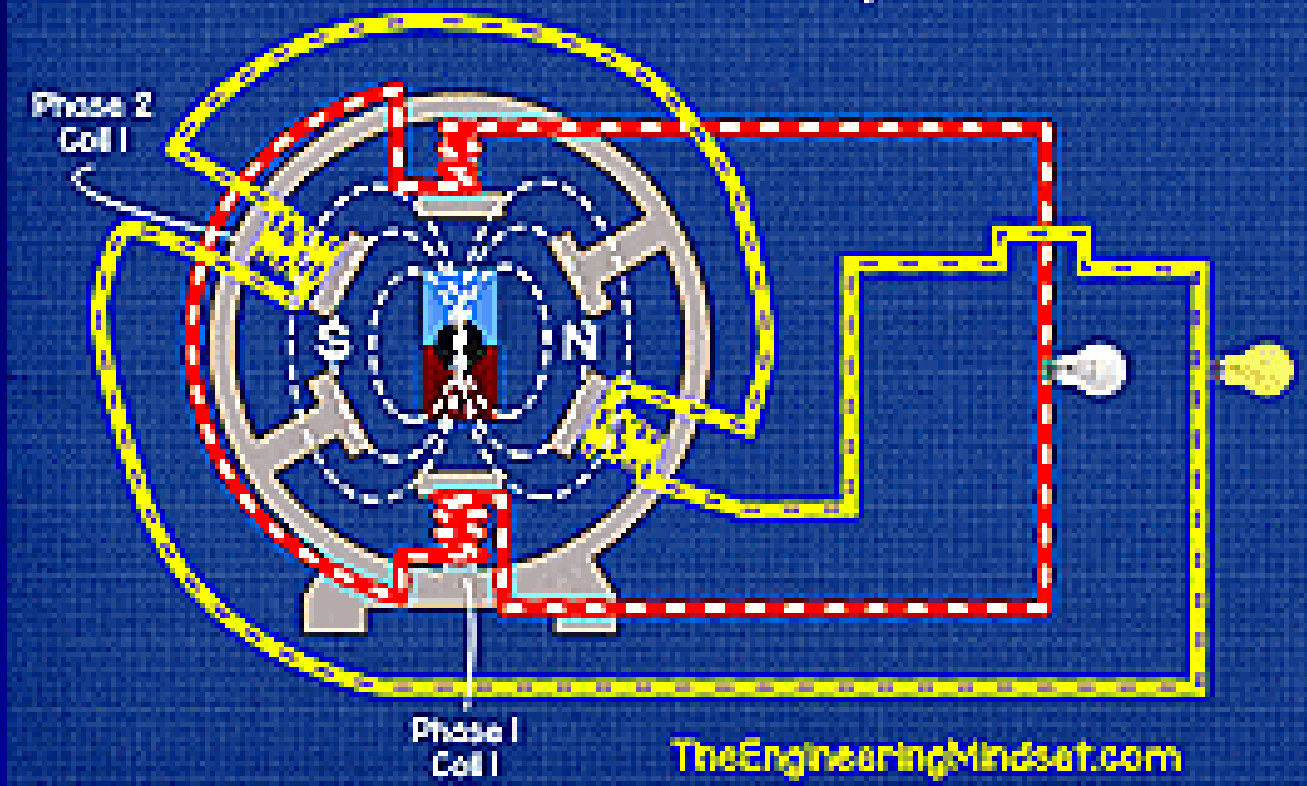
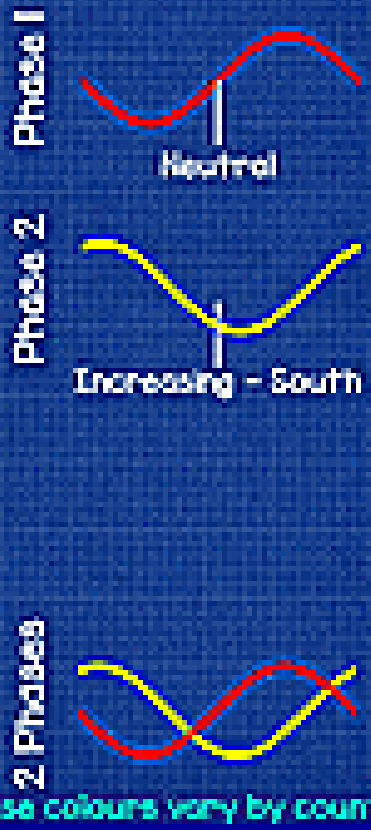
Three Phase Electricity

Explained





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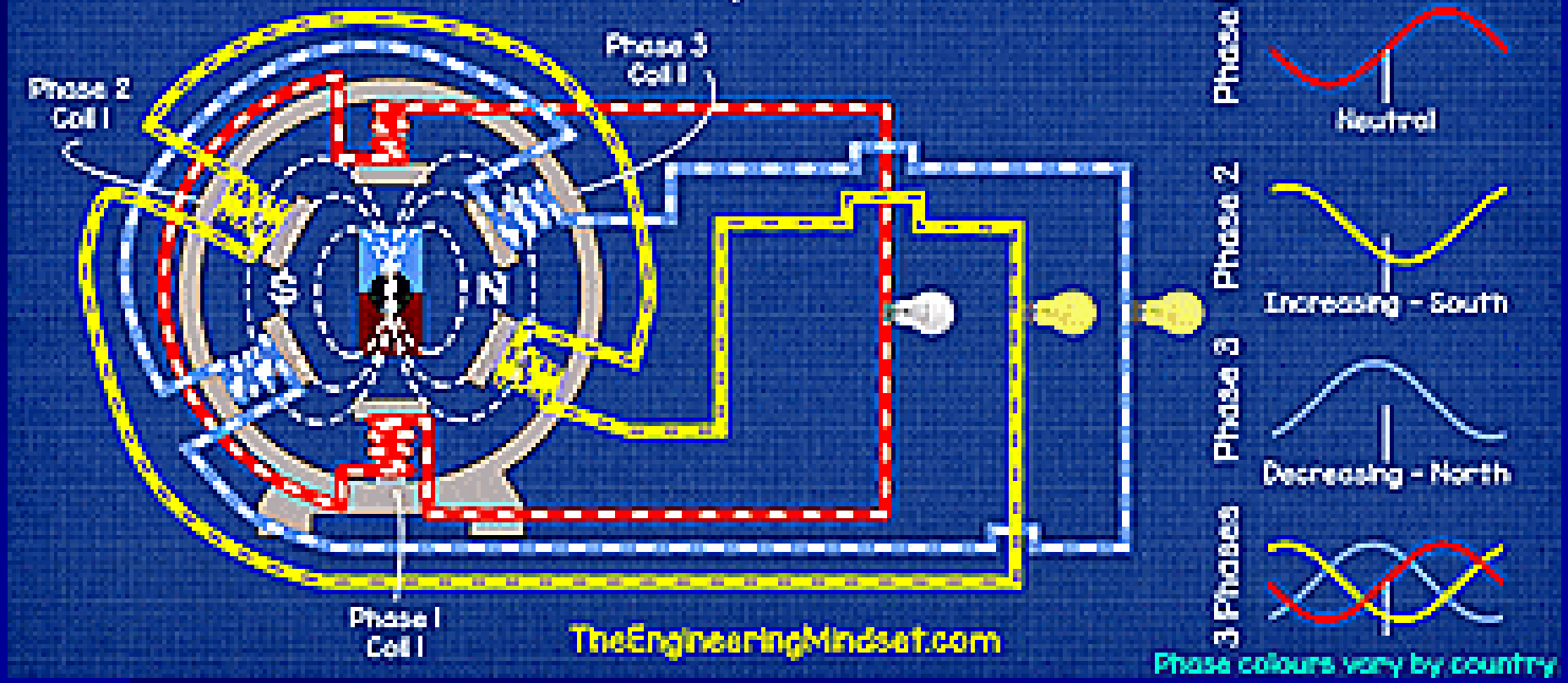

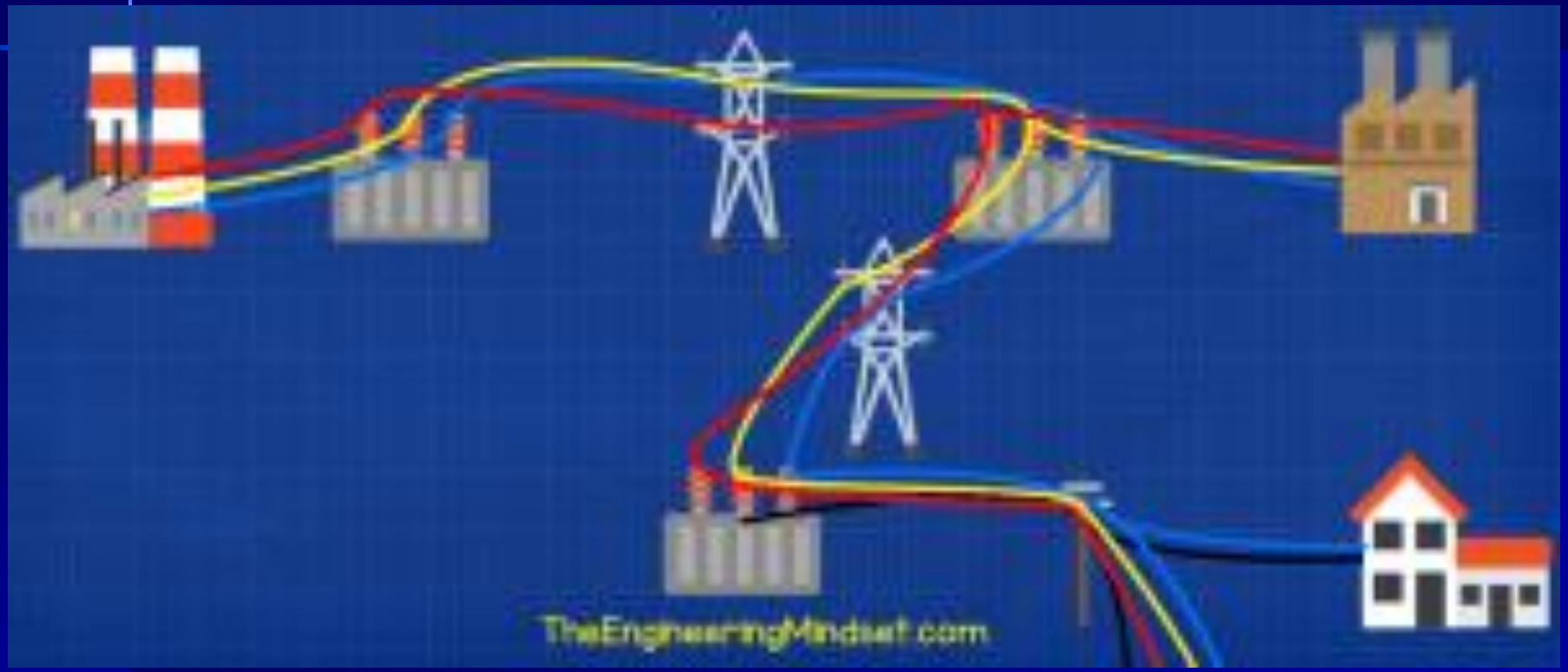

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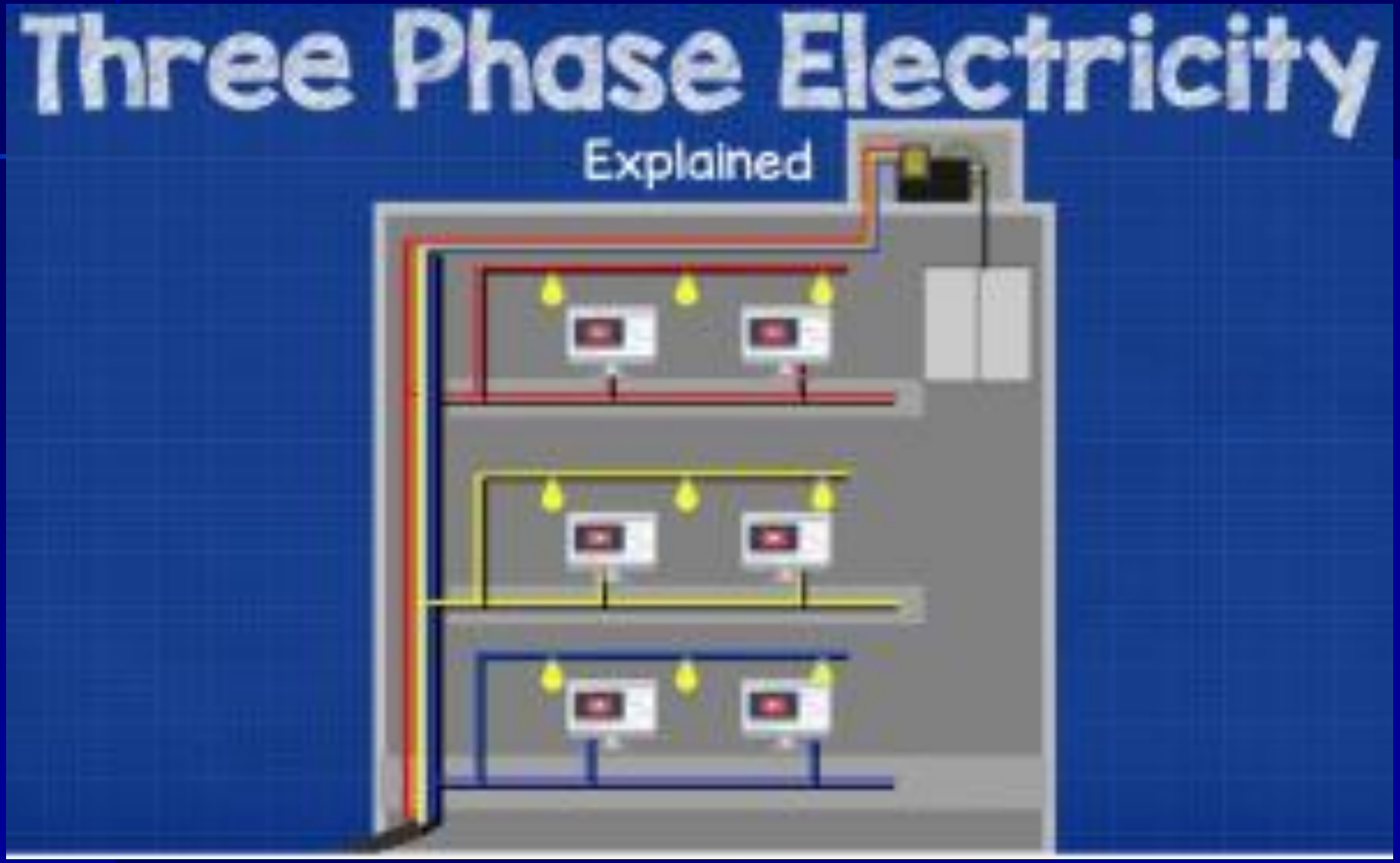
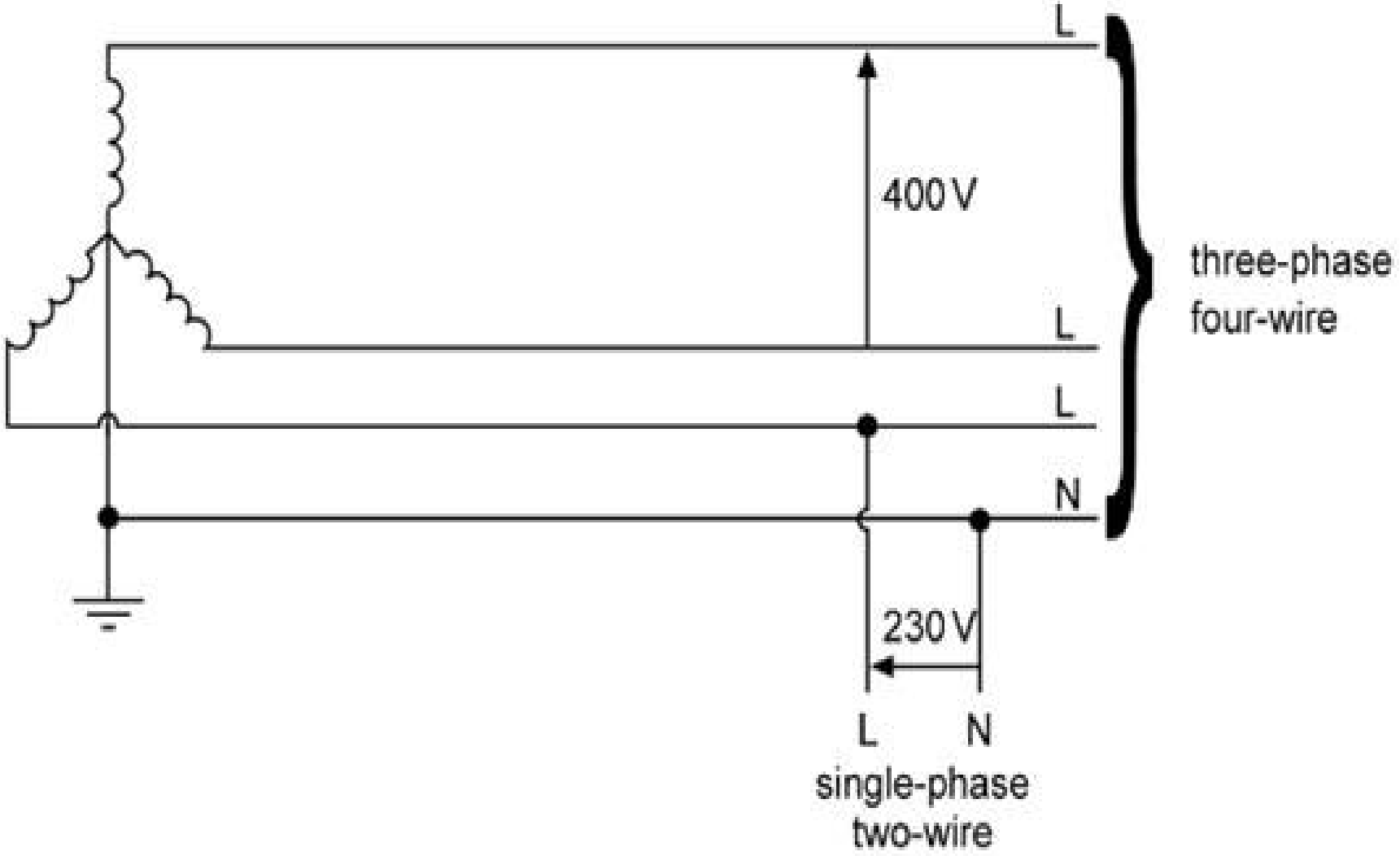




Distribution (U.K.)

Large factories at 11000 volts AC or above.

Smaller units – three-phase 400 volts AC.

Electricity supplied to homes at 230 volts AC.

Alternates at a frequency of 50 cycles per second (50 Hertz or Hz).

Earthing Systems

TNS

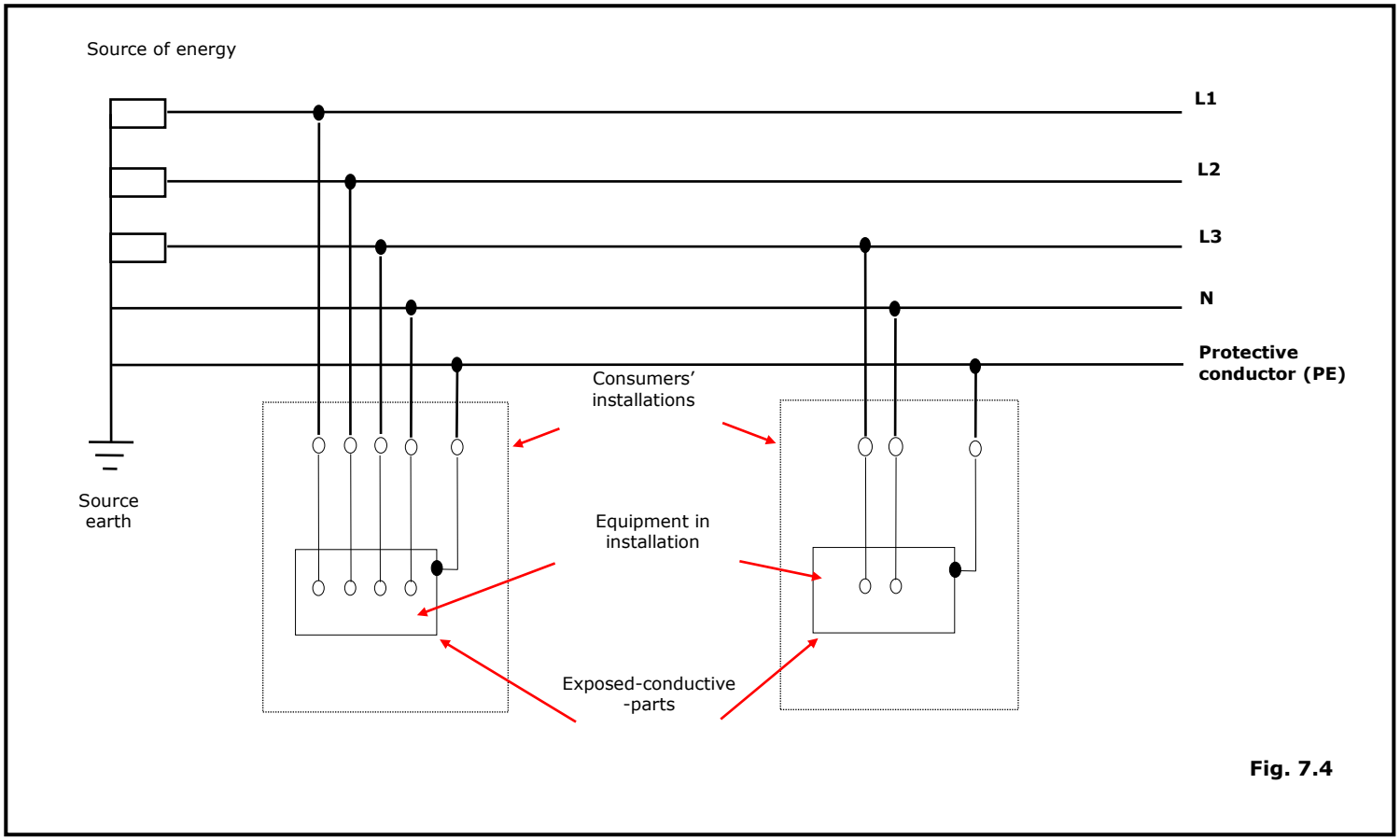


Fig. 7.4

TNC-S

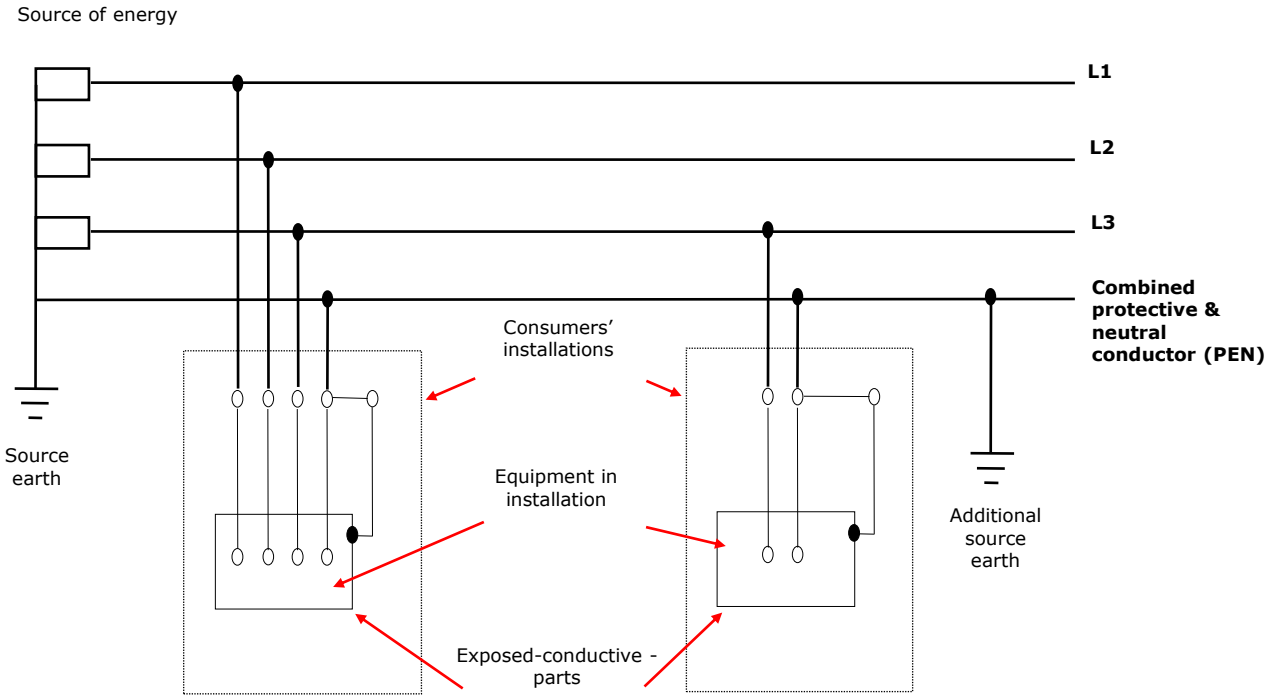


Fig. 7.5

TT

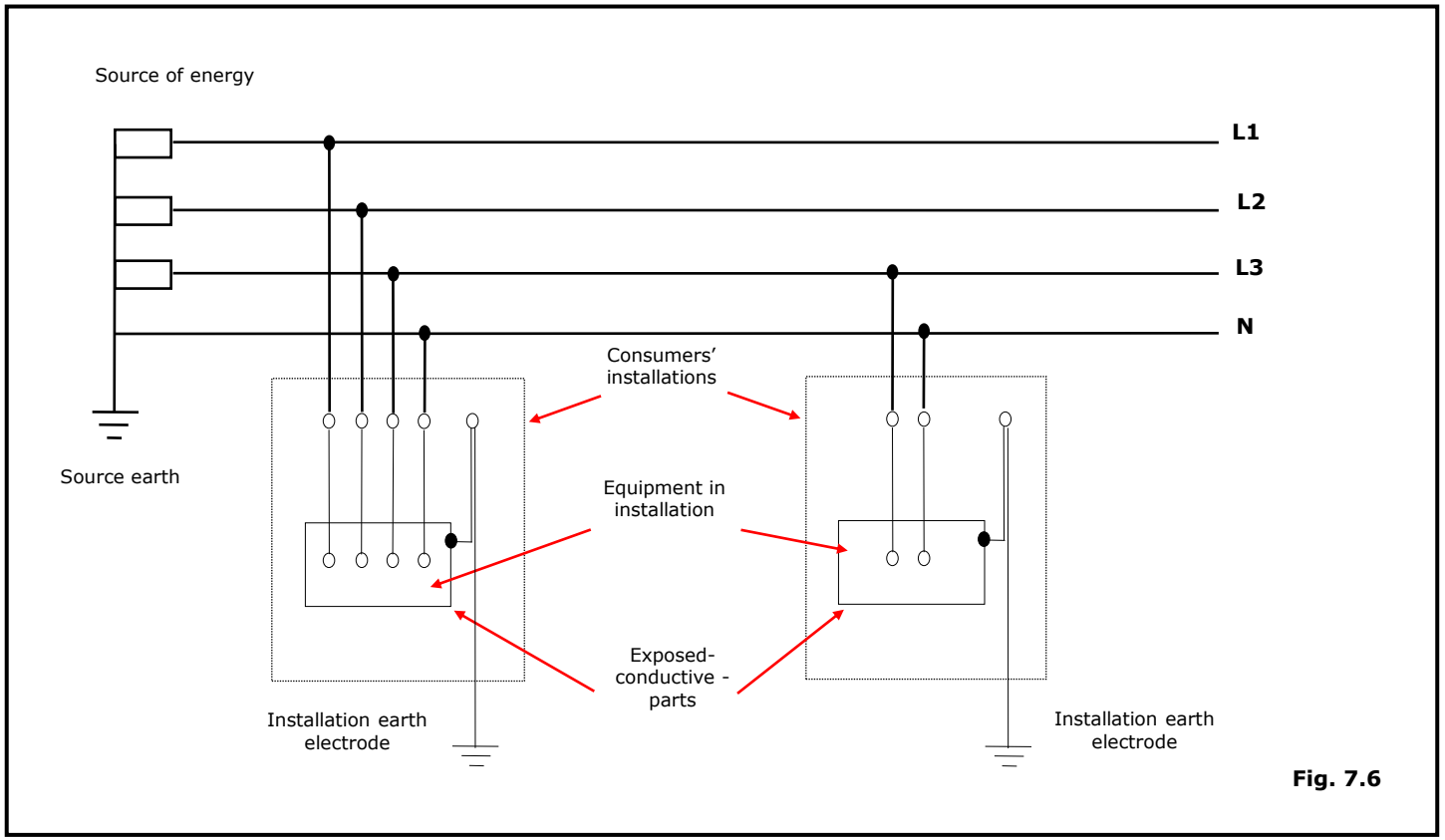
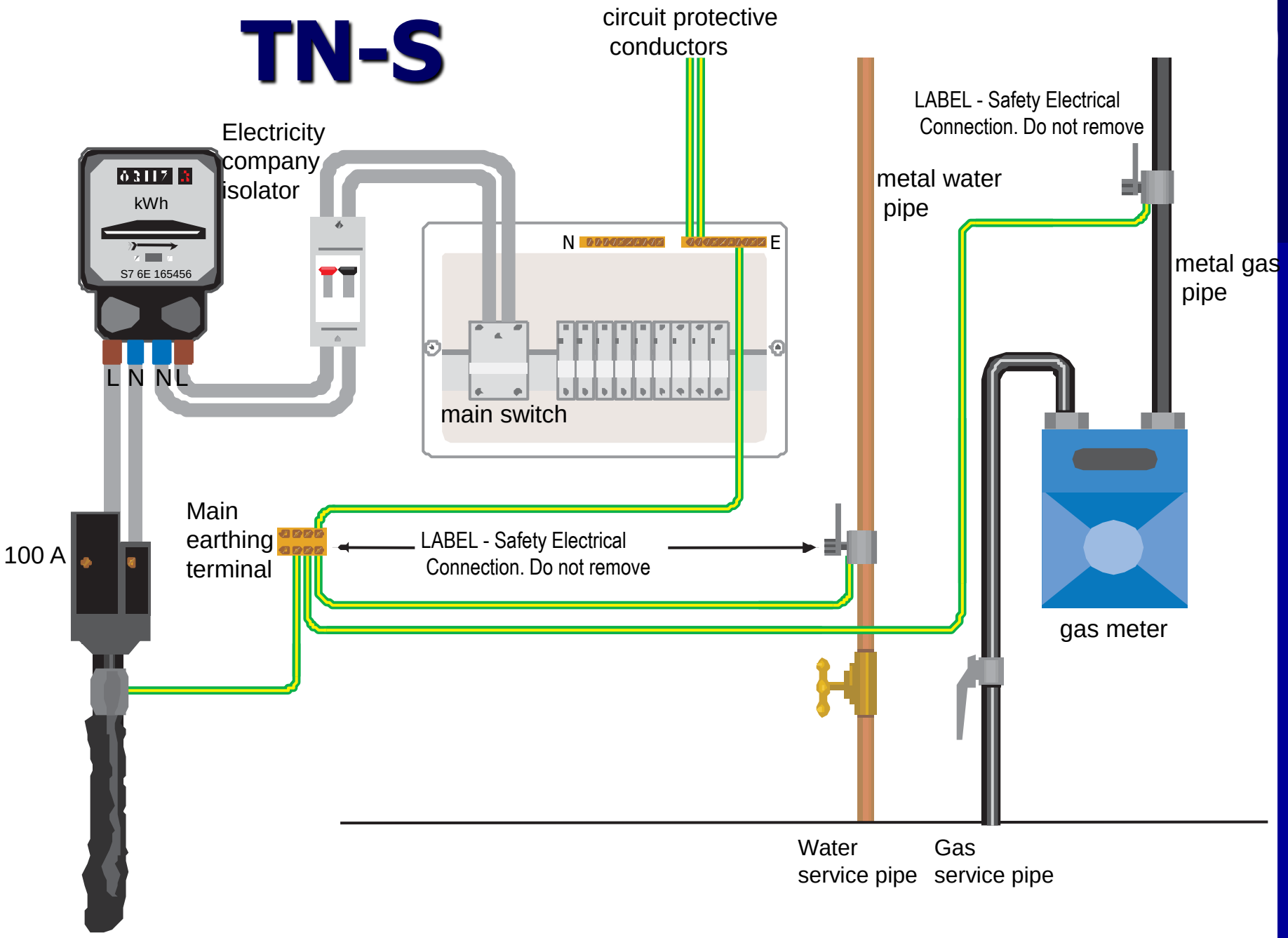
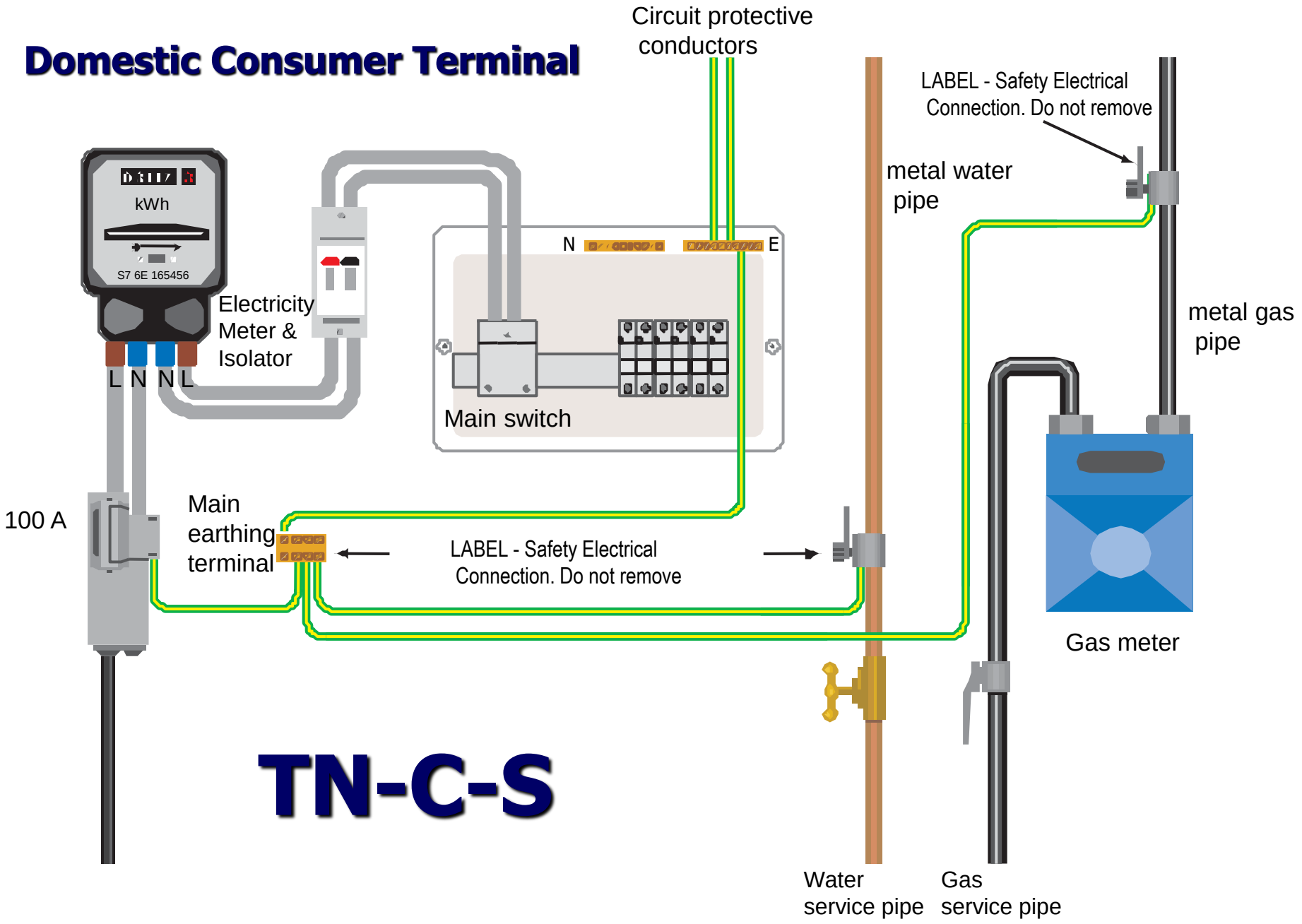


Fig. 7.6

TN-S



Domestic Consumer Terminal



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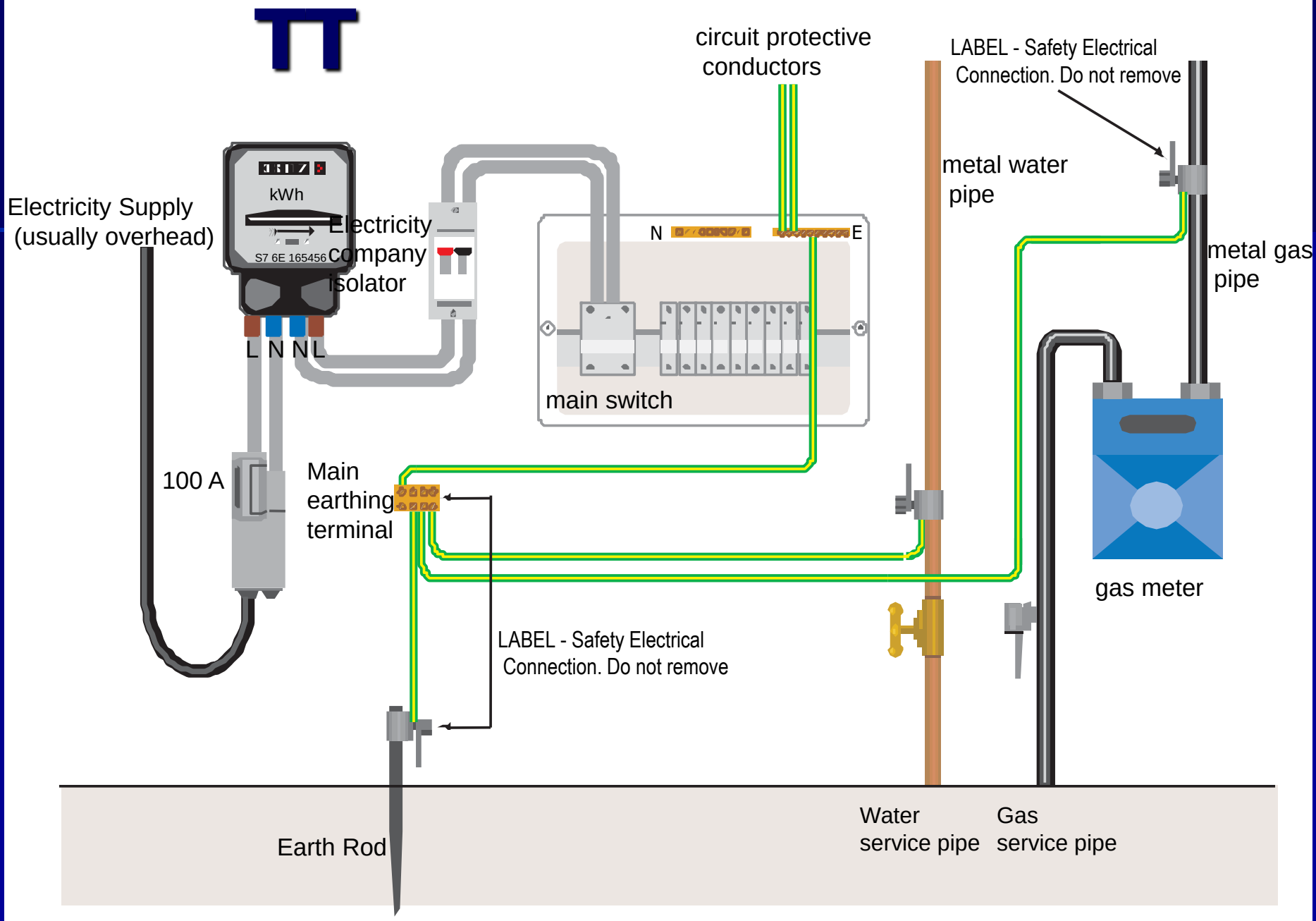
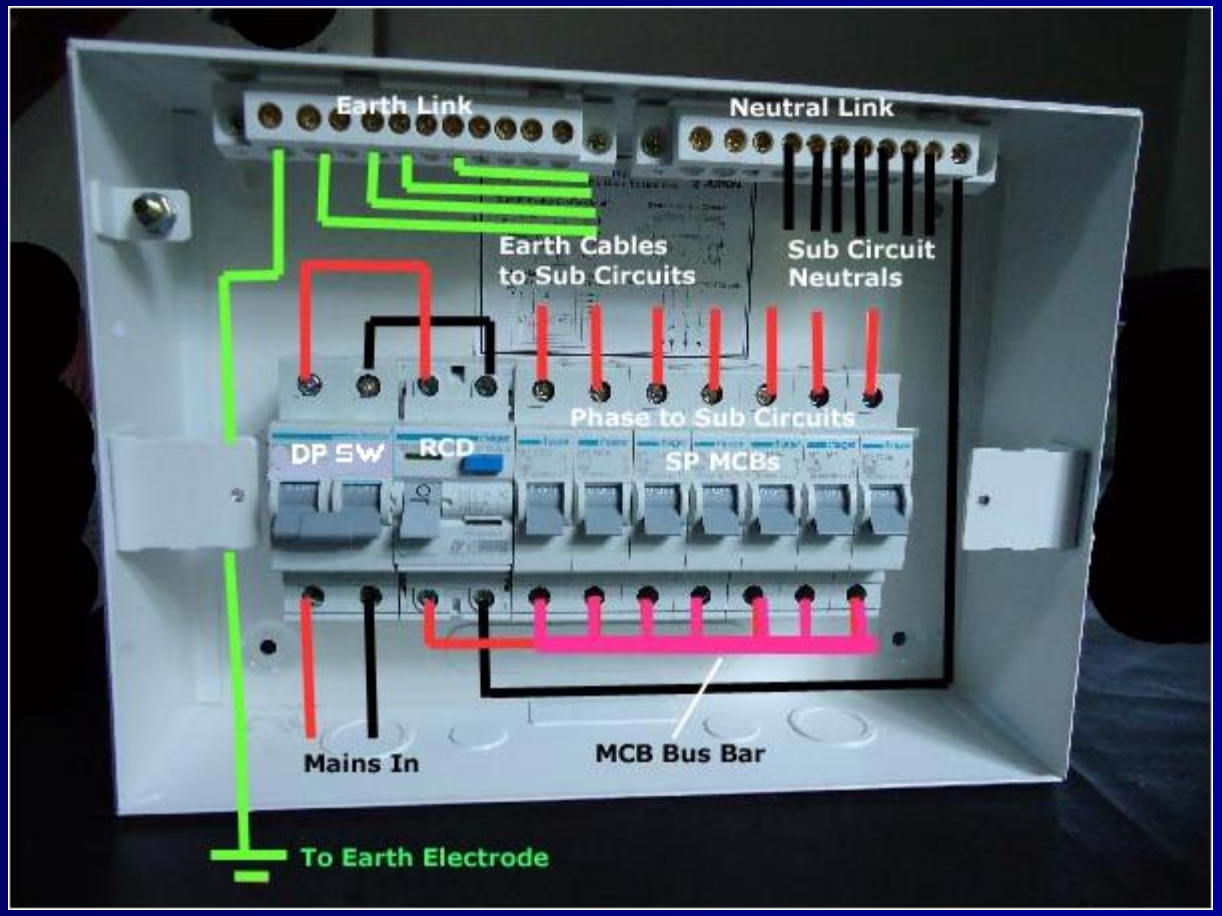
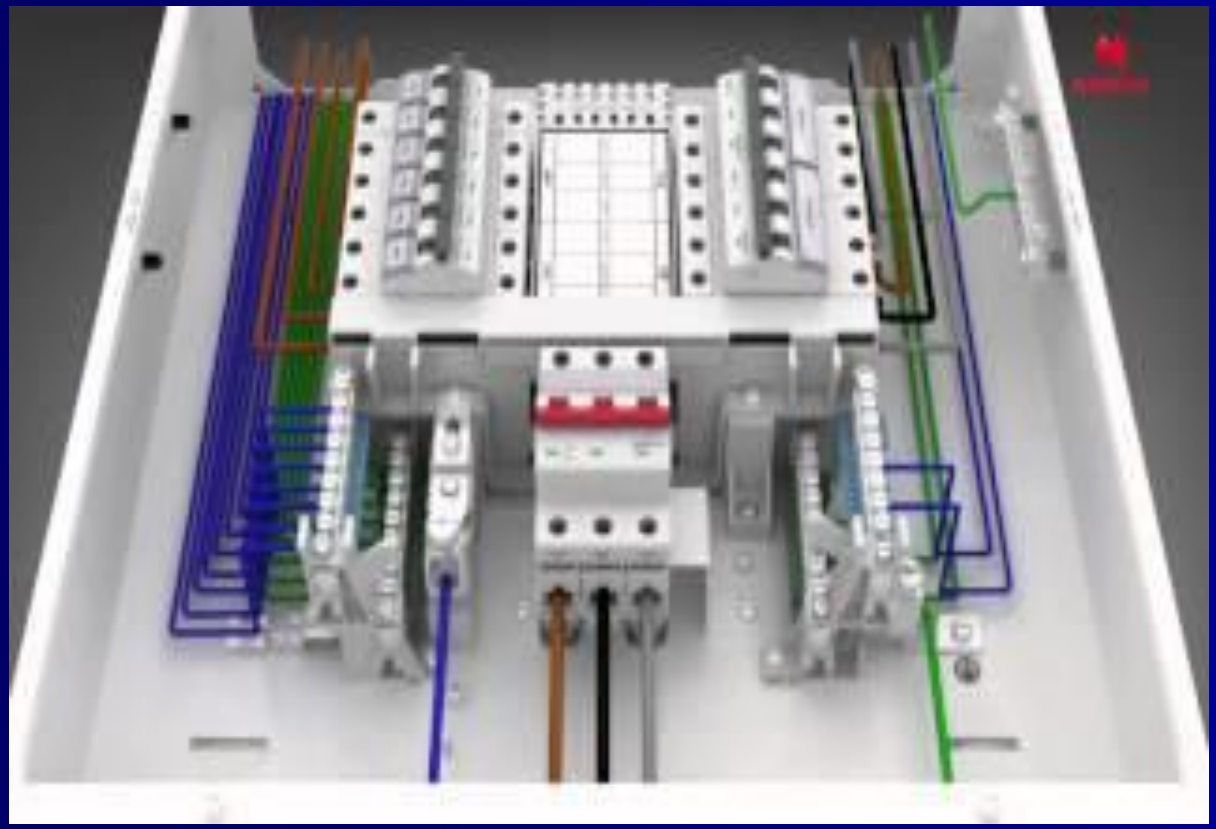


Consumer Unit BSEN 60898-1



Industrial Consumer Terminals

IEC 60947-2



BS 88 Fuse Board

Regulatory Requirements

All distribution boards **SHALL** have:

Circuit information sheet.

Label indicating the source of the electrical supply to the board.

Unique identification code & label.

Means of Isolation.

(IET Regulations 514.9 & 537)

Identification of Conductors

The identification of conductors within a system can be:

Numeric.
Alphanumeric.
Colour & Marking.

(Regulation 514.3 Table 51)

Harmonisation of Cable Core Colours (Appendix 7 IET Regulations)