

AC Circuit Power Calculator

Resolves apparent, real, and reactive power for a single-phase or balanced three-phase AC load from RMS voltage, RMS current, power factor, and phase model.

Generated October 10, 2026

<https://www.elecatrrix.com/power-energy-cost/ac-circuit-power-calculator/>

Inputs		
Input	Value	Unit
RMS voltage	120	V
RMS current	10	A
Power factor	0.8	PF
Phase model	Single phase	
Results		
Result	Value	Unit
Apparent power	1200	VA
Real power	960	W
Reactive power magnitude	720	var
Phase multiplier	1	x
Power-factor angle	36.8699	deg
Calculation details		
Detail	Value	Unit
Calculation basis	Ideal RMS AC power arithmetic. Single-phase apparent power uses $V \times I$; three-phase apparent power uses square root of $3 \times \text{line-to-line } V \times \text{line current}$.	
Electrical boundary	Power factor is entered as a magnitude from 0 to 1. This calculator does not infer waveform distortion, phase sequence, unbalance, harmonics, or displacement-versus-distortion power factor.	

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U.S. project boundary

United States electrical estimate only. Verify the adopted code, AHJ requirements, utility rules, equipment nameplates, conductor ampacity, overcurrent protection, and manufacturer instructions before design or installation decisions.

Formulas

$$S_{\text{single}} = V_{\text{RMS}} \times I_{\text{RMS}}$$

$$S_{\text{three}} = \sqrt{3} \times V_{\text{LL}} \times I_{\text{L}}$$

$$P = S \times \text{PF}$$

$$Q = \sqrt{S^2 - P^2}$$

$$\theta = \cos^{-1}(\text{PF})$$

Warnings and limitations

This AC power estimate uses ideal RMS and entered power-factor assumptions. It does not determine conductor ampacity, breaker or fuse size, service capacity, equipment rating, waveform distortion, phase unbalance, utility requirements, or code compliance.