

PumpTech Customer Education



<http://www.Pumptechnw.com>

Bellevue

Moses Lake

Canby

PumpTech Product Lines

UL Listed
Packaged Systems





Two full time Mechanical Engineers
Licensed in OR & WA

SolidWorks & E-Drawings Viewer

AutoCad Compatible Drawings

All Systems UL QCZJ Listed

Designed to HI Standards





Manufacturing Facility Canby, OR





Installation, Maintenance & Repair

- 9 Full Time Service Technicians
- 3 Full Service Shops
- 6 Service Trucks
- 23 Ton Crane Truck
- 8 Ton Crane Truck
- 3 Ton Crane Truck
- 2 Ton Flatbed & Trailer
- 1 Ton Flatbed & Trailer





Pipeline

Summer 2010 www.PumpTechnw.com Volume 1, Issue 2

PumpTech Inc.
 Bellevue, WA
 12020 SE 32nd St #2
 Bellevue, WA 98005
 888-644-6888

Canby, OR
 321 S Sequoia Parkway
 Canby, OR 97103
 503-659-6230

Moscow Lake, WA
 209 S Hamilton Rd
 Moscow Lake WA 98637
 509-786-6330

Serving the Pacific Northwest

PumpTech Pipeline
 Providing Knowledgeable Solutions

Cornell Names PumpTech Its Top Industrial Distributor

Cornell Pump Company (Clackamas, Oregon) has named PumpTech its number one industrial pump distributor in the US. Cornell pump manufacturers a wide line of clear water, solids handling, hot oil and food processing pumps for numerous industrial applications.

Mike Shoemaker, PumpTech's Industrial Products Manager, accepted the award at the annual distributor's meeting in Chicago. Our industrial sales team covers Idaho.

Oregon and Washington and focuses on the food processing, petrochemical, oil & gas, lumber, pulp & paper, power generation, and aluminum industries.

In addition to Cornell, PumpTech represents a number of other manufacturers of specialty industrial products. Congratulations to our industrial sales team!



PumpTech Named NW Master Distributor for Grundfos

Grundfos Pumps (Olathe, Kansas) has selected PumpTech as the Pacific Northwest master distributor for its Grundfos Dosing line of chemical metering pumps.

The product line includes a wide range of diaphragm metering pumps with flows to 1050 GPH and with flows to 3000 PSI. Grundfos pressures offer a variety of dosing technologies including digital dosing. Digital dosing pumps utilize stepper-motors that allow a 1000:1

turn down. In addition to dosing pumps, Grundfos offers a complete line of measurement & disinfection equipment including one of the best chlorine generators on the market.

Per this agreement PumpTech will stock \$100,000 of Grundfos Dosing pumps to support sales in the Pacific Northwest. This inventory will be centrally located in our Canby, OR branch and will allow quick delivery to other distributors, end users, and OEM's. Additionally, this inventory will support our MeterMan division which manufactures chemical metering systems in our Canby facility and also functions as the Grundfos Key Systems provider for the entire western United States.



Inside this issue:

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Fall 2010 www.PumpTechnw.com Volume 1, Issue 3

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PumpTech's Feature Rich Multi-Pump Controller

PumpTech's intelligent, multi-pump controller features an integrated PLC and Color Touch-Screen Human Machine Interface (HMI) that makes setup simple and extremely flexible. Up to four pumps can be set up for VFD control, across the line starting or a combination of the two.

The PLC provides for 22 digital inputs and 12 digital outputs. Also two 4-20mA or 0-10VDC transducer inputs are provided.

The controller is preprogrammed for pump down, level control and booster applications. At start up all you have to do is select the application and follow the setup instructions on the screen.

When motors are started across the line or via RVSS, "smart" motor

Continued on Page 4



QCEC Introduces New Refrigerated Sampler

Quality Control Equipment Company (QCEC) has introduced a new sampler with a modular refrigeration system. The refrigerator unit slides out for easy service or replacement. All units are made right here in the US and come with a 2 year warranty.

It features the same, time proven sampling technology that has set QCEC apart from its competition for over 40 years. All samplers use vacuum pumps

rather than peristaltic pumps for higher reliability and accuracy. Vacuum pumps never need hose replacement and increase the sampling range by providing lifts to 28 feet and horizontal of flexibility when locating the sampling unit.

The QLS model is the only sampler in the world that provides repeatable, self calibration and consistent sample size. It also provides flow - paced samples from a 4 - 20 input.

For more information on the features and benefits of QCEC samplers, contact your local PumpTech branch.




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newsletter@PumpTechnw.com



Pump Ed 101

Joe Evans, Ph.D

<http://www.PumpEd101.com>

<http://www.Pump-Zone.com>

AC Power

Alternating Current

What is Electricity ?

Electricity is really just organized lightning.

George Carlin

Edison versus Westinghouse

The Late 19th Century Fight Between
DC & AC to Become the US Standard

('twas the watt that won)

$$W = V \times A$$

$$1000 W = 1000 V \times 1 A \quad \text{or} \quad 1 V \times 1000 A$$

War Of Currents

Common DC and AC Terms

- Volt - Unit of potential difference (Pressure)
- Ampere - Unit of current strength (Flow)
- Ohm - Unit of resistance (Friction)
- Watt - Unit of power ($V \times A$) (Flow X Pressure)

DC Power

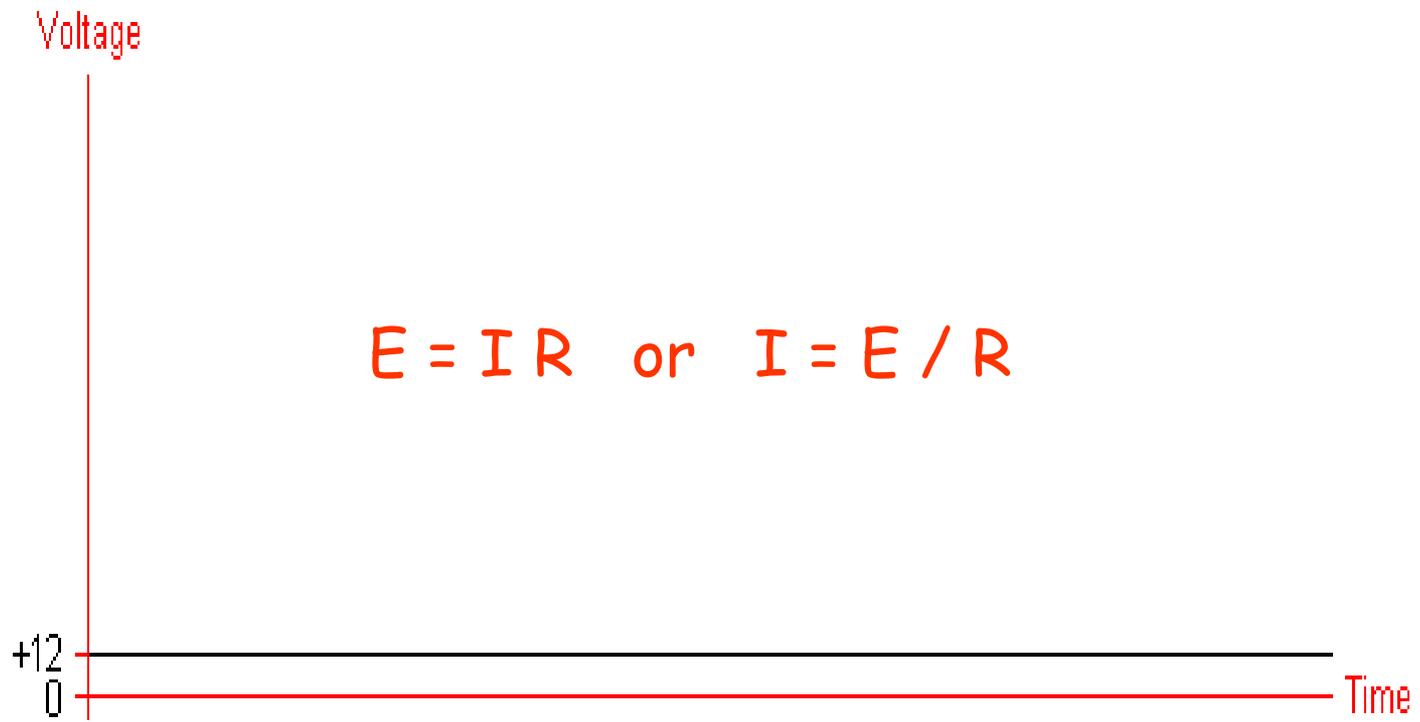
■ ADVANTAGES

- Simplicity
- Voltage remains constant
- Follows Ohms Law
- Easily stored

■ DISADVANTAGES

- Voltage not easily changed
- High transmission losses over long distances at usable voltages

The DC Power Curve



AC Power

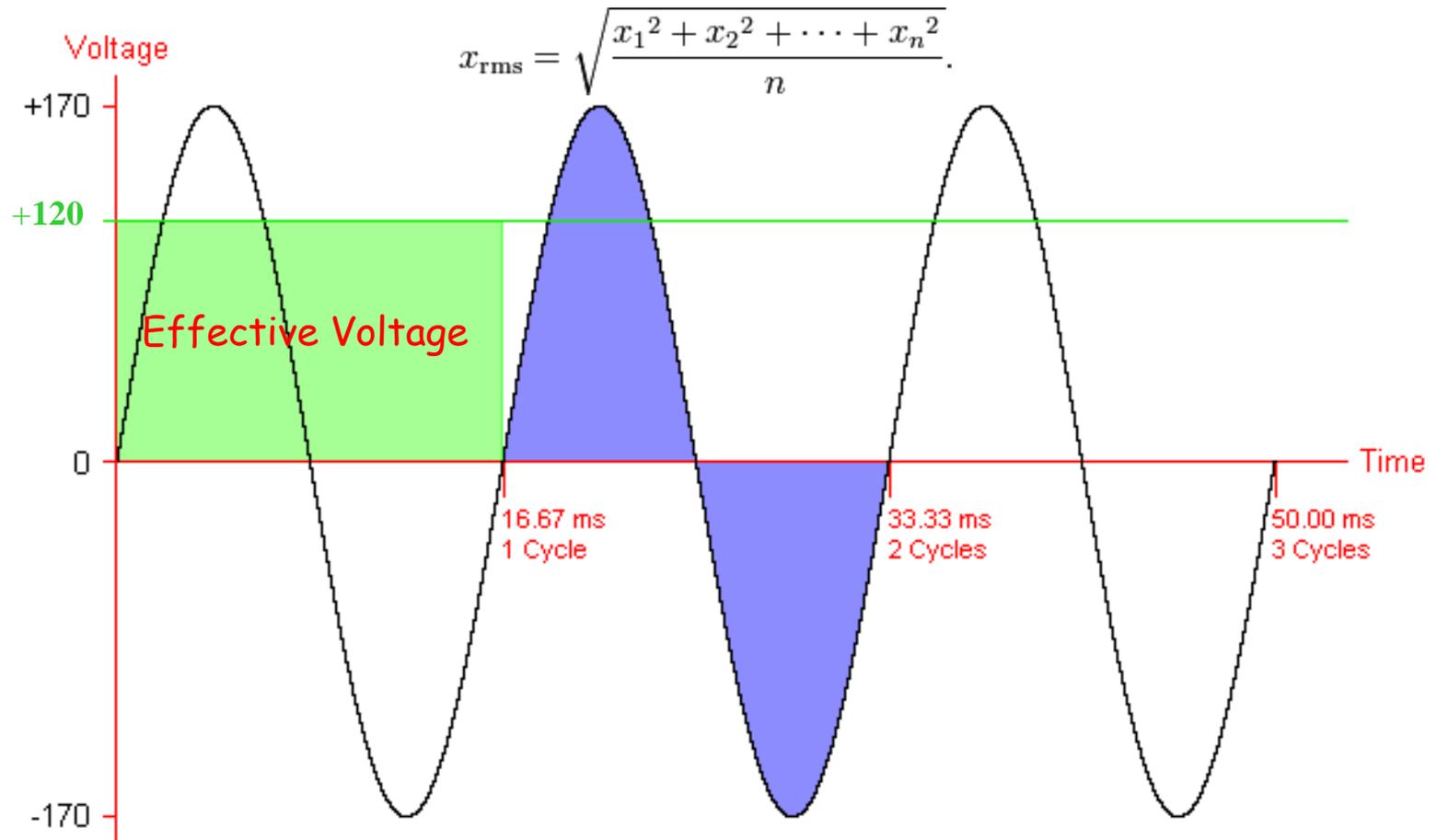
■ ADVANTAGES

- Induction
- Voltage can be changed easily
- Low transmission losses over long distances
- Frequency is variable
- Multiple phases

■ DISADVANTAGES

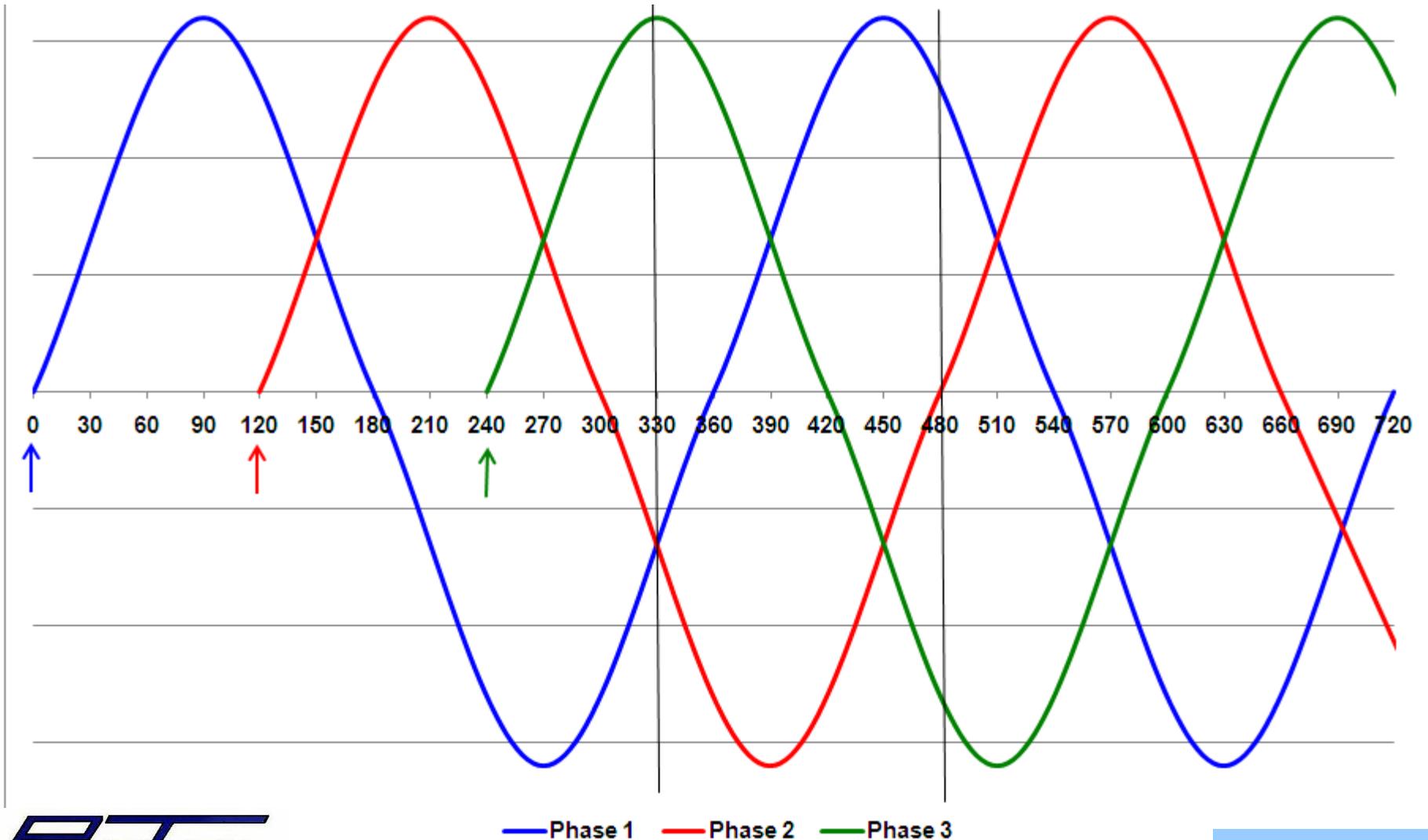
- More Complex
- Voltage varies with time
- Does not always follow Ohms Law

The Single Phase AC Curve



RMS or Effective Voltage = 0.707 X Peak Voltage
Peak Voltage = 1.416 X RMS or Effective Voltage

Three Phase Curve



AC Circuit Types

Resistive (R)

Resists Flow

Inductive (L)

Consumes & Returns

Capacitive (C)

Stores Energy

RLC's

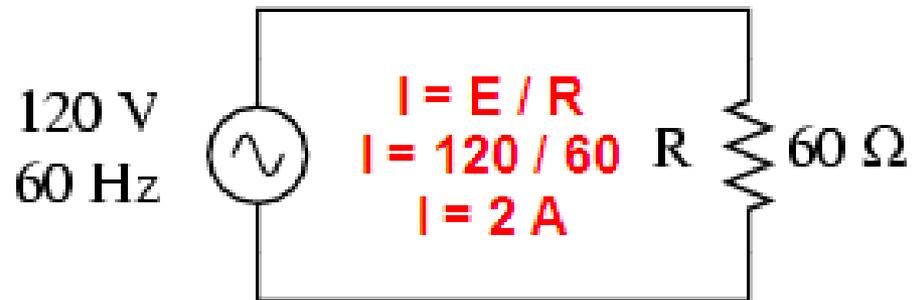
Combination

AC Resistive Circuit Examples

Electric Ranges, Irons &
Incandescent Lights

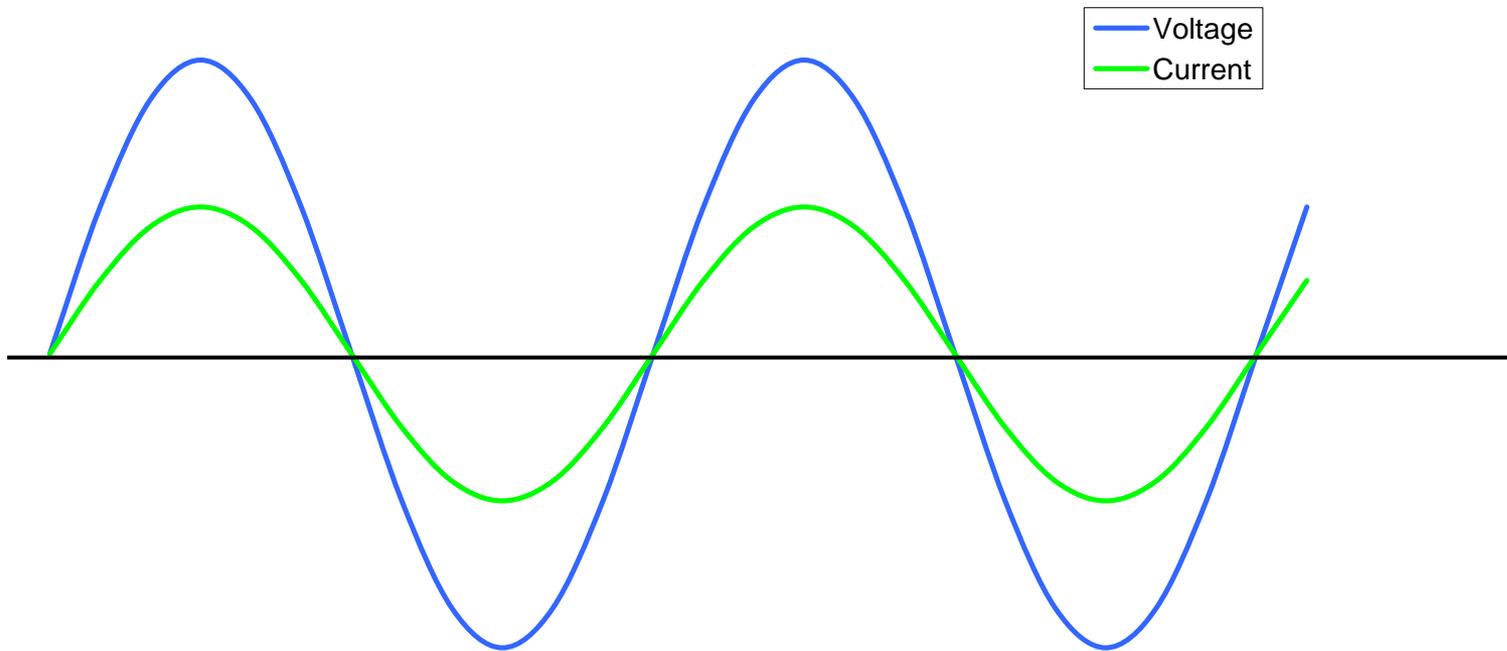
- Follow Ohm's Law (almost) $I = E / R$

Resistive Circuit



Single Phase Resistive Curve

Current & Voltage In Sync

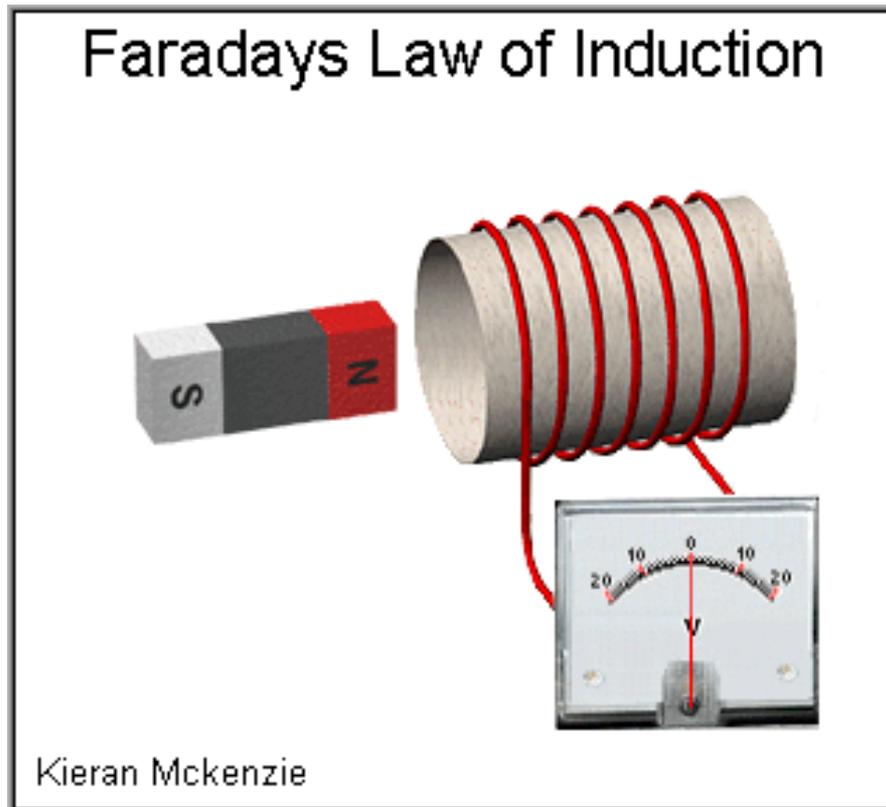


AC Inductive Circuit Examples

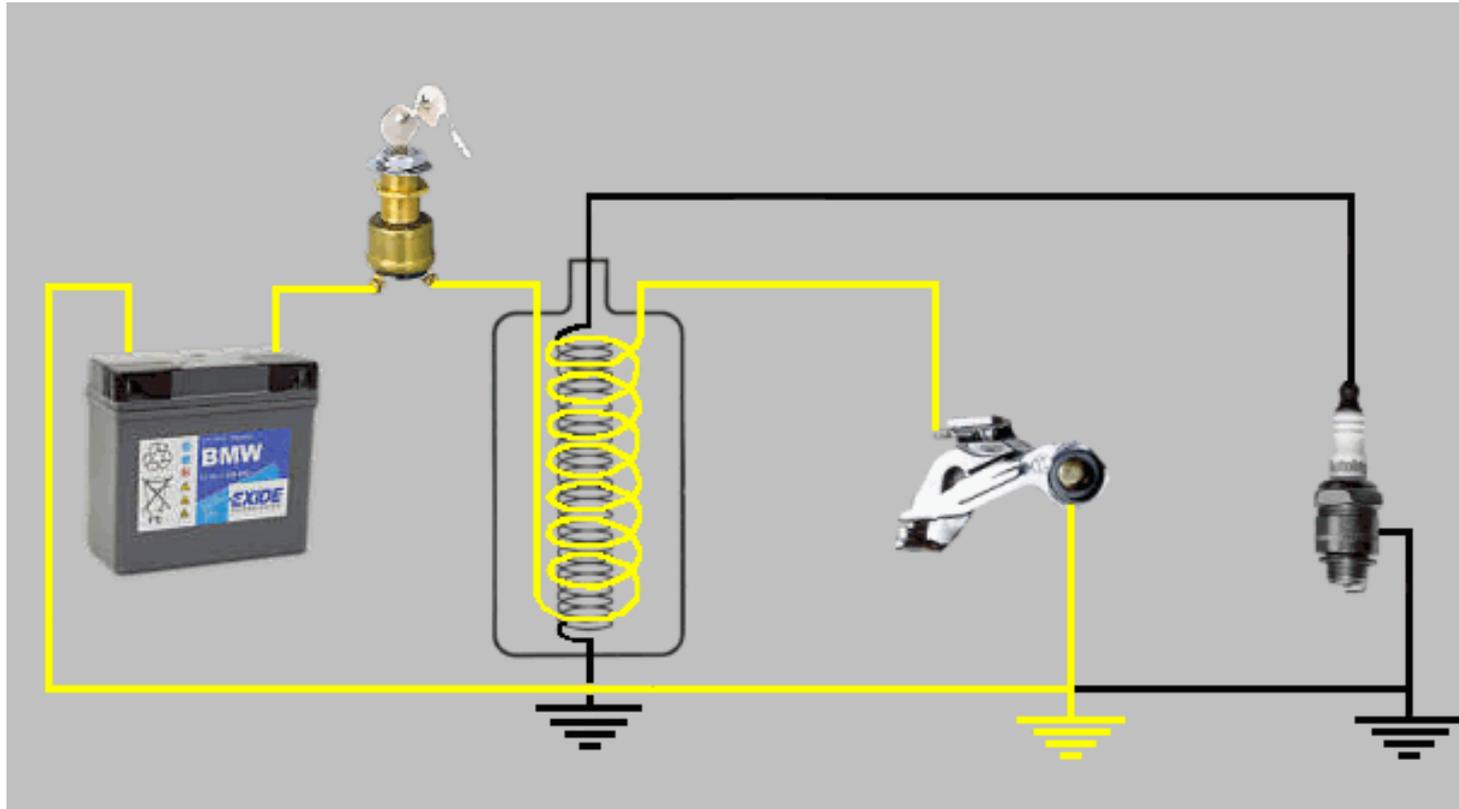
Electric Motors, Transformers & Solenoids

- Impedance (Z) replaces (R) in Ohm's Law
- $I = E / Z$
- where $Z = \sqrt{R^2 + X^2}$ and X is inductive and / or capacitive reactance

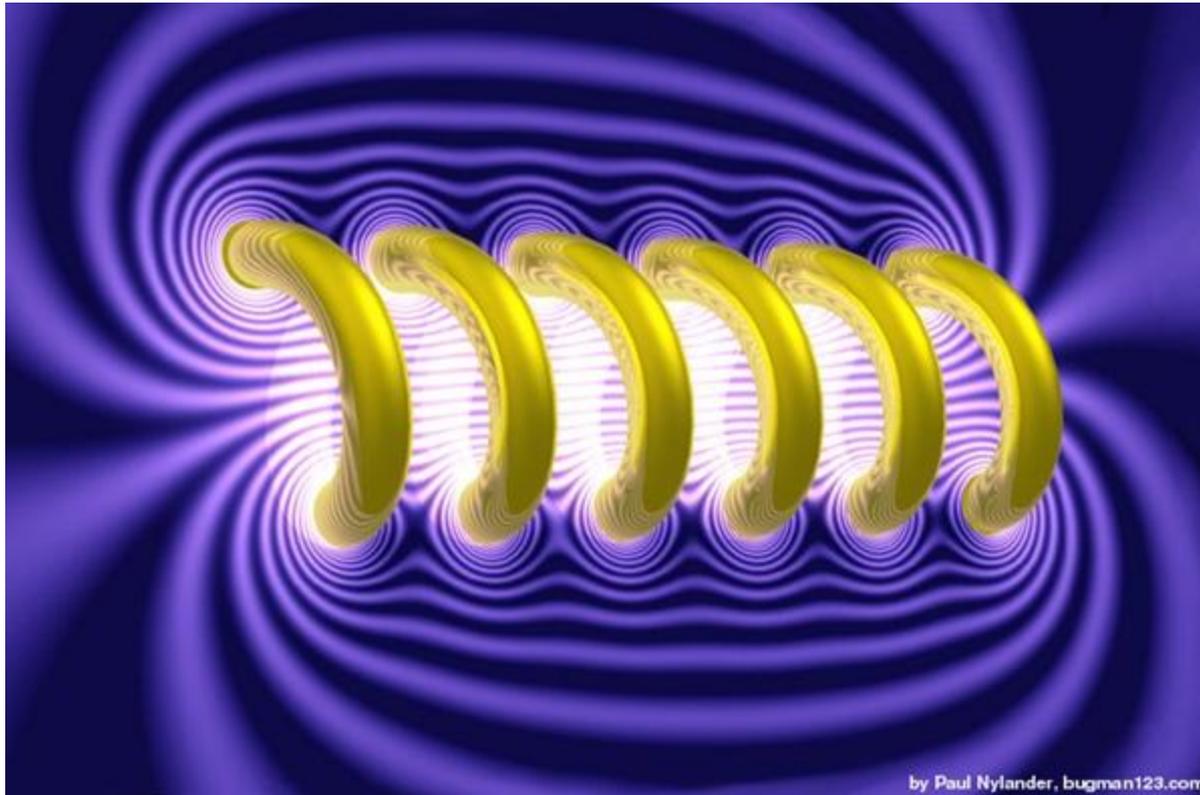
Magnetic Induction



DC Induction

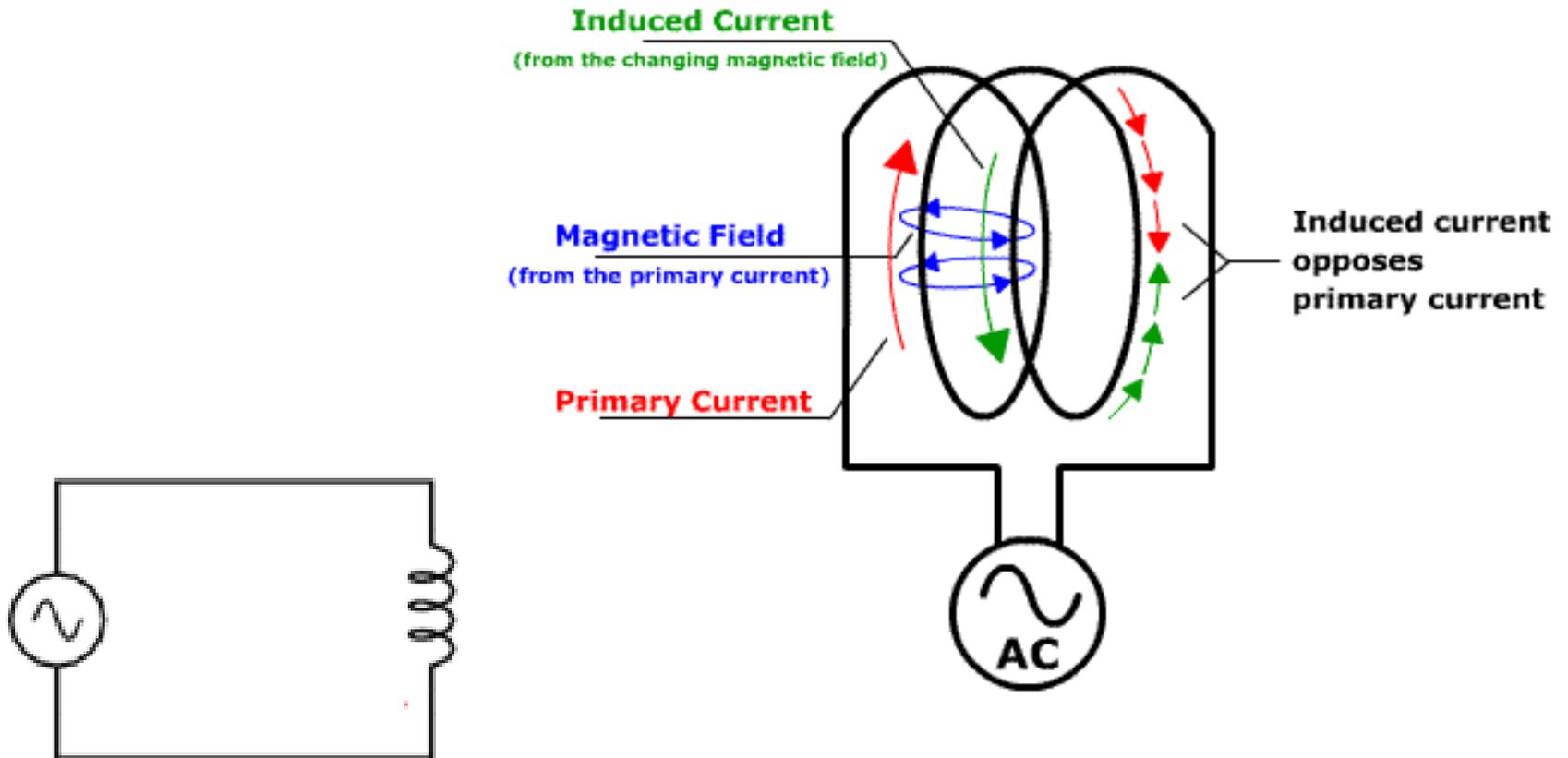


Self Induction



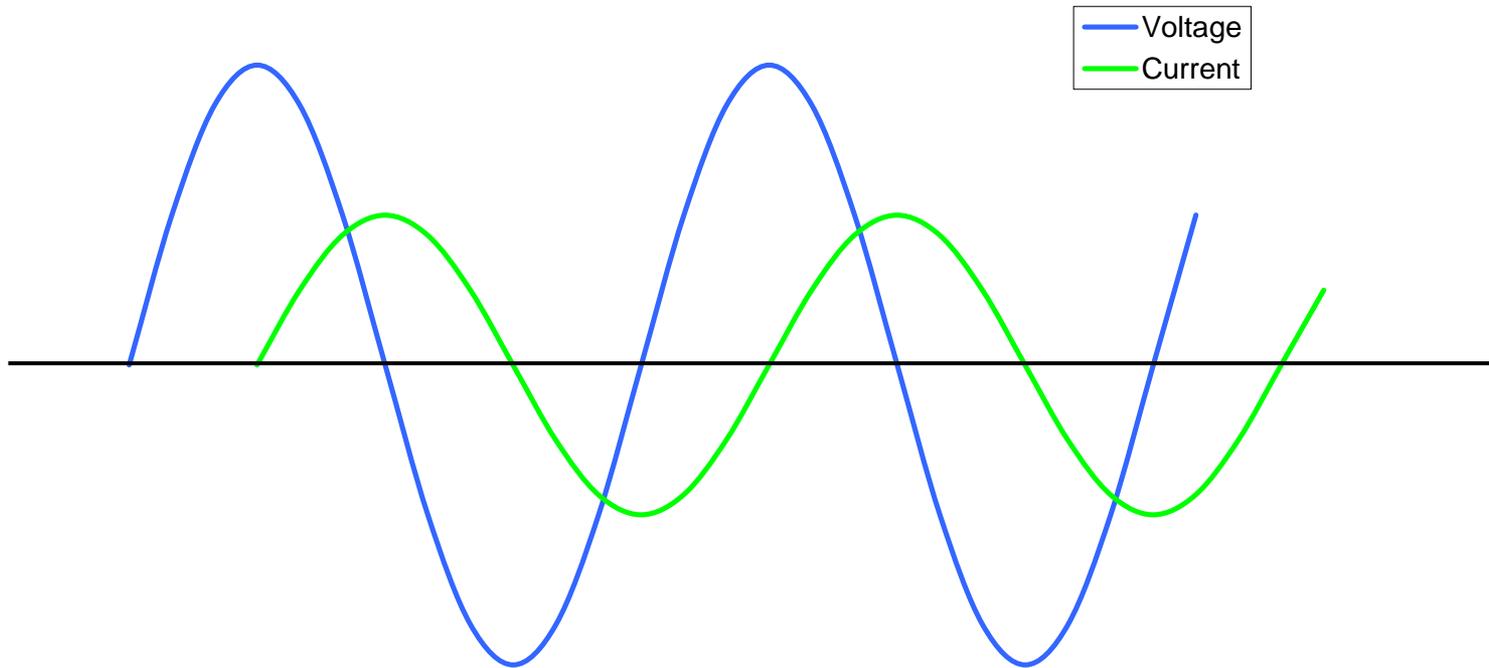
by Paul Nylander, bugman123.com

Purely Inductive Circuit



Purely Inductive Curve

Current Lagging Voltage

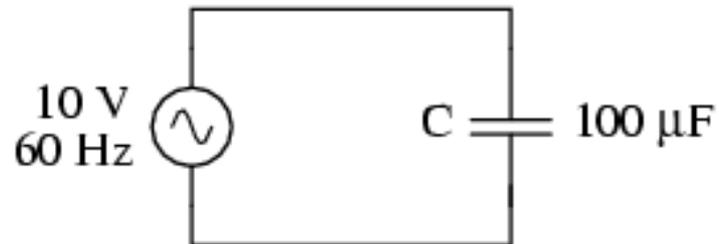


Inductive Reactance

Capacitive Circuits

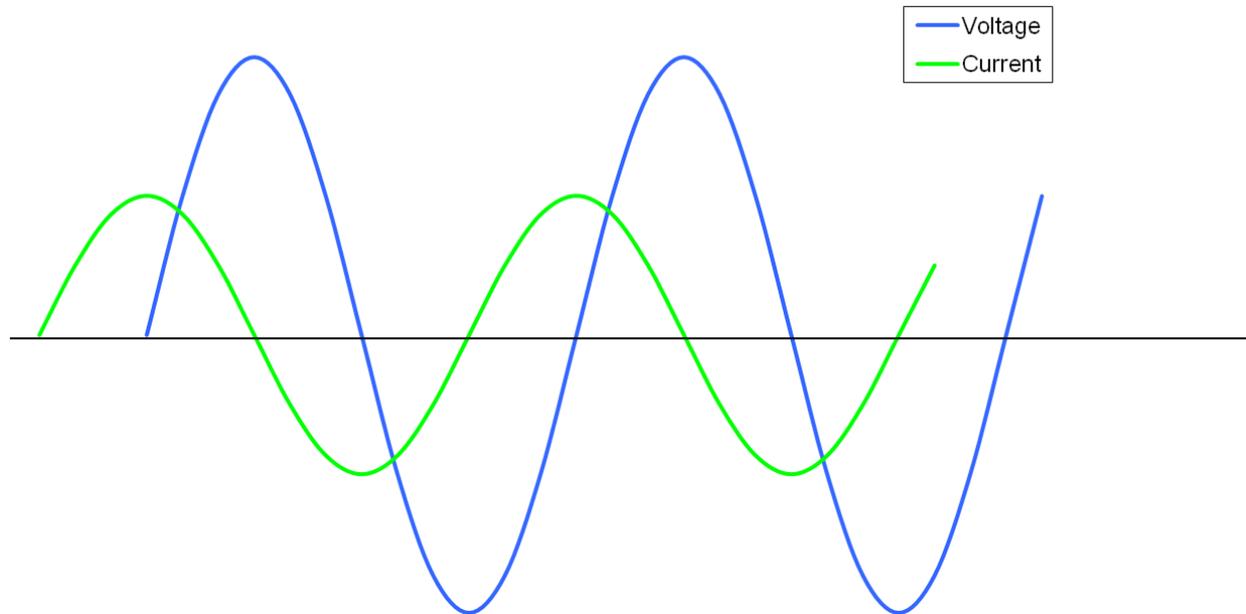
Examples

Condensers, Piezoelectric Devices, Metal Oxide Semiconductors, True Capacitors



Purely Capacitive Load

Voltage Lagging Current



Capacitive Reactance

Power Factor

Power Factor is an indication of how effectively an inductive device uses the power that is available in a circuit.

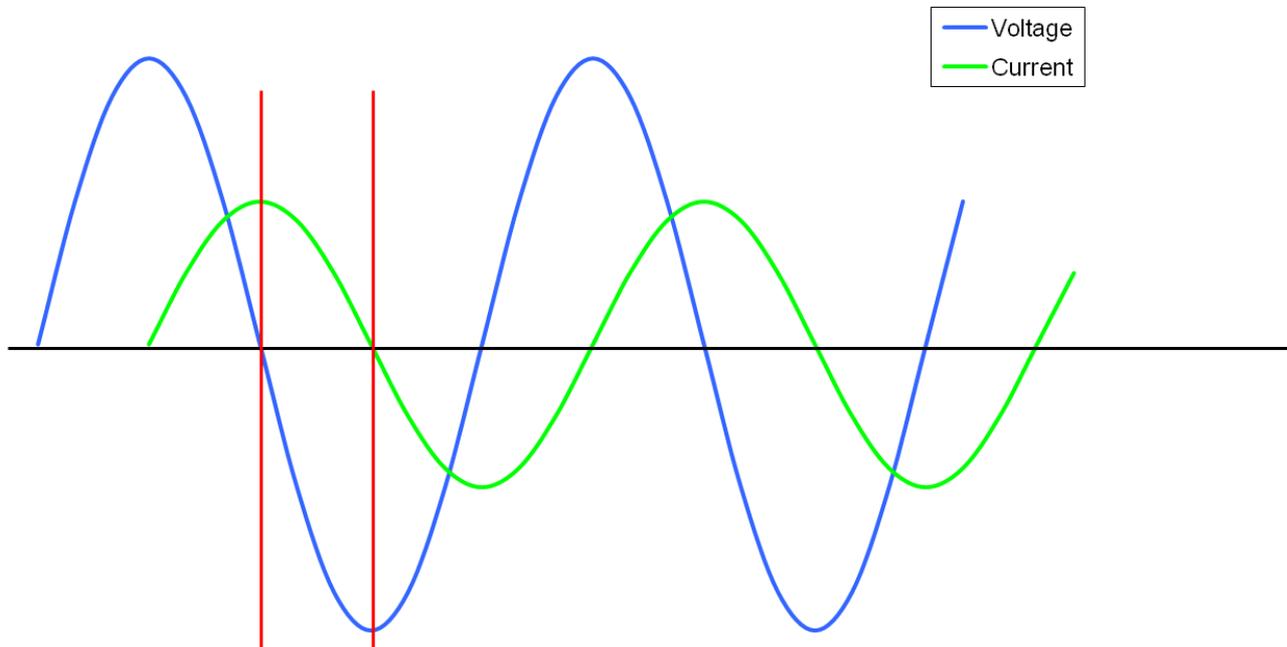
It refers to the portion of the power in a circuit (building, plant, process etc) that can actually be used by electrical equipment compared to the total amount that is supplied by the utility.

Expressed another way it is the power consumed (measured in watts) versus the total power available (measured in volt-amps).

But isn't a watt a volt-amp?

Power Factor

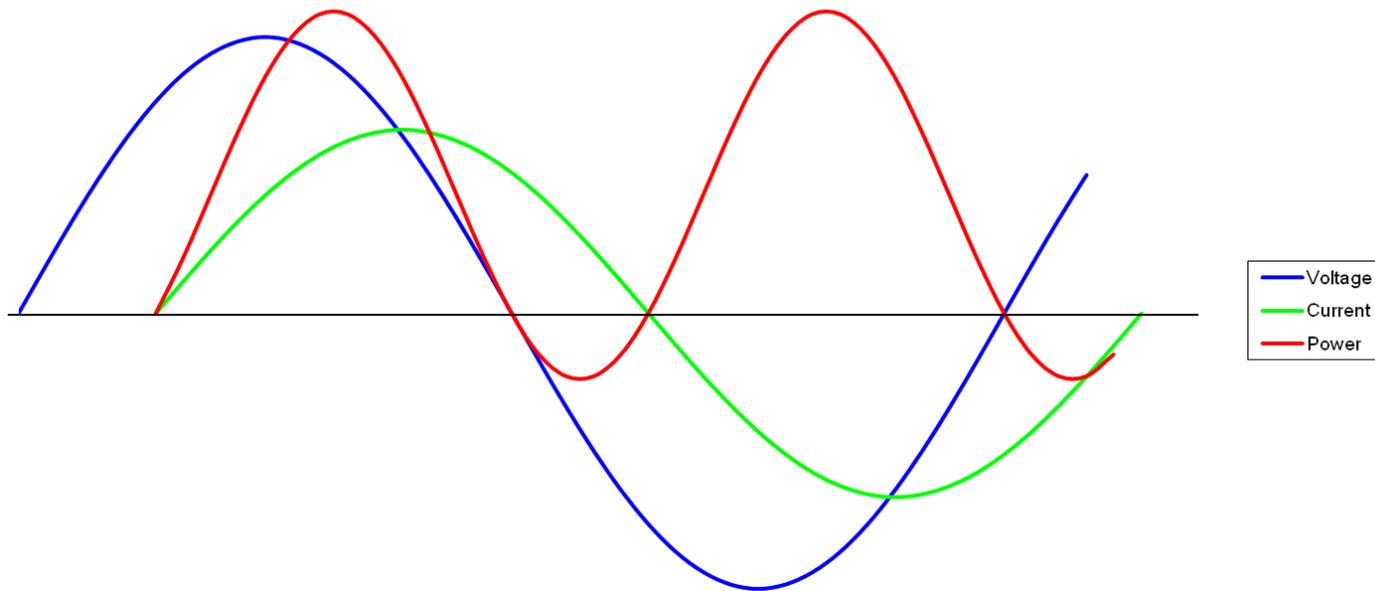
Current Lagging Voltage



Inductive Reactance

Power Factor

Typical Current Lag

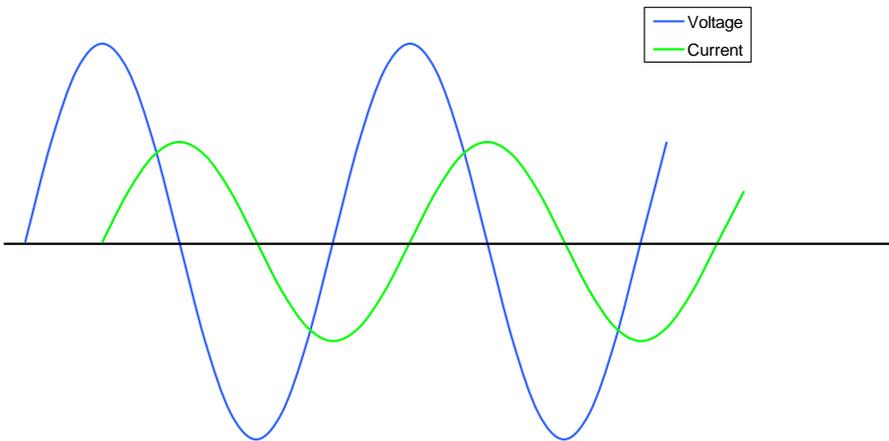


A More Typical Lag

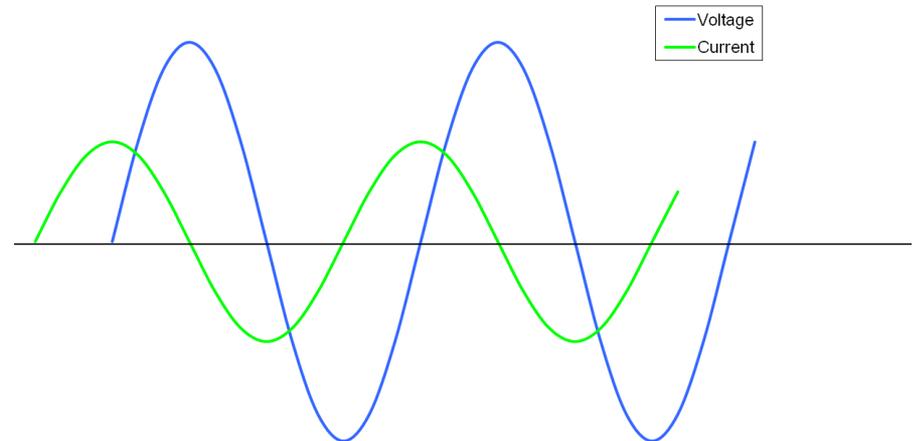
Capacitive Reactance

The Power Factor Fix

Current Lagging Voltage



Voltage Lagging Current

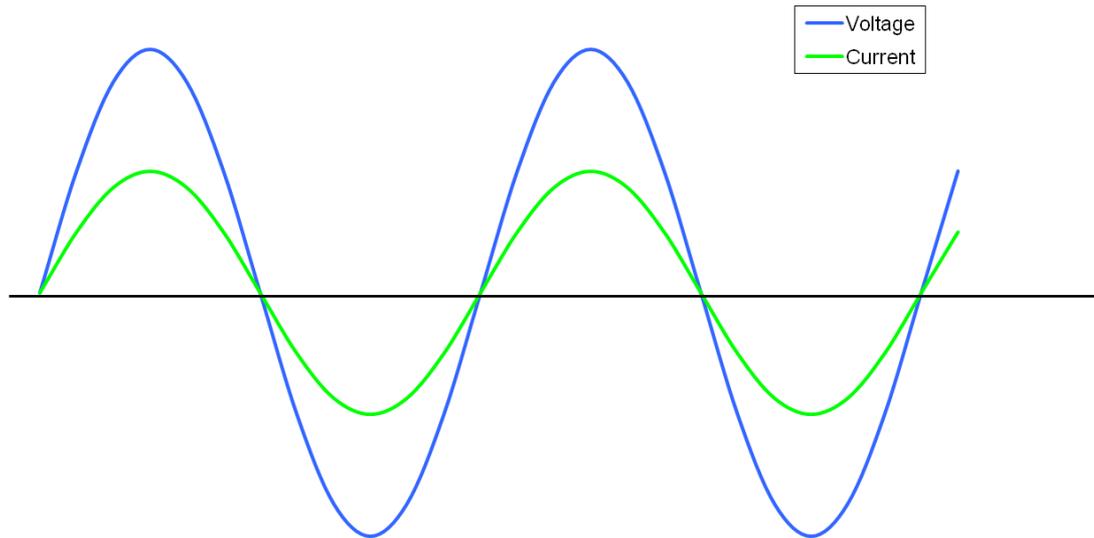


$$E = IZ$$

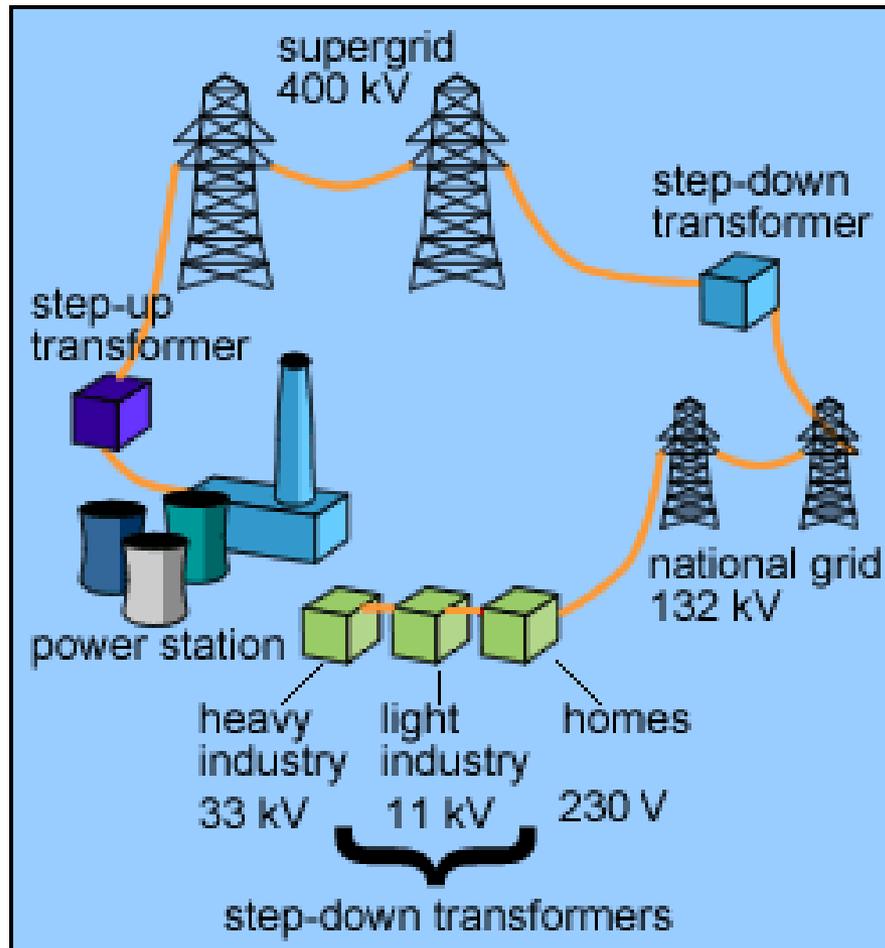
$$E = I(\sqrt{R^2 + (X_L - X_C)^2})$$

Capacitive Reactance The Power Factor Fix

Current & Voltage In Sync



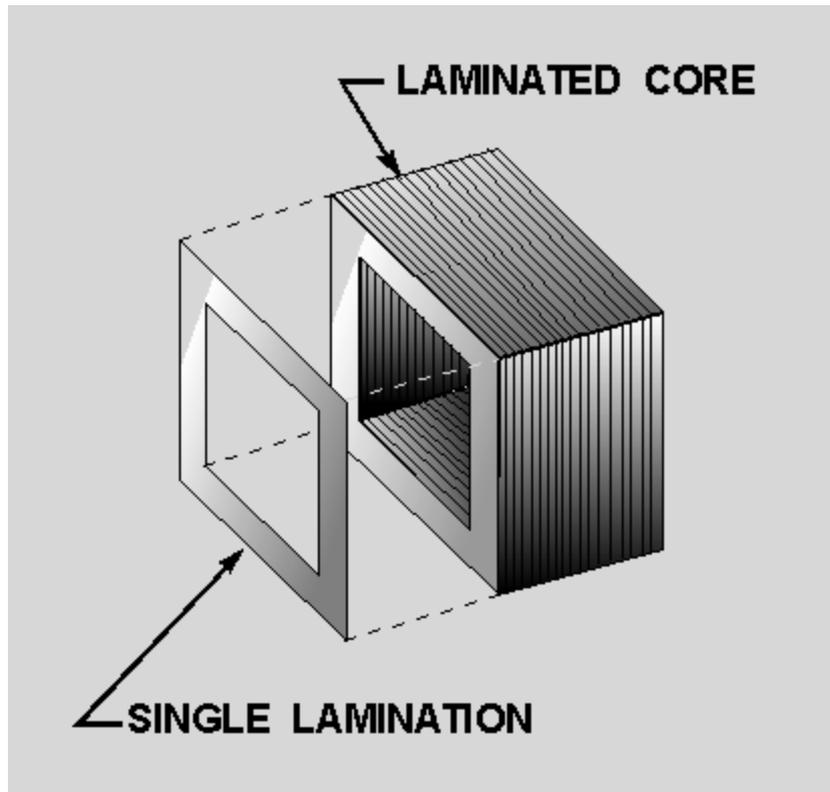
AC Power Transmission



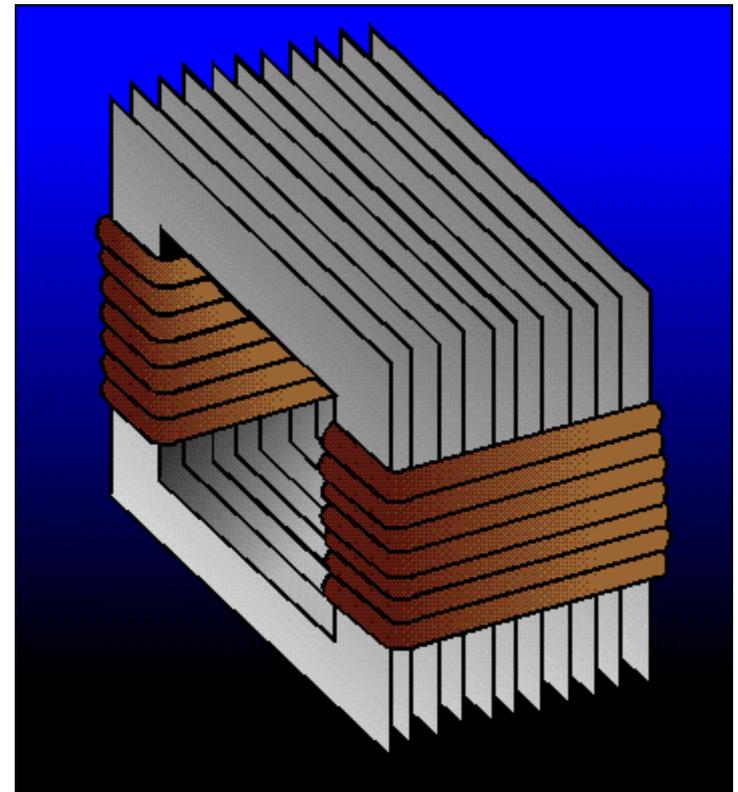
What Is A Transformer ?

- A device that increases or decreases AC voltage & current
- Operates through mutual induction
- Voltage change varies **directly** while current change varies **inversely**

Transformer Components



Laminations



Windings

How Transformers Work

- Mutual Induction
- Turns Ratio
- Voltage / Current Relationship

Mutual Induction

Primary winding

N_p turns

Primary current
 I_p

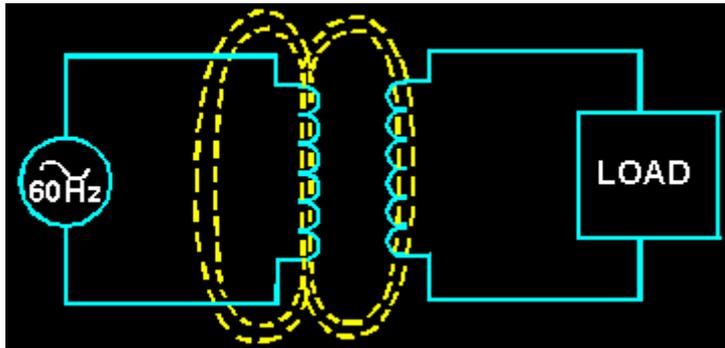
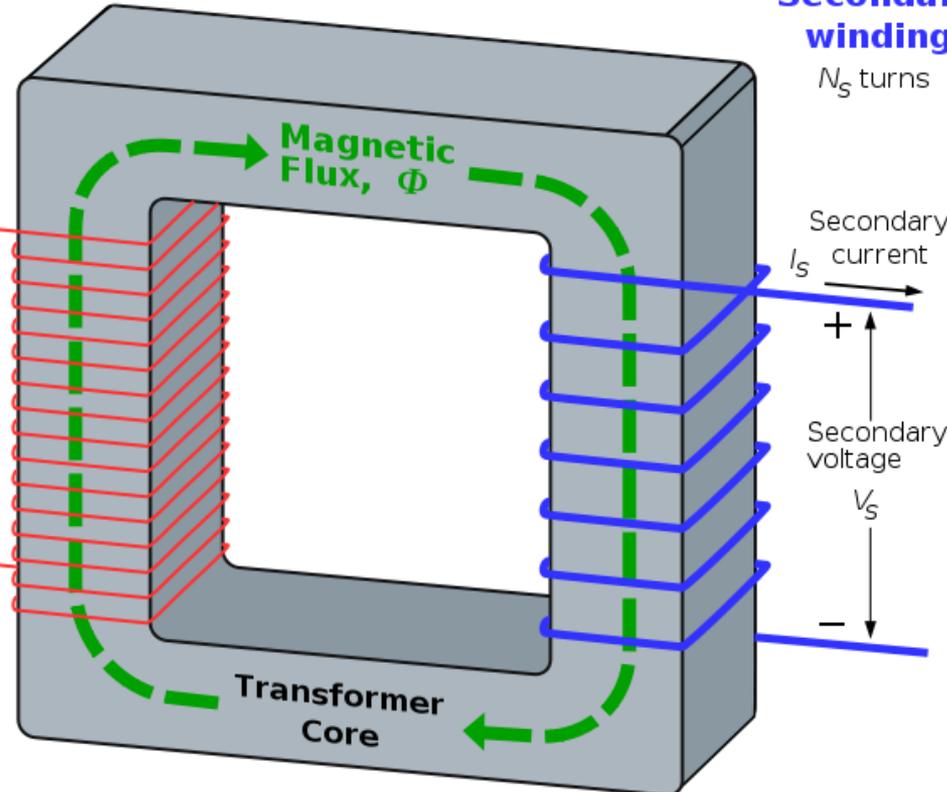
Primary voltage
 V_p

Secondary winding

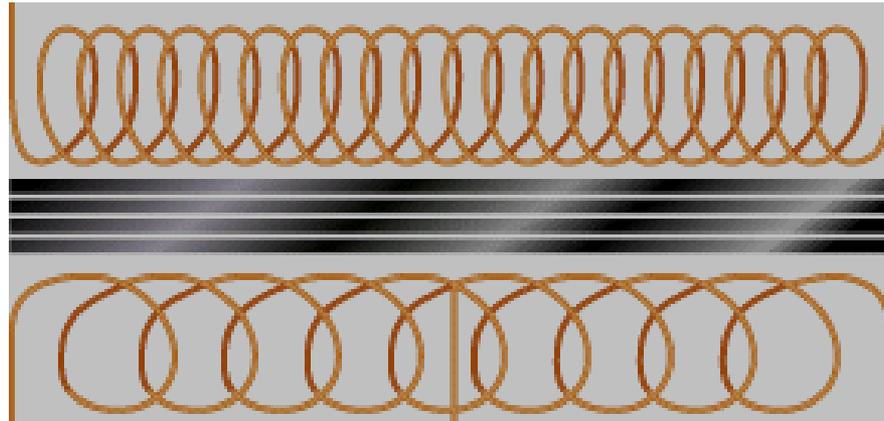
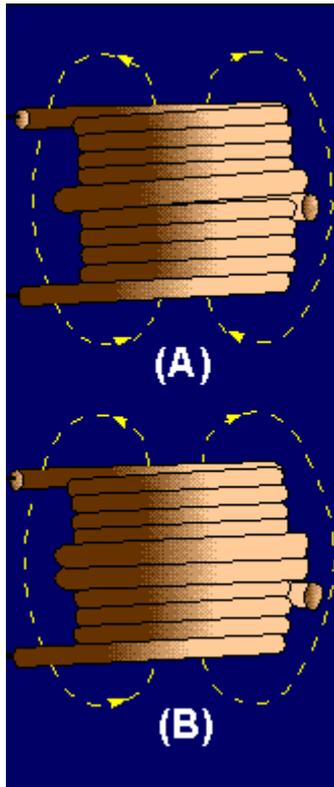
N_s turns

Secondary current
 I_s

Secondary voltage
 V_s



The Turns Ratio



$$\text{Turns Ratio} = T_p / T_s$$

The Volt / Amp Relationship

10 : 1 Turns Ratio :

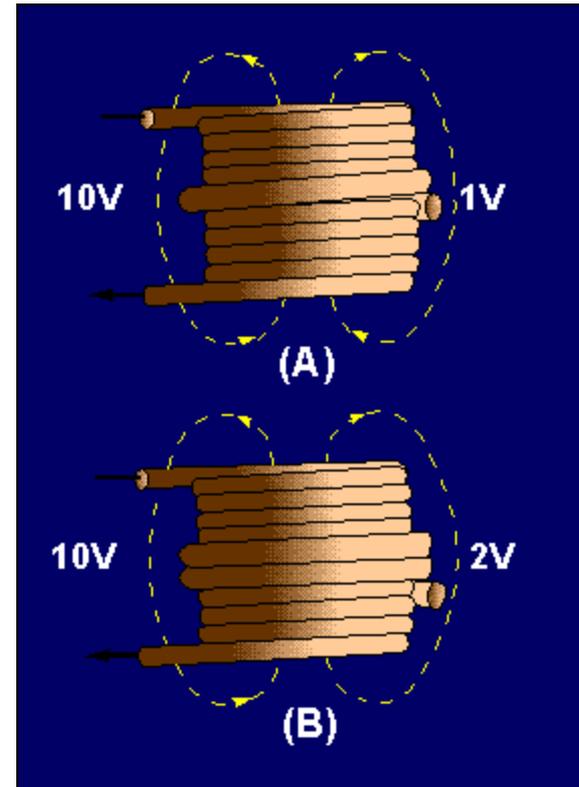
$$10 V_p = 1 V_s$$

$$1 A_p = 10 A_s$$

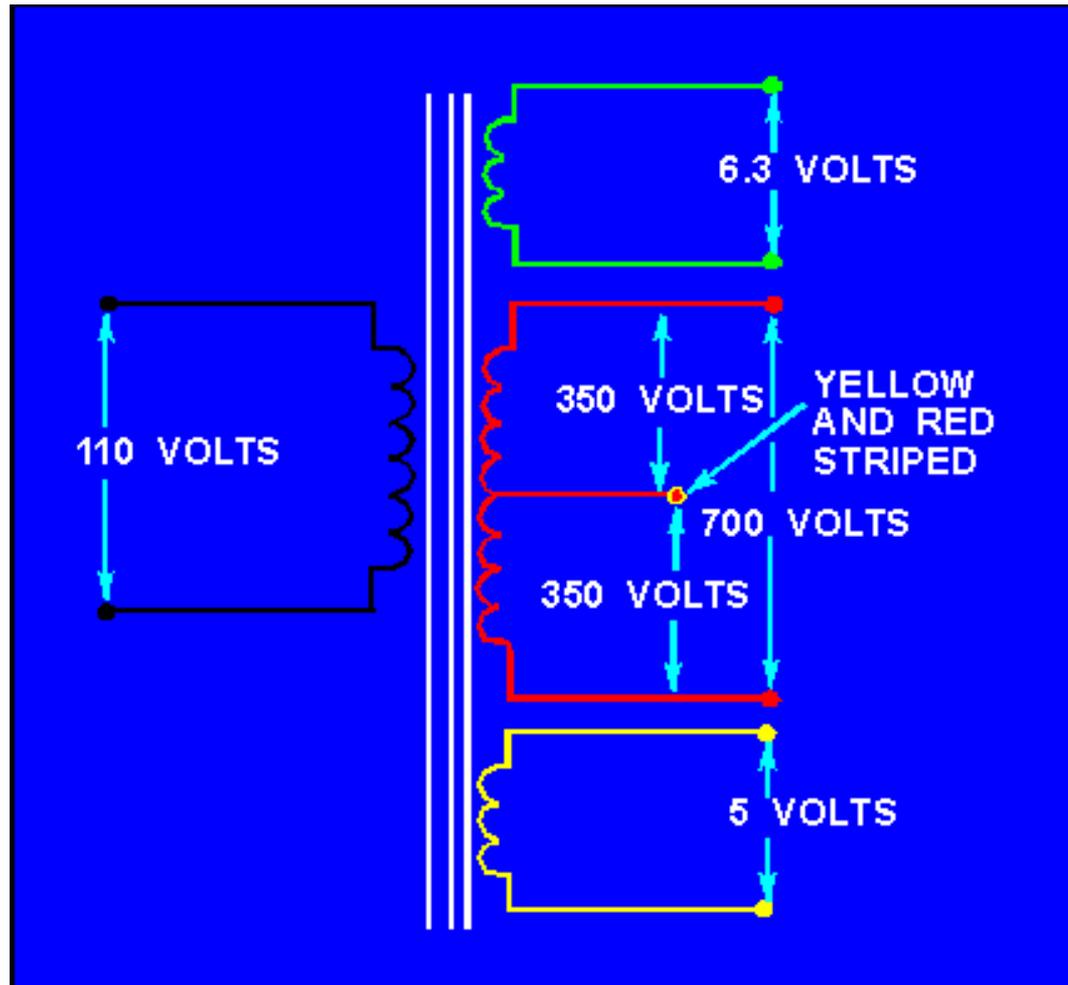
10 : 2 Turns Ratio :

$$10 V_p = 2 V_s$$

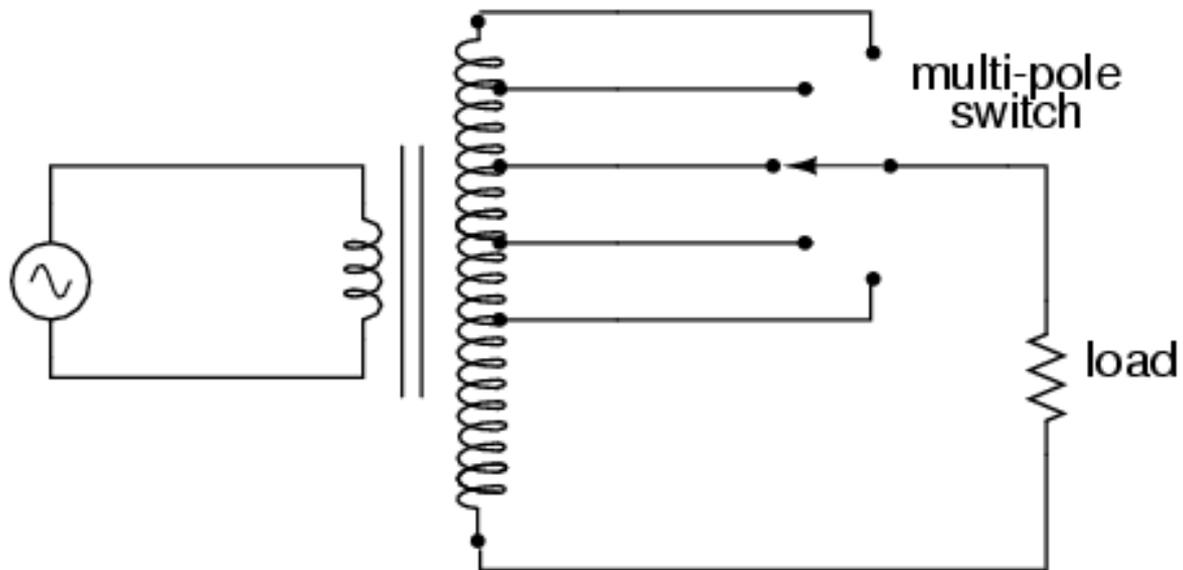
$$1 A_p = 5 A_s$$



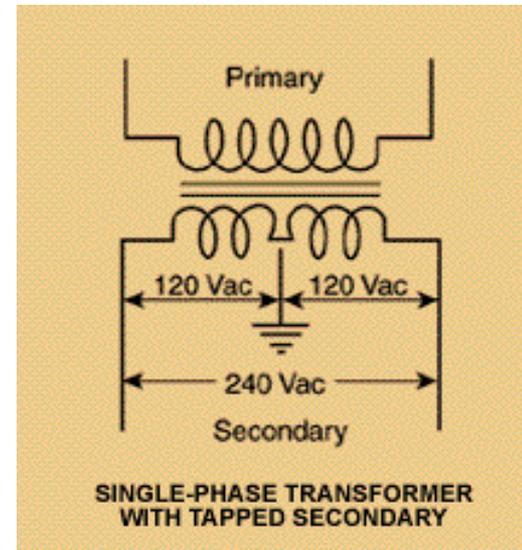
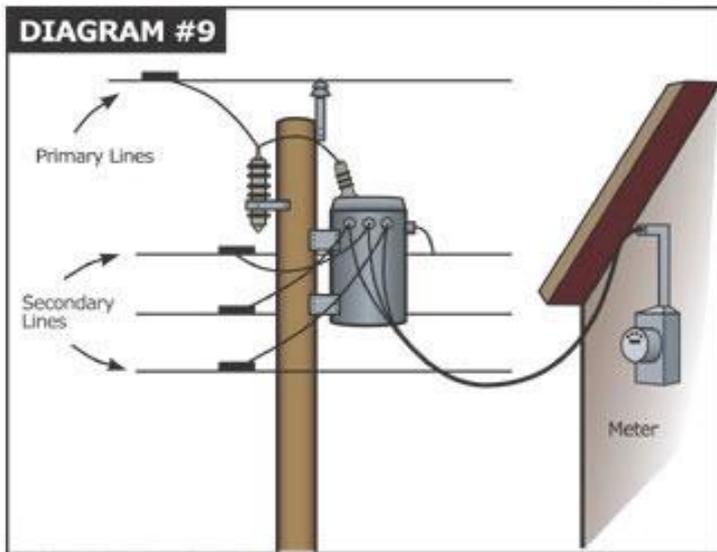
Typical Power Supply Transformer



Adjustable Tap Transformer



Residential Transformer

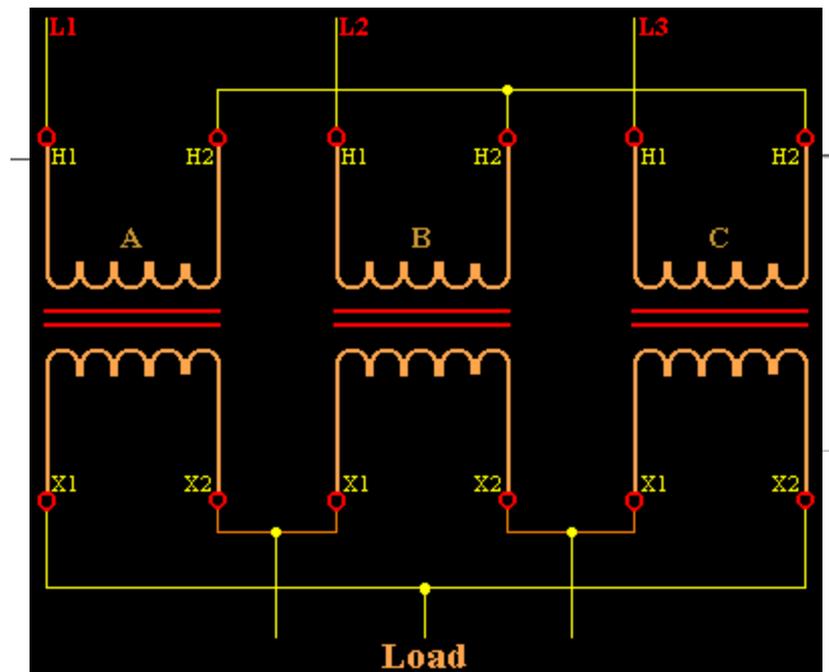


Three Phase Transformers

Wound as 3 Single Phase Units on Single Core

or

3 Individual Single Phase Units



Windings Connected in Wye or Delta Configurations

Three Phase Transformers

Why Wye? Why Delta?

Wye connections offer multiple voltages

Delta connections offer higher reliability

There are four possible combinations

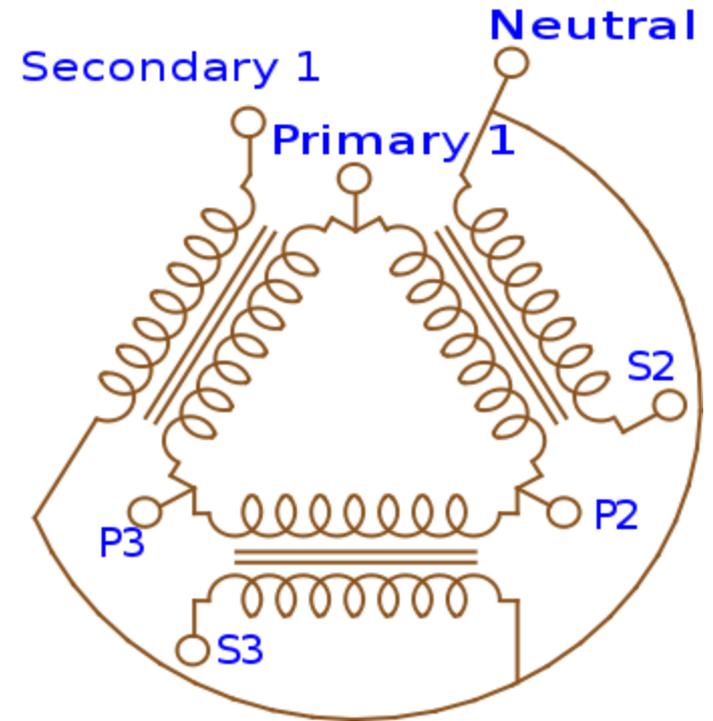
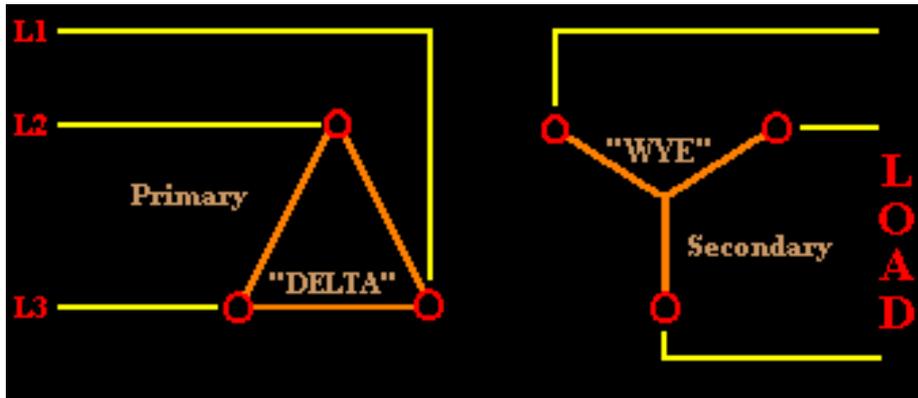
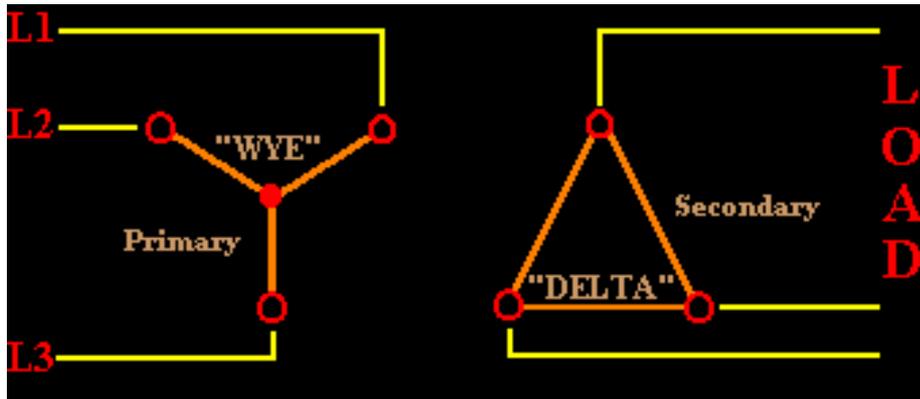
Delta to Delta - industrial applications

Delta to Wye - most common industrial / commercial

Wye to Delta - high voltage transmission

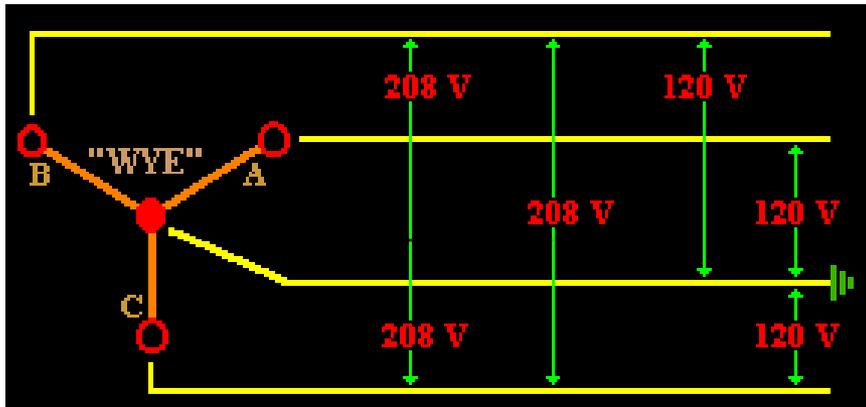
Wye to Wye - rarely used (harmonics & balance)

Wye & Delta Connections

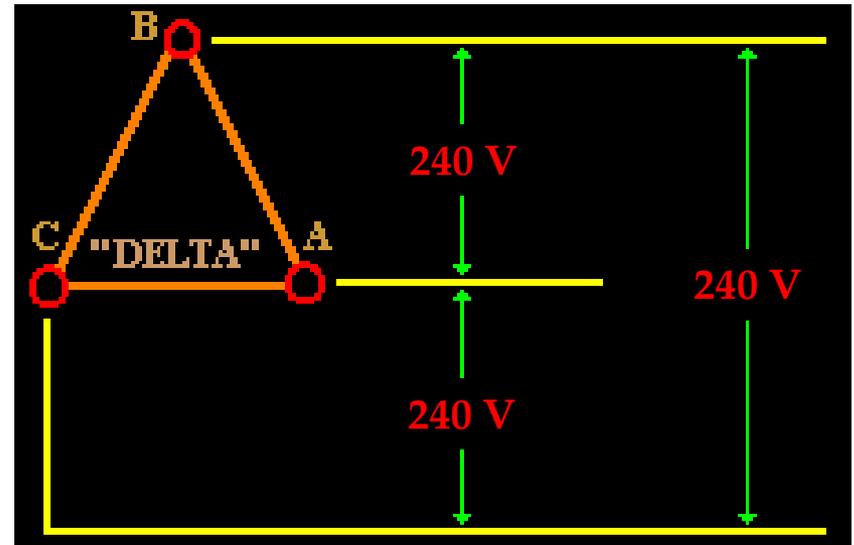


Delta / Wye

Wye & Delta Connections



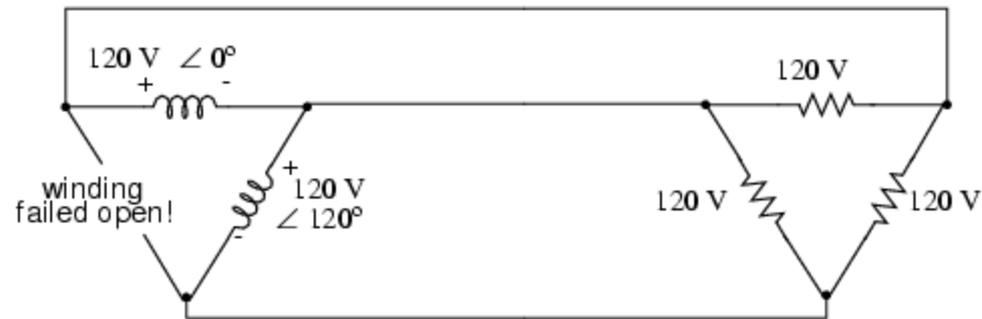
Phase to Phase = Phase Voltage X 1.732



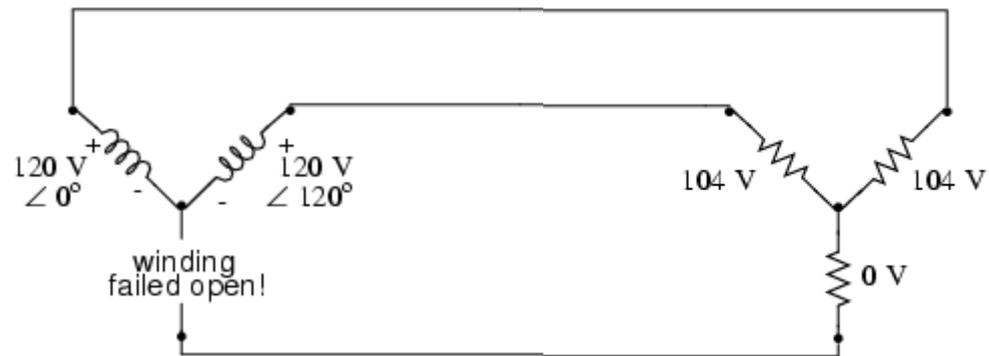
Phase to Phase = Phase Current X 1.732

$$\text{Power (W)} = E \times I \times 1.732 \times \text{pf}$$

Wye & Delta Winding Failure

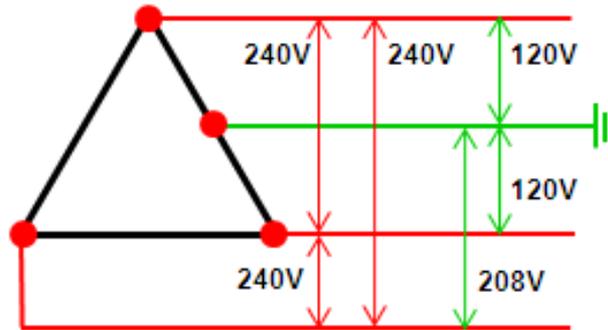


Does not affect load voltage & current

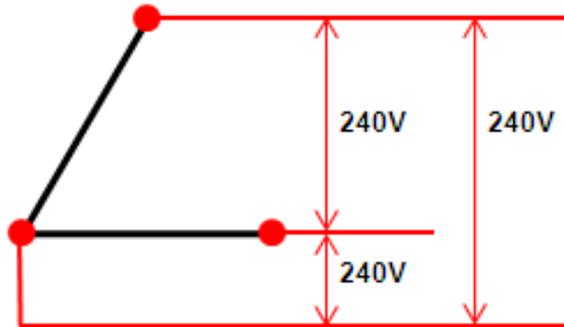


One leg 0 volts & two legs at 50%

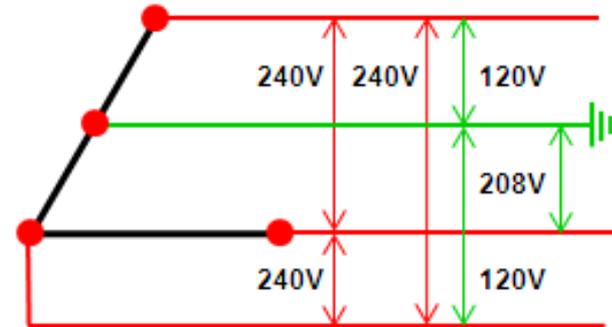
Delta Mutants



Center Tapped Delta



Open Delta (58%)



Center Tapped Open Delta

3 Phase AC Characteristics

- WYE or Delta Connected
- $\text{Power (W)} = E \times I \times 1.732 \times \text{pf}$
- $\text{Motor Amps} = (\text{HP} \times 746) / (E \times 1.732 \times \text{eff} \times \text{pf})$

Good Online Content

All About Circuits -

http://www.allaboutcircuits.com/vol_2/index.html

Integrated Publishing - EE Training Series -

<http://www.tpub.com/content/neets/>

Electronics - Tutorials -

<http://www.electronics-tutorials.ws/index.html>

Siemens -

<http://www3.sea.siemens.com/step/templates/lesson.mason?bep:2:1:1>

Electrician's Toolbox -

<http://www.elec-toolbox.com/>

RLC Circuits - Java Applet -

<http://www.walter-fendt.de/ph14e/accircuit.htm>



Pump Ed 101

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AC Power