

24 VDC Control Voltage Drop Calculator

Calculate voltage drop and load voltage on a 24 VDC control loop from load current, one-way cable length, conductor resistance, and the entered minimum load voltage.

Generated October 10, 2026

<https://www.elecatrrix.com/circuits-components/24vdc-control-voltage-drop-calculator/>

Inputs		
Input	Value	Unit
Control load current	1	A
One-way cable length	100	ft
Cable resistance	1	ohm/1000 ft
Supply voltage	24	VDC
Minimum load voltage	21.6	VDC
Results		
Result	Value	Unit
Round-trip length	200	ft
Voltage drop	0.2	V
Estimated load voltage	23.8	V
Voltage drop	0.8333	%
Minimum-voltage margin	2.2	V
Minimum-voltage comparison	At or above entered minimum voltage	
Calculation details		
Detail	Value	Unit
Calculation basis	The circuit uses twice the entered one-way length for a round trip. Voltage drop equals current multiplied by round-trip length and resistance per 1000 ft, divided by 1000.	

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Review boundary

Arithmetic estimate only; verify actual cable resistance, temperature, terminal behavior, source capacity, control-device minimum voltage, fusing, installation, and manufacturer instructions.

Formulas

$$L_{RT} = 2L_{one-way}$$

$$V_{drop} = I \times L_{RT} \times (R/1000)$$

$$V_{load} = V_{supply} - V_{drop}$$

$$\text{Drop percent} = \frac{V_{drop}}{V_{supply}} \times 100\%$$

$$\text{Minimum voltage margin} = V_{load} - V_{minimum}$$

Warnings and limitations

This is a 24 VDC loop voltage-drop estimate. It does not select cable, approve a control device, verify fusing, or establish code compliance.