Three-Phase and Single-Phase Power (kW from V, A, PF)

Active, apparent and reactive power from voltage, current and power factor for three-phase or single-phase loads, and the current for a given kW.

Method: IEC 60050-131 (power definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Supply	Three-phase (line-to-line voltage)	
Voltage	415.00	V
Line current	100.00	A
Power factor	85.000	%
Load for which to find the current	75.000	kW

Calculated results

Parameter	Value	Unit
Active power	61.098	kW
Apparent power	71.880	kVA
Reactive power	37.865	kvar
Current for the load entered	122.75	A

Formula and method

$$S = kVI \qquad P = S\cos\varphi \qquad Q = S\sin\varphi \qquad I_r = \frac{P_r}{kV\cos\varphi} \qquad k = \sqrt{3}\ (\text{three}-\text{phase})\ \text{or}\ 1$$

Variables

supply	three-phase or single-phase	–
V	voltage (line-to-line for three-phase)	V
I	line current	A
$\cos\varphi$	power factor	–
P_r	load for which to find current	W
P	active power	W
S	apparent power	VA
Q	reactive power	var
I_r	current for the load	A
k	√3 or 1	–

Method and standards

Balanced sinusoidal power definitions (IEC 60050-131).

Assumptions and limits

- Balanced, sinusoidal; harmonics not included.

References

- IEC 60050-131 (power definitions)

Report details

Report reference	FCC-ABKT-EHJ9 (the same inputs always give the same reference)
Generated	17 November 2026, 19:44 UTC
Calculator	Three-Phase and Single-Phase Power (kW from V, A, PF)
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/three-phase-power

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.