

Wire Size Calculator | Voltage-Drop Review

Review a two-conductor voltage-drop estimate from load current, one-way length, system voltage, allowable drop, and a documented conductor resistance. The result supports preliminary wire-size review; it does not select an AWG/kcmil conductor or make a code determination.

Generated October 10, 2026

<https://www.elecatrix.com/wire-raceway-ampacity/wire-size-calculator/>

Inputs

Input	Value	Unit
Load current	20	A
One-way length	100	ft
System voltage	120	V
Allowable voltage drop	3	%
Conductor resistance	1.588	ohm/1000 ft
Conductor resistance source note	N/A	

Results

Result	Value	Unit
Voltage drop	6.352	V
Voltage-drop percentage	5.2933	%
Allowable voltage drop	3.6	V
Maximum resistance for entered drop limit	0.9	ohm/1000 ft
Voltage-drop margin	-2.2933	percentage points

Status

Status	Value	Unit
Voltage-drop check	Entered resistance exceeds the entered voltage-drop limit.	

Calculation details

Detail	Value	Unit
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Calculation basis	Two-conductor loop voltage-drop estimate using user-supplied resistance per 1000 ft.
Selection boundary	No AWG/kcmil conductor size or code-compliant final selection is made by this calculator.

Formulas

$$\text{ell_loop} = \frac{2L_{\text{one-way}}}{1000}$$

$$\Delta V = I \times \text{ell_loop} \times R_{1000}$$

$$\Delta V_{\text{percent}} = \frac{\Delta V}{V_{\text{system}}} \times 100$$

$$\Delta V_{\text{allowable}} = V_{\text{system}} \times \frac{p_{\text{allowable}}}{100}$$

$$R_{\text{max},1000} = \frac{\Delta V_{\text{allowable}}}{I \times \text{ell_loop}}$$

$$M_{\text{pp}} = p_{\text{allowable}} - \Delta V_{\text{percent}}$$

$$\text{allowable voltage drop volts} = \text{system voltage} \times \text{allowable voltage-drop percent} / 100$$

$$\text{voltage-drop margin} = \text{allowable voltage-drop percent} - \text{voltage-drop percent}$$

final selection boundary = no AWG/kcmil conductor size or code-compliant final selection is made by this calculator

Warnings and limitations

This is a preliminary two-conductor voltage-drop estimate, not an NEC table claim, code-compliance determination, or final wire-size selection. The resistance target is the maximum acceptable resistance per 1000 ft for the entered limit; a lower actual conductor resistance produces less voltage drop. Verify conductor material, temperature, insulation, ampacity, terminals, installation method, phase arrangement, equipment instructions, and adopted local requirements separately. This simple loop model should not be applied directly to a three-phase circuit without adapting the circuit formula.