XP Power

XPerts in Power - Module 1
Input Power Sources

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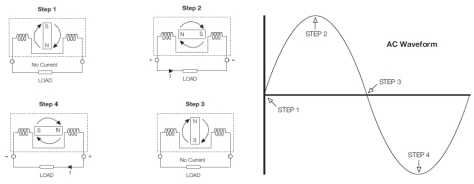
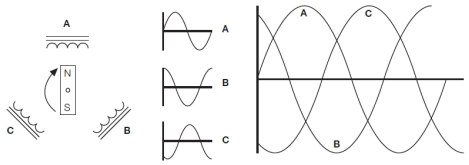
Module Content

- AC Sources
  - Single Phase
  - Three Phase
- Power Station to Socket Overview
- DC Sources
  - What is a battery ?
  - Type of batteries

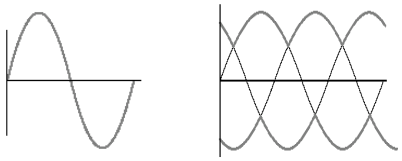
Producing a Single-Phase Voltage



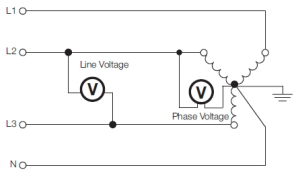
Producing a Three-Phase Voltage



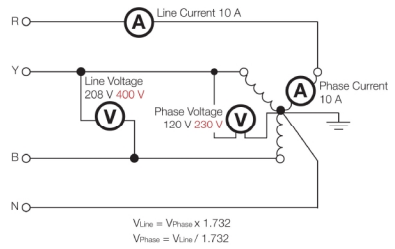
Why do Power Stations Generate 3-Phase



Star Connection

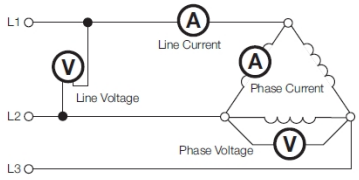


Star Connected Line & Phase Voltages



XP Power 7

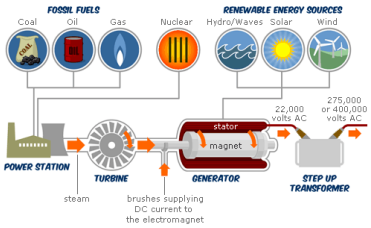
Delta Connection



$V_{LINE} = V_{PHASE}$

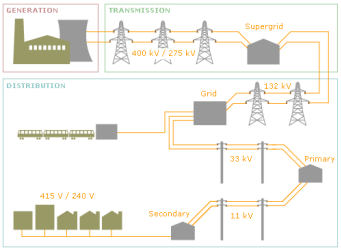
XP Power 8

Power Station Overview



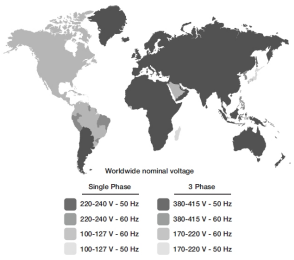
XP Power 9

National Grid Overview



XP Power 10

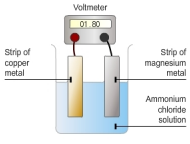
World Wide Voltage And Frequency



XP Power 11

What is a Battery ?

- A battery is an electricity storage device which can be found in any number of shapes, sizes, voltages and capacities.
- When two conducting materials (often dissimilar metals) are immersed in a solution, an electrical potential will exist between them If connected together through a closed circuit, a current will flow. The value of this potential (or voltage) is dependent on the materials used, giving rise to a whole family of battery types each having benefits and restrictions in use. Examples are:- lead acid, nickel cadmium (Nicad), lithium, silver alkaline.

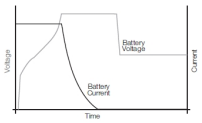


XP Power 12

Value Regulated Lead Acid

Based on technology developed in the 1960's, these batteries recombine the gases that are produced within the battery casing during operation of the battery, thus minimising water loss.

- Advantages
  Relatively low initial purchase cost
  Minimal Maintenance required
  5,10 & 15 year design life options available.
- Disadvantages
  Recommended operation temperature 20-25°C
  Battery life halved for every 10°C above 25°C
  Battery state of charge can only be determined by external monitoring circuit.
  Damaged if discharged to zero volts



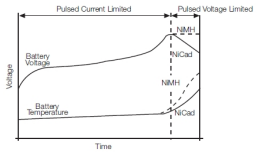
Nickel Cadmium & Nickel Metal Hydride

NiCad

- Older technology typically used in portable applications.
- High power density.
- High discharge rates
- Memory effect

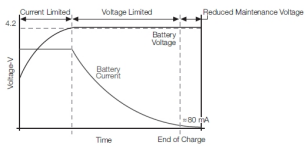
NiMH

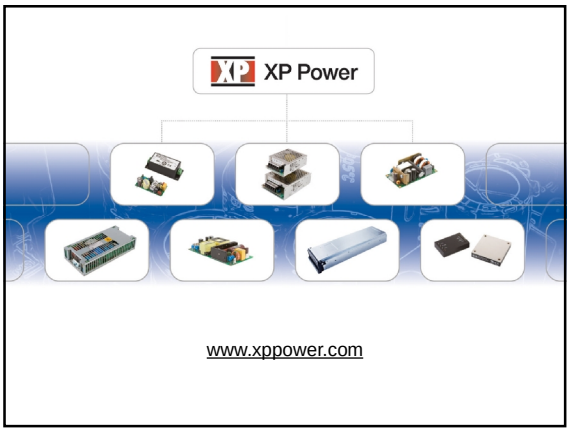
- More recent evolution of NiCad
- No memory effect



Lithium

- Typically used in portable applications.
- Higher power density than VRLA or Nickel
- Low self discharge rate
- Stringent charging regime





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