

Battery Capacity Calculator

Estimate required battery watt-hours, kilowatt-hours, and amp-hours from load power, runtime, system voltage, usable depth of discharge, and efficiency. Battery chemistry, discharge rate, BMS limits, temperature, and installation requirements are outside this calculation.

Generated October 9, 2026

<https://www.elecatrix.com/solar-backup-power/battery-capacity-calculator/>

Inputs

Input	Value	Unit
Load	500	W
Runtime	4	h
Battery system voltage	24	V
Usable depth of discharge	80	%
System efficiency	90	%

Results

Result	Value	Unit
Load energy	2000	Wh
Required battery energy	2777.7778	Wh
Battery energy equivalent	2.7778	kWh
Required battery capacity	115.7407	Ah
Usable factor	0.72	x

Calculation details

Detail	Value	Unit
Calculation basis	Required battery capacity is load watts times runtime, adjusted for usable depth of discharge and efficiency.	
Selection boundary	Battery estimate only; no chemistry, BMS, temperature, discharge rate, inverter, listing, ventilation, fire, utility, or code-compliance result is made.	

Formulas

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P_{load} =load power,quad t =required runtime,quad V_{system} =nominal system voltage

DoD =usable depth of discharge percent,quad η =system efficiency percent

$E_{load} = P_{load} \times t$

$f_{usable} = (DoD/100) \times (\eta/100)$

$E_{battery} = \frac{E_{load}}{f_{usable}}$

$C_{battery} = \frac{E_{battery}}{V_{system}}$

Warnings and limitations

This battery capacity estimate uses entered runtime assumptions only. It does not approve battery chemistry, BMS, enclosure, inverter, protection, ventilation, fire-safety, utility, or code compliance.