1. **How to convert amps to watts**

How to convert electric current in amps (A) to electric power in watts (W).
You can calculate watts from amps and volts. You can't convert amps to watts since watts and amps units do not measure the same quantity.

- DC amps to watts
- AC single phase amps to watts
- AC three phase amps to watts

DC amps to watts calculation formula

The power *P* in watts (W) is equal to the current *I* in amps (A), times the voltage *V* in volts (V):

$P_{(W)} = I_{(A)} \times V_{(V)}$

So watts are equal to amps times volts:

watt = amp × volt

or

W = A × V

Example

What is power consumption in watts when the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to current of 3 amps times the voltage of 110 volts.

$P = 3A \times 110V = 330W$

AC single phase amps to watts calculation formula

The real power *P* in watts (W) is equal to the power factor *PF* times the current *I* in amps (A), times the RMS voltage *V* in volts (V):

$P_{(W)} = PF \times I_{(A)} \times V_{(V)}$

So watts are equal to power factor times amps times volts:

watt = *PF* × amp × volt

or

W = *PF* × A × V

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts.

$P = 0.8 \times 3A \times 110V = 264W$

AC three phase amps to watts calculation formula

Watts calculation with line to line voltage

The real power *P* in watts (W) is equal to square root of 3 times the power factor *PF* times the current *I* in amps (A), times the line to line RMS voltage $V_{L\text{-}L}$ in volts (V):

$P_{(W)} = \sqrt{3} \times PF \times I_{(A)} \times V_{L\text{-}L(V)}$

So watts are equal to square root of 3 times power factor PF times amps times volts:

watt = $\sqrt{3}$ × *PF* × amp × volt

or

W = $\sqrt{3}$ × *PF* × A × V

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to power factor of 0.8 times current of 3 amps times the voltage of 110 volts.

$P = \sqrt{3} \times 0.8 \times 3A \times 110V = 457W$

Watts calculation with line to neutral voltage

The calculation assumes the loads are balanced.
The real power *P* in watts (W) is equal to 3 times the power factor *PF* times the current *I* in amps (A), times the line to neutral RMS voltage $V_{L\text{-}0}$ in volts (V):

$P_{(W)} = 3 \times PF \times I_{(A)} \times V_{L\text{-}0(V)}$

So watts are equal to 3 times power factor PF times amps times volts:

watt = 3 × *PF* × amp × volt

or

W = 3 × *PF* × A × V

2. How to convert amps to kilowatts

How to convert electric current in amps (A) to electric power in kilowatts (kW).
You can calculate kilowatts from amps and volts. You can't convert amps to kilowatts since kilowatts and amps units do not measure the same quantity.

DC amps to kilowatts calculation formula

The power *P* in kilowatts is equal to the current *I* in amps, times the voltage *V* in volts divided by 1000:

$P_{(kW)} = I_{(A)} \times V_{(V)} / 1000$

So kilowatts are equal to amps times volts divided by 1000:

kilowatt = amp × volt / 1000

or

kW = A × V / 1000

Example

What is power consumption in kW when the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to current of 3 amps times the voltage of 110 volts, divided by 1000.

$P = 3A \times 110V / 1000 = 0.33kW$

AC single phase amps to kilowatts calculation formula

The real power *P* in kilowatts is equal to the power factor *PF* times the current *I* in amps, times the RMS voltage *V* in volts divided by 1000:

$P_{(kW)} = PF \times I_{(A)} \times V_{(V)} / 1000$

So kilowatts are equal to power factor times amps times volts divided by 1000:

kilowatt = *PF* × amp × volt / 1000

or

kW = *PF* × A × V / 1000

Example

What is power consumption in kW when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts, divided by 1000.

$P = 0.8 \times 3A \times 110V / 1000 = 0.264kW$

AC three phase amps to kilowatts calculation formula

The real power *P* in kilowatts is equal to square root of 3 times the power factor *PF* times the current *I* in amps, times the line to line RMS voltage $V_{L\text{-}L}$ in volts divided by 1000:

$P_{(kW)} = \sqrt{3} \times PF \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$

So kilowatts are equal to square root of 3 times power factor PF times amps times volts divided by 1000:

kilowatt = $\sqrt{3}$ × *PF* × amp × volt / 1000

or

kW = $\sqrt{3}$ × *PF* × A × V / 1000

Example

What is power consumption in kW when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to square root of 3 times power factor of 0.8 times current of 3 amps times the voltage of 110 volts, divided by 1000.

$P = \sqrt{3} \times 0.8 \times 3A \times 110V / 1000 = 0.457kW$

3. How to convert amps to VA

Electric current in amps (A) to apparent power in volt-amps (VA).
You can calculate volt-amps from amps and volts, but you can't convert amps to volt-amps since volt-amps and amps units do not measure the same quantity.

Single phase amps to VA calculation formula

The apparent power *S* in volt-amps (VA) is equal to current *I* in amps (A), times the RMS voltage *V* in volts (V):

$S_{(VA)} = I_{(A)} \times V_{(V)}$

So volt-amps are equal to amps times volts:

volt-amps = amps × volts

or

VA = A · V

Example
What is the apparent power in VA when the current is 12A and the voltage supply is 110V?
Solution:
$S = 12A \times 110V = 1320VA$

3 phase amps to VA calculation formula

The apparent power *S* in volt-amps (VA) is equal to square root of 3 times current *I* in amps (A), times the line to line RMS voltage $V_{L\text{-}L}$ in volts (V):
$S_{(VA)} = \sqrt{3} \times I_{(A)} \times V_{L\text{-}L(V)}$
So volt-amps are equal to square root of 3 times amps times volts:
kilovolt-amps = $\sqrt{3} \times$ amps $\times$ volts
or
kVA = $\sqrt{3} \times A \cdot V$

Example
What is the apparent power in VA when the current is 12A and the voltage supply is 110V?
Solution:
$S = \sqrt{3} \times 12A \times 110V = 2286VA$

4. How to convert amps to kVA

How to convert electric current in amps (A) to apparent power in kilovolt-amps (kVA).
You can calculate kilovolt-amps from amps and volts, but you can't convert amps to kilovolt-amps since kilovolt-amps and amps units do not measure the same quantity.

Single phase amps to kVA calculation formula

The apparent power S in kilovolt-amps is equal to current I in amps, times the voltage V in volts, divided by 1000:
$S_{(kVA)} = I_{(A)} \times V_{(V)} / 1000$
So kilovolt-amps are equal to amps times volts divided by 1000.
kilovolt-amps = amps $\times$ volts / 1000
or
kVA = $A \cdot V / 1000$

Example
What is the apparent power in kVA when the current is 12A and the voltage supply is 110V?
Solution:
$S = 12A \times 110V / 1000 = 1.32kVA$

3 phase amps to kVA calculation formula

Calculation with line to line voltage

The apparent power S in kilovolt-amps (with balanced loads) is equal to square root of 3 times the current I in amps, times the line to line voltage $V_{L\text{-}L}$ in volts, divided by 1000:
$S_{(kVA)} = \sqrt{3} \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$
So kilovolt-amps are equal to $\sqrt{3}$ times amps times volts divided by 1000.
kilovolt-amps = $\sqrt{3} \times$ amps $\times$ volts / 1000
or
kVA = $\sqrt{3} \times A \cdot V / 1000$

Example
What is the apparent power in kVA when the current is 12A and the line to line voltage supply is 190V?
Solution:
$S = \sqrt{3} \times 12A \times 190V / 1000 = 3.949kVA$

Calculation with line to neutral voltage

The apparent power S in kilovolt-amps (with balanced loads) is equal to 3 times the current I in amps, times the line to neutral voltage $V_{L\text{-}N}$ in volts, divided by 1000:
$S_{(kVA)} = 3 \times I_{(A)} \times V_{L\text{-}N(V)} / 1000$
So kilovolt-amps are equal to 3 times amps times volts divided by 1000.
kilovolt-amps = 3 $\times$ amps $\times$ volts / 1000
or
kVA = $3 \times A \cdot V / 1000$

Example
What is the apparent power in kVA when the current is 12A and the line to neutral voltage supply is 120V?
Solution:
$S = 3 \times 12\text{A} \times 120\text{V} / 1000 = 4.32\text{kVA}$

5. How to convert amps to volts

How to convert electric current in amps (A) to voltage in volts (V).
You can calculate volts from amps and watts or ohms, but you can't convert amps to volts since volt and amp units represent different quantities.

Amps to volts calculation with watts

The voltage *V* in volts (V) is equal to the power *P* in watts (W), divided by the current *I* in amps (A):
$V_{(V)} = P_{(W)} / I_{(A)}$
So
volt = watt / amp
or
V = W / A

Example
What is the voltage supply of an electrical circuit that has power consumption of 45 watts and current flow of 3 amps?
The voltage V is equal to 45 watts divided by 3 amps:
$V = 45\text{W} / 3\text{A} = 15\text{V}$

Amps to volts calculation with ohms

The voltage *V* in volts (V) is equal to the current *I* in amps (A), times the resistance *R* in ohms (Ω):
$V_{(V)} = I_{(A)} \times R_{(\Omega)}$
So
volt = amp × ohm
or
V = A × Ω

Example
What is the voltage supply of an electrical circuit that has current flow of 3 amps and resistance of 10 ohms?
According to ohm's law the voltage V is equal to 3 amps times 10 ohms:
$V = 3\text{A} \times 10\Omega = 30\text{V}$

6. How to convert amps to milliamps

How to convert electric current from amps (A) to milliamps (mA).

amps to milliamps calculation formula

The current I in milliamps (mA) is equal to the current I in amps (A) times 1000:
$I_{(mA)} = I_{(A)} \times 1000$

So milliamps are equal to amps times 1000:
milliamp = amp × 1000
or
mA = A × 1000

Example
Convert current of 3 amps to milliamps:
The current I in milliamps (mA) is equal to 3 amps (A) times 1000:
$I_{(mA)} = 3\text{A} \times 1000 = 3000\text{mA}$

7. How to convert milliamps to amps

How to convert electric current from milliamps (mA) to amps (A).

milliamps to amps conversion

The current $I_{(A)}$ in amps is equal to the current $I_{(mA)}$ in milliamps divided by 1000:

$I_{(A)} = I_{(mA)} / 1000$

So amps are equal to milliamps divided by 1000:

amp = milliamp / 1000

or

A = mA / 1000

Example

Convert current of 300 milliamps to amps:

The current I in amps (A) is equal to 300 milliamps (mA) divided by 1000:

$I_{(A)} = 300\text{mA} / 1000 = 0.3\text{A}$

8. How to convert watts to amps

How to convert electric power in watts (W) to electric current in amps (A).

You can calculate amps from watts and volts. You can't convert watts to amps since watts and amps units do not measure the same quantity.

- DC watts to amps
- AC single phase watts to amps
- AC three phase watts to amps

DC watts to amps calculation formula

The current *I* in amps (A) is equal to the power *P* in watts (W), divided by the voltage *V* in volts (V):

$I_{(A)} = P_{(W)} / V_{(V)}$

So amps are equal to watts divided by volts.

amp = watt / volt

or

A = W / V

Example

What is the current in amps when the power consumption is 330 watts and the voltage supply is 110 volts?

$I = 330\text{W} / 110\text{V} = 3\text{A}$

AC single phase watts to amps calculation formula

The current *I* in amps (A) is equal to the real power *P* in watts (W), divided by the power factor *PF* times the RMS voltage *V* in volts (V):

$I_{(A)} = P_{(W)} / (PF \times V_{(V)})$

So amps are equal to watts divided by power factor times volts.

amps = watts / (*PF* × volts)

or

A = W / (*PF* × V)

Example

What is the current in amps when the power consumption is 330 watts, the power factor is 0.8 and the voltage supply is 110 volts?

$I = 330\text{W} / (0.8 \times 110\text{V}) = 3.75\text{A}$

AC three phase watts to amps calculation formula

Amps calculation with line to line voltage

The current *I* in amps (A) is equal to the real power *P* in watts (W), divided by square root of 3 times the power factor *PF* times the line to line RMS voltage $V_{L\text{-}L}$ in volts (V):

$I_{(A)} = P_{(W)} / (\sqrt{3} \times PF \times V_{L\text{-}L(V)})$

So amps are equal to watts divided by square root of 3 times power factor times volts.

amps = watts / ($\sqrt{3}$ × *PF* × volts)

or

$A = W / (\sqrt{3} \times PF \times V)$

Example

What is the current in amps when the power consumption is 330 watts, the power factor is 0.8 and the voltage supply is 110 volts?

$I = 330W / (\sqrt{3} \times 0.8 \times 110V) = 2.165A$

Amps calculation with line to neutral voltage

The calculation assumes the loads are balanced.

The current *I* in amps (A) is equal to the real power *P* in watts (W), divided by 3 times the power factor *PF* times the line to neutral RMS voltage $V_{L\text{-}0}$ in volts (V):

$I_{(A)} = P_{(W)} / (3 \times PF \times V_{L\text{-}0(V)})$

So amps are equal to watts divided by 3 times power factor times volts.

$amps = watts / (3 \times PF \times volts)$

or

$A = W / (3 \times PF \times V)$

9. How to convert watts to joules

How to convert electric power in watts (W) to energy in joules (J).

You can calculate joules from watts and seconds, but you can't convert watts to joules since watt and joule units represent different quantities.

Watts to joules calculation formula

The energy *E* in joules (J) is equal to the power *P* in watts (W), times the time period *t* in seconds (s):

$E_{(J)} = P_{(W)} \times t_{(s)}$

So

$joules = watts \times seconds$

or

$J = W \times s$

Example

What is the energy consumption of an electrical circuit that has power consumption of 30 watts for time duration of 3 seconds?

$E_{(J)} = 30W \times 3s = 90J$

How to convert watts to volts

How to convert electric power in watts (W) to electrical voltage in volts (V).

You can calculate volts from watts and amps, but you can't convert watts to volts since watts and volts units do not measure the same quantity.

DC watts to volts calculation formula

The voltage *V* in volts is equal to the power *P* in watts, divided by the current *I* in amps:

$V_{(V)} = P_{(W)} / I_{(A)}$

So volts are equal to watts divided by amps.

$volt = watt / amp$

or

$V = W / A$

Example

What is the voltage in volts when the power consumption is 45 watts and the current flow is 3 amps?

$V = 45W / 3A = 15V$

AC single phase watts to volts calculation formula

The RMS voltage *V* in volts is equal to the power *P* in watts, divided by the power factor *PF* times the current *I* in amps:

$V_{(V)} = P_{(W)} / (PF \times I_{(A)})$

So volts are equal to watts divided by power factor times amps.

$volts = watts / (PF \times amps)$

or

$V = W / (PF \times A)$

Example

What is the voltage in volts when the power consumption is 330 watts, the power factor is 0.8 and the current is 3.75 amps?

$V = 330W / (0.8 \times 3.75A) = 110V$

AC three phase watts to volts calculation formula

The line to line RMS voltage $V_{L\text{-}L}$ in volts is equal to the power P in watts, divided by square root of 3 times the power factor PF times the current I in amps:

$V_{L\text{-}L(V)} = P_{(W)} / (\sqrt{3} \times PF \times I_{(A)})$

So volts are equal to watts divided by square root of 3 times power factor times amps.

volts = watts / ($\sqrt{3} \times PF \times$ amps)

or

V = W / ($\sqrt{3} \times PF \times$ A)

Example

What is the voltage in volts when the power consumption is 330 watts, the power factor is 0.8 and the current flow is 2.165 amps?

$V = 330\text{W} / (\sqrt{3} \times 0.8 \times 2.165\text{A}) = 110\text{V}$

10. How to convert watts to VA

How to convert real power in watts (W) to apparent power in volt-amps (VA).

Watts to VA calculation formula

The apparent power S in volt-amps (VA) is equal to the real power P in watts (W), divided by the power factor PF:

$S_{(VA)} = P_{(W)} / PF$

So volt-amps are equal to watts divided by the power factor.

volt-amps = watts / PF

or

VA = W / PF

Example

What is the apparent power in volt-amps when the real power is 3000W and the power factor is 0.8?

Solution:

$S = 3000\text{W} / 0.8 = 3750\text{VA}$

How to convert watts to kVA

How to convert real power in watts (W) to apparent power in kilovolt-amps (kVA).

Watts to kVA calculation formula

The apparent power S in kilovolt-amps (kVA) is equal to the real power P in watts (W), divided by 1000 times the power factor PF:

$S_{(kVA)} = P_{(W)} / (1000 \times PF)$

So kilovolt-amps are equal to watts divided by 1000 times the power factor.

kilovolt-amps = watts / (1000 × PF)

or

kVA = kW / (1000 × PF)

Example

What is the apparent power in kilovolt-amps when the real power is 3000W and the power factor is 0.8?

Solution:

$S = 3000\text{W} / (1000 \times 0.8) = 3.75\text{kVA}$

11. How to convert volts to amps

How to convert electrical voltage in volts (V) to electric current in amps (A).

You can calculate amps from volts and watts or ohms, but you can't convert volts to amps since volt and amp units represent different quantities.

Volts to amps calculation with watts

The current I in amps (A) is equal to the power P in watts (W) , divided by the voltage V in volts (V):

$I_{(A)} = P_{(W)} / V_{(V)}$

So

amp = watt / volt

or

A = W / V

Example

What is the current flow of an electrical circuit that has power consumption of 45 watts and voltage supply of 15 volts?

$I = 45\text{W} / 15\text{V} = 3\text{A}$

Volts to amps calculation with ohms

The current *I* in amps (A) is equal to the voltage *V* in volts (V) divided by the resistance *R* in ohms (Ω):

$I_{(A)} = V_{(V)} / R_{(\Omega)}$

So

$\text{amp} = \text{volt} / \text{ohm}$

or

$\text{A} = \text{V} / \Omega$

Example

What is the current flow of an electrical circuit that has voltage supply of 30 volts and resistance of 10Ω?

According to ohm's law the current I is equal to 30 volts divided by 10 ohms:

$I = 30\text{V} / 10\Omega = 3\text{A}$

12. How to convert volts to watts

How to convert electrical voltage in volts (V) to electric power in watts (W).

You can calculate watts from volts and amps, but you can't convert volts to watts since watts and volts units do not measure the same quantity.

DC volts to watts calculation formula

The power *P* in watts is equal to the voltage *V* in volts, times the current *I* in amps:

$P_{(W)} = V_{(V)} \times I_{(A)}$

So watts are equal to volts times amps:

$\text{watt} = \text{volt} \times \text{amp}$

or

$\text{W} = \text{V} \times \text{A}$

Example

What is power consumption in watts when the current is 3A and the voltage supply is 15V?

Answer: the power P is equal to current of 3 amps times the voltage of 15 volts.

$P = 15\text{V} \times 3\text{A} = 45\text{W}$

AC single phase volts to watts calculation formula

The real power *P* in watts is equal to the power factor *PF* times the current *I* in amps, times the RMS voltage *V* in volts:

$P_{(W)} = PF \times I_{(A)} \times V_{(V)}$

So watts are equal to power factor times amps times volts:

$\text{watt} = PF \times \text{amp} \times \text{volt}$

or

$\text{W} = PF \times \text{A} \times \text{V}$

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?

Answer: the power P is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts.

$P = 0.8 \times 3\text{A} \times 110\text{V} = 264\text{W}$

AC three phase volts to watts calculation formula

The real power *P* in watts is equal to square root of 3 times the power factor *PF* times the current *I* in amps, times the line to line RMS voltage $V_{\text{L-L}}$ in volts:

$P_{(W)} = \sqrt{3} \times PF \times I_{(A)} \times V_{\text{L-L(V)}}$

So watts are equal to square root of 3 times power factor PF times amps times volts:

$\text{watt} = \sqrt{3} \times PF \times \text{amp} \times \text{volt}$

or

$\text{W} = \sqrt{3} \times PF \times \text{A} \times \text{V}$

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?

Answer: the power P is equal to power factor of 0.8 times current of 3 amps times the voltage of 110 volts.

$P_{(W)} = \sqrt{3} \times 0.8 \times 3A \times 110V = 457W$

13. How to convert volts to kilowatts

How to convert electrical voltage in volts (V) to electric power in kilowatts (kW).
You can calculate kilowatts from volts and amps, but you can't convert volts to kilowatts since kilowatts and volts units do not measure the same quantity.

DC volts to kilowatts calculation formula

The power *P* in kilowatts (kw) is equal to the voltage *V* in volts (V), times the current *I* in amps (A) divided by 1000:
$P_{(kW)} = V_{(V)} \times I_{(A)} / 1000$
So kilowatts are equal to volts times amps divided by 1000:
kilowatts = volts × amps / 1000
or
kW = V × A / 1000

Example

What is power consumption in kilowatts when the current is 3A and the voltage supply is 15V?
The power *P* is equal to current of 3 amps times the voltage of 15 volts divided by 1000.
$P = 15V \times 3A / 1000 = 0.045$ kW

AC single phase volts to kilowatts calculation formula

The real power *P* in kilowatts (kW) is equal to the power factor *PF* times the current *I* in amps (A), times the RMS voltage *V* in volts (V):
$P_{(kW)} = PF \times I_{(A)} \times V_{(V)} / 1000$
So kilowatts are equal to power factor times amps times volts:
kilowatt = *PF* × amp × volt / 1000
or
kW = *PF* × A × V / 1000

Example

What is power consumption in kilowatts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
The power *P* is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts divided by 1000.
$P = 0.8 \times 3A \times 110V / 1000 = 0.264$ kW

AC three phase volts to kilowatts calculation formula

The real power *P* in kilowatts (kW) is equal to square root of 3 times the power factor *PF* times the current *I* in amps (A), times the line to line RMS voltage $V_{L\text{-}L}$ in volts (V) divided by 1000:
$P_{(kW)} = \sqrt{3} \times PF \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$
$\approx 1.732 \times PF \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$
So kilowatts are equal to square root of 3 times power factor *PF* times amps times volts divided by 1000:
kilowatt = $\sqrt{3}$ × *PF* × amp × volt / 1000
or
kW = $\sqrt{3}$ × *PF* × A × V / 1000

Example

What is power consumption in kilowatts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
The power *P* is equal to power factor of 0.8 times current of 3 amps times the voltage of 110 volts divided by 1000.
$P_{(kW)} = \sqrt{3} \times 0.8 \times 3A \times 110V / 1000 = 0.457$kW

14. How to convert volts to ohms

How to convert electrical voltage in volts (V) to electric resistance in ohms (Ω).
You can calculate ohms from volts and amps or watts, but you can't convert volts to ohms since volt and ohm units do not measure the same quantity.

Volts to ohms calculation with amps

According to ohm's law, the resistance R in ohms (Ω) is equal to the voltage V in volts (V) divided by the current I in amps (A):
$R_{(\Omega)} = V_{(V)} / I_{(A)}$

So ohms are equal to volts divided by amps:

ohms = volts / amps
or
$\Omega = V / A$

Example
Calculate the resistance in ohms of a resistor when the voltage is 5 volts and the current is 0.2 amps.
The resistance R is equal to 5 volts divided by 0.2 amps, which is equal to 25 ohms:
$R = 5V / 0.2A = 25\Omega$

Volts to ohms calculation with watts

The power *P* is equal to the voltage *V* times the current *I*:
$P = V \times I$
The current *I* is equal to the voltage *V* divided by the resistance *R* (ohm's law):
$I = V / R$
So the power *P* is equal to
$P = V \times V / R = V^2 / R$
So the resistance *R* in ohms (Ω) is equal to the square value of voltage *V* in volts (V) divided by the power *P* in watts (W):
$R_{(\Omega)} = V^2_{(V)} / P_{(W)}$

So ohms are equal to the square value of volts divided by watts:
$ohms = volts^2 / watts$
or
$\Omega = V^2 / W$

Example
Calculate the resistance in ohms of a resistor when the voltage is 5 volts and the power is 2 watts.
The resistance R is equal to square of 5 volts divided by 2 watts, which is equal to 12.5 ohms.
$R = (5V)^2 / 2W = 12.5\Omega$

15. How to convert kilowatts to amps

How to convert electric power in kilowatts (kW) to electric current in amps (A).
You can calculate amps from kilowatts and volts. You can't convert kilowatts to amps since kilowatts and amps units do not measure the same quantity.

DC kilowatts to amps calculation formula

The current *I* in amps is equal to 1000 times the power *P* in kilowatts, divided by the voltage *V* in volts:
$I_{(A)} = 1000 \times P_{(kW)} / V_{(V)}$
So amps are equal to 1000 times kilowatts divided by volts.
$amps = 1000 \times kilowatts / volts$
or
$A = 1000 \times kW / V$

Example
What is the current in amps when the power consumption is 0.33 kilowatts and the voltage supply is 110 volts?
$I = 1000 \times 0.33kW / 110V = 3A$

AC single phase kilowatts to amps calculation formula

The current *I* in amps is equal to 1000 times the real power *P* in kilowatts, divided by the power factor *PF* times the voltage *V* in volts:
$I = 1000 \times P / (PF \times V)$
So amps are equal to 1000 times kilowatts divided by power factor times volts.
$amps = 1000 \times kilowatts / (PF \times volts)$
or
$A = 1000 \times kW / (PF \times V)$

Example
What is the current in amps when the power consumption is 0.33 kilowatts, the power factor is 0.8 and the voltage supply is 110 volts?
$I = 1000 \times 0.33kW / (0.8 \times 110V) = 3.75A$

AC three phase kilowatts to amps calculation formula

The current *I* in amps is equal to 1000 times the real power *P* in kilowatts, divided by square root of 3 times the power factor *PF* times the line to line RMS voltage $V_{L\text{-}L}$ in volts:

$I = 1000 \times P / (\sqrt{3} \times PF \times V_{L\text{-}L})$

So amps are equal to 1000 times kilowatts divided by square root of 3 times power factor times volts.

amps = 1000 × kilowatts / (√3 × *PF* × volts)

or

A = 1000 × kW / (√3 × *PF* × V)

Example

What is the current in amps when the power consumption is 0.33 kilowatts, the power factor is 0.8 and the voltage supply is 110 volts?

$I = 1000 \times 0.33\text{kW} / (\sqrt{3} \times 0.8 \times 110\text{V}) = 2.165\text{A}$

16. How to convert kilowatts to kilowatts-hour

How to convert electric power in kilowatts (kW) to energy in kilowatt-hour (kWh).

You can calculate kilowatt-hour from kilowatts and hours, but you can't convert kilowatt to kilowatt-hour, since kilowatt and kilowatt-hour units represent different quantities.

Kilowatts to kilowatt-hour calculation formula

The energy E in kilowatt-hour (kWh) is equal to the power P in kilowatts (kW), times the time period t in hours (hr):

$E_{(kWh)} = P_{(kW)} \times t_{(hr)}$

So

kilowatt-hour = kilowatt × hour

or

kWh = kW × hr

Example

What is the energy consumption in watt-hour when the power consumption is 5 kilowatts for time duration of 3 hours?

$E = 5\text{kW} \times 3\text{h} = 15\ \text{kWh}$

17. How to convert kW to VA

How to convert real power in kilowatts (kW) to apparent power in volt-amps (VA).

Kilowatts to volt-amps calculation formula

The apparent power S in volt-amps (VA) is equal to 1000 times the real power P in kilowatts (kW), divided by the power factor PF:

$S_{(VA)} = 1000 \times P_{(kW)} / PF$

So volt-amps are equal to 1000 times kilowatts divided by the power factor.

volt-amps = 1000 × kilowatts / PF

or

VA = 1000 × kW / PF

Example

What is the apparent power in volt-amps when the real power is 3 kW and the power factor is 0.8?

Solution:

$S = 1000 \times 3\text{kW} / 0.8 = 3750\text{VA}$

18. How to convert kW to kVA

How to convert real power in kilowatts (kW) to apparent power in kilovolt-amps (kVA).

kW to kVA calculation formula

The apparent power S in kilovolt-amps (kVA) is equal to the real power P in kilowatts (kW), divided by the power factor PF:

$S_{(kVA)} = P_{(kW)} / PF$

So kilovolt-amps are equal to kilowatts divided by the power factor.

kilovolt-amps = kilowatts / PF

or

kVA = kW / PF

Example

What is the apparent power in kilovolt-amps when the real power is 3 kW and the power factor is 0.8?
Solution:
$S = 3\text{kW} / 0.8 = 3.75\text{kVA}$

19. How to convert volts to watts

How to convert electrical voltage in volts (V) to electric power in watts (W).
You can calculate watts from volts and amps, but you can't convert volts to watts since watts and volts units do not measure the same quantity.

DC volts to watts calculation formula

The power P in watts is equal to the voltage V in volts, times the current I in amps:
$P_{(W)} = V_{(V)} \times I_{(A)}$
So watts are equal to volts times amps:
$\text{watt} = \text{volt} \times \text{amp}$
or
$\text{W} = \text{V} \times \text{A}$

Example

What is power consumption in watts when the current is 3A and the voltage supply is 15V?
Answer: the power P is equal to current of 3 amps times the voltage of 15 volts.
$P = 15\text{V} \times 3\text{A} = 45\text{W}$

AC single phase volts to watts calculation formula

The real power P in watts is equal to the power factor PF times the current I in amps, times the RMS voltage V in volts:
$P_{(W)} = PF \times I_{(A)} \times V_{(V)}$
So watts are equal to power factor times amps times volts:
$\text{watt} = PF \times \text{amp} \times \text{volt}$
or
$\text{W} = PF \times \text{A} \times \text{V}$

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts.
$P = 0.8 \times 3\text{A} \times 110\text{V} = 264\text{W}$

AC three phase volts to watts calculation formula

The real power P in watts is equal to square root of 3 times the power factor PF times the current I in amps, times the line to line RMS voltage $V_{L\text{-}L}$ in volts:
$P_{(W)} = \sqrt{3} \times PF \times I_{(A)} \times V_{L\text{-}L(V)}$
So watts are equal to square root of 3 times power factor PF times amps times volts:
$\text{watt} = \sqrt{3} \times PF \times \text{amp} \times \text{volt}$
or
$\text{W} = \sqrt{3} \times PF \times \text{A} \times \text{V}$

Example

What is power consumption in watts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
Answer: the power P is equal to power factor of 0.8 times current of 3 amps times the voltage of 110 volts.
$P_{(W)} = \sqrt{3} \times 0.8 \times 3\text{A} \times 110\text{V} = 457\text{W}$

20. How to convert volts to kilowatts

How to convert electrical voltage in volts (V) to electric power in kilowatts (kW).
You can calculate kilowatts from volts and amps, but you can't convert volts to kilowatts since kilowatts and volts units do not measure the same quantity.

DC volts to kilowatts calculation formula

The power P in kilowatts (kw) is equal to the voltage V in volts (V), times the current I in amps (A) divided by 1000:
$P_{(kW)} = V_{(V)} \times I_{(A)} / 1000$
So kilowatts are equal to volts times amps divided by 1000:

kilowatts = volts × amps / 1000
or
kW = V × A / 1000

Example

What is power consumption in kilowatts when the current is 3A and the voltage supply is 15V?
The power *P* is equal to current of 3 amps times the voltage of 15 volts divided by 1000.
P = 15V × 3A / 1000 = 0.045 kW

AC single phase volts to kilowatts calculation formula

The real power *P* in kilowatts (kW) is equal to the power factor *PF* times the current *I* in amps (A), times the RMS voltage *V* in volts (V):
$P_{(kW)} = PF \times I_{(A)} \times V_{(V)} / 1000$
So kilowatts are equal to power factor times amps times volts:
kilowatt = *PF* × amp × volt / 1000
or
kW = *PF* × A × V / 1000

Example

What is power consumption in kilowatts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
The power *P* is equal to power factor of 0.8 times current of 3 amps times voltage of 110 volts divided by 1000.
P = 0.8 × 3A × 110V / 1000 = 0.264 kW

AC three phase volts to kilowatts calculation formula

The real power *P* in kilowatts (kW) is equal to square root of 3 times the power factor *PF* times the current *I* in amps (A), times the line to line RMS voltage $V_{L\text{-}L}$ in volts (V) divided by 1000:
$P_{(kW)} = \sqrt{3} \times PF \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$
$\approx 1.732 \times PF \times I_{(A)} \times V_{L\text{-}L(V)} / 1000$
So kilowatts are equal to square root of 3 times power factor *PF* times amps times volts divided by 1000:
kilowatt = $\sqrt{3}$ × *PF* × amp × volt / 1000
or
kW = $\sqrt{3}$ × *PF* × A × V / 1000

Example

What is power consumption in kilowatts when the power factor is 0.8 and the current is 3A and the voltage supply is 110V?
The power *P* is equal to power factor of 0.8 times current of 3 amps times the voltage of 110 volts divided by 1000.
$P_{(kW)} = \sqrt{3} \times 0.8 \times 3A \times 110V / 1000 = 0.457kW$

21. How to convert VA to watts

How to convert apparent power in volt-amps (VA) to real power in watts (W).

VA to watts calculation formula

The real power P in watts (W) is equal to the apparent power S in volt-amps (VA), times the power factor PF:
$P_{(W)} = S_{(VA)} \times PF$
So watts are equal to volt-amps times the power factor.
watts = volt-amps × PF
or
W = VA × PF

Example

What is the real power in watts when the apparent power is 3000 VA and the power factor is 0.8?
Solution:
P = 3000VA × 0.8 = 2400W

22. How to convert VA to kW

How to convert apparent power in volt-amps (VA) to real power in kilowatts (kW).

Volt-amps to kW calculation formula

The real power P in kilowatts (kW) is equal to the apparent power S in volt-amps (VA), times the power factor PF divided by 1000:

$P_{(kW)} = S_{(VA)} \times PF / 1000$

So kilowatts are equal to volt-amps times the power factor divided by 1000.

kilowatts = volt-amps × PF / 1000

or

kW = VA × PF / 1000

Example

What is the real power in kilowatts when the apparent power is 3000 VA and the power factor is 0.8?

Solution:

$P = 3000VA \times 0.8 / 1000 = 2.4kW$

23. How to convert VA to kVA

How to convert apparent power from volt-amps (VA) to kilovolt-amps (kVA).

Volt-amps to kVA calculation formula

The apparent power S in kilovolt-amps (kVA) is equal to the apparent power S in volt-amps (VA), divided by 1000:

$S_{(kVA)} = S_{(VA)} / 1000$

So kilovolt-amps are equal to volt-amps divided by 1000:

kilovolt-amps = volt-amps / 1000

or

kVA = VA / 1000

Example

What is the apparent power in kilovolt-amps when the apparent power in volt-amps is 3000VA?

Solution:

$S = 3000VA / 1000 = 3kVA$

24. How to convert kVA to amps

How to convert apparent power in kilovolt-amps (kVA) to electric current in amps (A).

You can calculate amps from kilovolt-amps and volts, but you can't convert kilovolt-amps to amps since kilovolt-amps and amps units do not measure the same quantity.

Single phase kVA to amps calculation formula

The current I in amps is equal to 1000 times the apparent power S in kilovolt-amps, divided by the voltage V in volts:

$I_{(A)} = 1000 \times S_{(kVA)} / V_{(V)}$

So amps are equal to 1000 times kilovolt-amps divided by volts.

amps = 1000 × kVA / volts

or

A = 1000 · kVA / V

Example

Question: What is the current in amps when the apparent power is 3 kVA and the voltage supply is 110 volts?

Solution:

$I = 1000 \times 3kVA / 110V = 27.27A$

3 phase kVA to amps calculation formula

Calculation with line to line voltage

The current I in amps is equal to 1000 times the apparent power S in kilovolt-amps, divided by the square root of 3 times the line to line voltage V in volts:

$I_{(A)} = 1000 \times S_{(kVA)} / (\sqrt{3} \times V_{L\text{-}L(V)})$

So amps are equal to 1000 times kilovolt-amps divided by the square root of 3 times volts.

amps = 1000 × kVA / (√3 × volts)
or
A = 1000 · kVA / (√3 × V)

Example

Question: What is the current in amps when the apparent power is 3 kVA and the line to line voltage supply is 190 volts?
Solution:
I = 1000 × 3kVA / (√3 × 190V) = 9.116A

Calculation with line to neutral voltage

The current I in amps is equal to 1000 times the apparent power S in kilovolt-amps, divided by 3 times the line to line voltage V in volts:
$I_{(A)} = 1000 \times S_{(kVA)} / (3 \times V_{L\text{-}N(V)})$
So amps are equal to 1000 times kilovolt-amps divided by 3 times volts.
amps = 1000 × kVA / (3 × volts)
or
A = 1000 · kVA / (3 × V)

Example

Question: What is the current in amps when the apparent power is 3 kVA and the line to neutral voltage supply is 120 volts?
Solution:
I = 1000 × 3kVA / (3 × 120V) = 8.333A

25. How to convert kVA to VA

How to convert apparent power from kilovolt-amps (kVA) to volt-amps (VA).

kVA to VA calculation formula

The apparent power S in volt-amps (VA) is equal to 1000 times the apparent power S in kilovolt-amps (kVA):
$S_{(VA)} = 1000 \times S_{(kVA)}$

So volt-amps are equal to 1000 times kilovolt-amps:
VA = 1000 × kilovolt-amps
or
VA = 1000 × kVA

Example

What is the apparent power in volt-amps when the apparent power in kilovolt-amps is 3 kVA?
Solution:
S = 1000 × 3kVA = 3000VA