

Transformer UPS Capacity Calculator

Provides a preliminary comparison of UPS apparent load and reserve-adjusted transformer demand against an entered transformer capacity.

Generated October 10, 2026

<https://www.elecatrix.com/power-quality-transformers/transformer-ups-capacity-calculator/>

Inputs

Input	Value	Unit
Transformer size	45	kVA
UPS apparent load	30	kW
Load power factor	0.9	PF
Reserve allowance	20	%

Results

Result	Value	Unit
UPS load	33.3333	kVA
Reserve-adjusted transformer requirement	40	kVA
Available transformer margin	5	kVA
Transformer utilization	88.8889	%

Status

Status	Value	Unit
Capacity comparison	Within entered transformer capacity	

Calculation details

Detail	Value	Unit
Calculation basis	UPS kW is converted to kVA by power factor, reserve is added, and the result is compared with entered transformer kVA.	
UPS boundary	Capacity comparison only; UPS selection, runtime, bypass, harmonics, grounding, and protection remain external.	

Formulas

$$S_{\text{UPS}}[\text{kVA}] = \frac{P_{\text{UPS}}[\text{kW}]}{\text{PF}}$$

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$$r_factor = 1 + \frac{r}{100}$$

$$S_required[kVA] = S_UPS[kVA] \times r_factor$$

$$M[kVA] = S_transformer[kVA] - S_required[kVA]$$

$$U\% = \frac{S_required[kVA]}{S_transformer[kVA]} \times 100$$

Warnings and limitations

This capacity comparison does not select a UPS, battery system, bypass, transformer, protection, grounding, runtime, harmonic filter, or code-compliant installation.