kW, kVA, kvar and Power Factor (Power Triangle)

Solves the power triangle: apparent power, power factor and phase angle from kW and kvar, or kvar and kVA from kW and power factor.

Method: IEC 60050-131 (power definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Known values	kW and kvar	
Active power	800.00	kW
Reactive power	600.00	kvar
Power factor	80.000	%

Calculated results

Parameter	Value	Unit
Apparent power	1,000.0	kVA
Power factor	80.000	%
Reactive power	600.00	kvar
Phase angle	36.870	°
kvar per kW	0.75000	

Formula and method

The formula is shown on the calculator page: https://calc.firecad.com/electrical/power/kw-kva-kvar-power-triangle

Variables

given	which pair is known	–
P	active power	W
Q	reactive power	var
$\cos\varphi$	power factor	–
S	apparent power	VA
φ	phase angle	rad
$\tan\varphi$	kvar per kW	–

Method and standards

Right-angled power triangle of balanced sinusoidal circuits.

Assumptions and limits

- Sinusoidal; distortion power from harmonics is not included.
- With "kW and power factor" the load is taken as lagging (inductive); for a leading (capacitive) load enter kW and a negative kvar.

References

- IEC 60050-131 (power definitions)

Report details

Report reference	FCC-NM1B-2VJ8 (the same inputs always give the same reference)
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Calculator	kW, kVA, kvar and Power Factor (Power Triangle)
Method last reviewed	12 November 2026
Software release	FireCAD Calc, release of 17 November 2026
Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/electrical/power/kw-kva-kvar-power-triangle

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.