

Motor Current Calculator

Enter motor horsepower, voltage, phase count, efficiency, and power factor to create a transparent U.S. English preliminary motor running-current estimate. The model uses 746 watts per mechanical horsepower and does not reproduce NEC motor tables, replace a full-load-current table lookup, or select a compliant conductor, starter, overload setting, or overcurrent device.

Generated October 10, 2026

<https://www.elecatrix.com/motors-starters/motor-current-calculator/>

Inputs

Input	Value	Unit
Motor horsepower	10	hp
Motor voltage	240	V
Phase count	Single-phase	phase
Motor efficiency	85	%
Power factor	0.8	PF
Horsepower basis note	N/A	
Voltage basis note	N/A	
Efficiency basis note	N/A	
Power factor basis note	N/A	

Results

Result	Value	Unit
Estimated shaft power	7460	W
Efficiency ratio	0.85	decimal
Estimated electrical input power	8776.4706	W
Estimated apparent power	10970.5882	VA
Phase multiplier	1	x
Estimated running current from entered horsepower	45.7108	A

Calculation details

Detail	Value	Unit
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Calculation basis	Entered motor horsepower, voltage, phase count, efficiency, and power factor using 746 watts per mechanical horsepower.
NEC table boundary	No NEC motor full-load-current table, conductor ampacity, overload setting, overcurrent protection, or code-compliance result is made by this calculator.
Nameplate boundary	Nameplate and manufacturer data can differ from this estimate and must control equipment-specific review.
Power factor boundary	Power factor is user-supplied; this calculator does not determine leading/lagging direction, load-dependent power factor, harmonics, correction equipment, or manufacturer-specific motor data.
Phase model boundary	Balanced equivalent model only; no phase-balance, starting, duty-cycle, overload, overcurrent, conductor, or equipment-rating decision is made by this calculator.
Equipment selection boundary	No conductor, breaker, fuse, overload, starter, controller, service, utility, or code-compliance selection is made by this calculator.

Formulas

$$P_{\text{shaft}} = \text{Motor horsepower} \times 746$$

$$\eta = (\text{Efficiency percent}/100)$$

$$P_{\text{input}} = \frac{P_{\text{shaft}}}{\eta}$$

$$S = \frac{P_{\text{input}}}{\text{PF}}$$

$$\phi = 1 \text{ for single-phase; } \sqrt{3} \text{ for balanced three-phase}$$

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$I_{\text{running}} = (S/V \times \phi)$

$\text{efficiency ratio} = \text{efficiency percent} / 100$

phase model boundary = balanced equivalent model only; no phase-balance, starting, duty-cycle, overload, overcurrent, conductor, or equipment-rating decision is made by this calculator

NEC table boundary = no NEC motor full-load-current table, conductor ampacity, overload setting, overcurrent protection, or code-compliance result is made by this calculator

power factor boundary = power factor is user-supplied; this calculator does not determine leading/lagging direction, load-dependent power factor, harmonics, correction equipment, or manufacturer-specific motor data

Warnings and limitations

This is a U.S. English preliminary engineering estimate, not an NEC motor full-load-current table lookup, not conductor-sizing, not starter selection, not an overload calculation, not overcurrent-protection selection, not a service calculation, and not a code-compliance result. Actual current varies with motor design, voltage, load, speed, starting condition, efficiency, power factor, temperature, harmonics, nameplate data, and local requirements. Verify the nameplate, manufacturer data, adopted NEC edition, AHJ direction, equipment ratings, and project conditions with a qualified electrical professional before design or installation.