

VFD Dynamic Braking Resistor Calculator

Calculate an early VFD commissioning and application estimate when load inertia, speed, deceleration time, and drive data are known.

Generated October 10, 2026

<https://www.elecatrix.com/motors-starters/vfd-dynamic-braking-resistor-calculator/>

Inputs

Input	Value	Unit
Reflected load inertia	2	kg??m2
Initial speed	1800	rpm
Final speed	600	rpm
Deceleration time	5	s
Braking energy fraction	90	%
DC bus voltage	700	V
Resistor duty fraction	20	%
Braking cycles per hour	4	cycles/h
Drive or load note	Record drive model, chopper threshold, and resistor manual separately.	

Results

Result	Value	Unit
Resistor energy per stop	28424.4607	J
Peak resistor power	5684.8921	W
Average resistor power	31.5827	W
Minimum resistance estimate	86.1934	ohm
Duty-adjusted power estimate	157.9137	W

Calculation details

Detail	Value	Unit
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Calculation basis

Rotational kinetic energy is calculated from the entered inertia and speed change. Entered braking efficiency and deceleration time determine per-stop resistor energy and peak power. Energy per stop times cycles per hour is converted from joules per hour to watts, then the entered duty fraction gives the duty-adjusted power estimate.

VFD boundary

Preliminary braking-energy estimate only; verify drive chopper threshold, minimum resistance, resistor pulse rating, enclosure, thermal duty, motor load, and manufacturer selection data separately.

Formulas

$$\omega = \text{rpm} \times (2\pi/60)$$

$$E_{\text{rotating}} = 0.5J(\omega_{\text{initial}}^2 - \omega_{\text{final}}^2)$$

$$E_{\text{resistor}} = E_{\text{rotating}} \times \text{braking energy fraction}$$

$$P_{\text{peak}} = \frac{E_{\text{resistor}}}{t_{\text{deceleration}}}$$

$$P_{\text{average}} = \frac{E_{\text{resistor}} \times \text{cycles per hour}}{3600}$$

$$R_{\text{minimum}} = \frac{V_{\text{DC bus}}^2}{P_{\text{peak}}}$$

$$P_{\text{duty}} = \frac{P_{\text{average}}}{\text{duty fraction}}$$

Warnings and limitations

This is a preliminary braking-energy estimate. It does not select a resistor, approve a drive chopper, verify pulse ratings, determine stopping performance, or prove equipment suitability.