

Backup Generator Sizing Calculator

Calculate running and starting generator demand in kW, then convert the reserved surge requirement to a planning kVA value from entered backup loads, starting contribution, reserve, and power factor.

Generated October 10, 2026

<https://www.elecatrix.com/solar-backup-power/backup-generator-sizing-calculator/>

Inputs

Input	Value	Unit
Critical load	4	kW
Essential load	6	kW
Motor starting contribution	5	kW
Starting multiplier	1.5	x
Reserve	20	%
Generator power factor	0.8	PF

Results

Result	Value	Unit
Running load	10	kW
Starting load	17.5	kW
Reserved running load	12	kW
Reserved starting load	21	kW
Planning generator capacity	26.25	kVA
Reserve multiplier	1.2	x

Calculation details

Detail	Value	Unit
Calculation basis	The screen sums entered critical and essential load, adds the entered motor starting contribution, then applies the entered reserve.	

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Selection boundary

Backup generator planning screen only; this does not approve generator selection, starting performance, transfer equipment, fuel, grounding, utility interconnection, or code compliance.

Formulas

$$P_{\text{running}} = P_{\text{critical}} + P_{\text{essential}}$$

$$P_{\text{start}} = P_{\text{running}} + P_{\text{motor start}} \times M_{\text{start}}$$

$$P_{\text{surge}} = P_{\text{start}} \times (1 + \text{fracR}_{\%100})$$

$$S_{\text{generator}} = \text{frac}P_{\text{surge}}PF$$

Warnings and limitations

Planning estimate only; this calculation does not approve generator selection. Confirm generator starting performance, altitude and temperature derating, transfer equipment, fuel, grounding, utility requirements, and adopted-code requirements before selection.