Single-Phase Motor Full-Load Current and Power

Full-load current, input power, apparent and reactive power of a single-phase motor from rated output, voltage, efficiency and power factor.

Method: IEC 60034-1 (rating and performance definitions)

Input parameters

Unit system: SI

Parameter	Value	Unit
Supply voltage	230.00	V
Rated shaft output	2.2000	kW
Efficiency at full load	82.000	%
Power factor at full load	0.90000	

Calculated results

Parameter	Value	Unit
Full-load current	12.961	A
Electrical input power	2.6829	kW
Apparent power	2.9810	kVA
Reactive power	1.2994	kvar
Motor losses (heat)	0.48293	kW

Formula and method

$$P_{in} = \frac{P_{out}}{\eta} \qquad S = \frac{P_{in}}{\cos\varphi} \qquad I = \frac{S}{U} = \frac{P_{out}}{U\,\eta\,\cos\varphi} \qquad Q = \sqrt{S^2 - P_{in}^2} \qquad P_{loss} = P_{in} - P_{out}$$

Variables

U	supply voltage	V
P_{out}	rated mechanical output at the shaft	W
η	efficiency at full load	–
$\cos\varphi$	power factor at full load	–
I	full-load current	A
P_{in}	active electrical input	W
S	apparent power	VA
Q	reactive power	var
P_{loss}	losses dissipated as heat	W

Method and standards

Single-phase power relations, with efficiency and power factor as defined in IEC 60034-1. The output may be entered in kW or horsepower (1 hp = 745.70 W).

Assumptions and limits

- Rated voltage and frequency; full-load efficiency and power factor from the nameplate or data sheet.
- Both efficiency and power factor fall at part load.

References

- IEC 60034-1 (rating and performance definitions)

Report details

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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/motors/motor-flc-1phase

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.