



Basic Formula Table  
Electrikgrid Website  
Revised 05/2014, J Allen

/=divided by \*=multiplied by sq root=square root of...

NERC Area Control Error:

$ACE = (N1a - N1s) - 10\beta(Fa - Fs) - I_{me}$

Single phase kVA = kV \* amps, Single phase kW = kV \* amps \* power factor

3 phase kVA = kV \* amps \* 1.73 3 phase kW = kV \* amps \* power factor \* 1.73

Total kVA for three banked identically rated 1 phase transformers = 3 \* kVA of a single transformer

Maximum amps = (kVA rating of equipment) / (kV \* 1.73)

Maximum transformer short circuit amps = (transformer maximum amp rating / % Z) \* 100

Regulator maximum amps = (nameplate kVA of regulator) / (kV \* 1.73 \* % regulation in decimal format)

Conversion 120 VAC secondary to primary kV:

For phase to ground potential: primary volts = secondary phase to ground volts PT ratio \* 1.73

For phase to phase potential: primary volts = metering phase to phase volts \* PT ratio

RPM for 60 Hz = (frequency in Hertz \* 120) / poles

Basic electricity:

E/R when I=amps, E=volts, R=Ohms resistance

Hydroelectric highlights

1 hp = 746 watts = 0.746 kW = 33000 ft/lbs per minute

1 acre foot (AF) = 43,560 cubic feet

cubic feet per second \* hours \* 0.0826 = AF for given period

1 cubic foot per second (CFS) for 24 hours = 1.98 AF

kW = (CFS \* head in feet \* efficiency in decimal) / 11.8

1 foot head = 0.4335 psig

Water flow through an orifice = coefficient \* opening in square feet \* [sq. root (64.4 \* head in feet)]

1 gallon = 231 cubic inches = 0.13368 cubic feet = weight of 8.33 lbs

Fundamental trigonometric relationships

Sin (sine) = opposite/hypotenuse; cos (cosine) = adjacent/hypotenuse; tan (tangent) = opposite/adjacent;  $c^2 = a^2 + b^2$  MVAR =  $\text{sq root}(MVA^2 - MW^2)$

amps/volts = phase angle difference

Other:

Inches \* 0.0254 = meters; miles \* 1.609 = kilometers; liters \* 0.2642 = gallons; 1 inch Hg = 0.491 psi; watts = btu/min \* 17.57; kilometers \* 0.621 = miles;

$F = (9/5 * C) + 32$   $C = 5/9(F - 32)$

**CAUTION: THINK, BE SAFE, BE ALIVE! SAFETY FIRST**