

Shunt Resistor Calculator

Estimate meter-shunt and current-sense resistor values from entered current, resistance, and target voltage-drop assumptions before power, thermal, tolerance, and calibration review.

Generated October 10, 2026

<https://www.elecatrrix.com/circuits-components/shunt-resistor-calculator/>

Inputs

Input	Value	Unit
Meter current	0.001	A
Meter resistance	100	ohm
Target current	10	A
Target shunt voltage drop	50	mV
Meter-current basis note	N/A	
Meter-resistance basis note	N/A	
Target-current basis note	N/A	
Target voltage-drop basis note	N/A	

Results

Result	Value	Unit
Shunt resistance	0.01	ohm
Meter voltage drop	0.1	V
Shunt current	9.999	A
Shunt power	0.9999	W
Meter path power	0.0001	W
Total measured current	10	A
Target voltage drop	0.05	V
Current-sense shunt resistance	0.005	ohm
Current-sense shunt power	0.5	W

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Calculation details

Detail	Value	Unit
Calculation basis	Ideal meter-shunt and current-sense arithmetic using Ohm law: meter voltage is based on the entered meter current and resistance, the meter shunt carries the remaining target current, and the current-sense reference uses the entered target voltage drop over the target current.	
Measurement boundary	Simple Ohm law meter-shunt arithmetic only; no instrument accuracy, calibration, temperature coefficient, isolation, or safety rating is selected by this calculator.	
Power rating boundary	Calculated shunt power is arithmetic only; choose actual resistor power rating, derating, mounting, and temperature rise from manufacturer data and project conditions.	
Thermal boundary	Shunt resistors can generate significant heat; this calculator does not model enclosure temperature, heat sinking, ambient conditions, duty cycle, or thermal runaway.	
Tolerance boundary	No tolerance, temperature coefficient, calibration adjustment, burden-voltage accuracy, or measurement uncertainty is determined by this calculator.	
Component selection boundary	No resistor wattage selection, tolerance selection, enclosure, installation, manufacturer approval, listing, or code-compliance result is made by this calculator.	

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Formulas

$$V_{\text{meter}} = I_{\text{meter}} \times R_{\text{meter}}$$

$$I_{\text{shunt}} = I_{\text{target}} - I_{\text{meter}}$$

$$R_{\text{shunt}} = \frac{V_{\text{meter}}}{I_{\text{shunt}}}$$

$$P_{\text{shunt}} = I_{\text{shunt}}^2 \times R_{\text{shunt}}$$

$$P_{\text{meter}} = I_{\text{meter}}^2 \times R_{\text{meter}}$$

$$V_{\text{target}} = \frac{V_{\text{target, mV}}}{1000}$$

$$R_{\text{sense}} = \frac{V_{\text{target}}}{I_{\text{target}}}$$

$$P_{\text{sense}} = I_{\text{target}}^2 \times R_{\text{sense}}$$

$$\text{shunt power} = \text{shunt current}^2 \times \text{shunt resistance}$$

$$\text{meter power} = \text{meter current}^2 \times \text{meter resistance}$$

$$\text{target voltage drop in volts} = \text{target voltage drop in millivolts} / 1000$$

$$\text{current-sense resistance} = \text{target voltage drop in volts} / \text{target current}$$

$$\text{current-sense power} = \text{target current}^2 \times \text{current-sense resistance}$$

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component selection boundary = no resistor wattage selection, tolerance selection, enclosure, installation, manufacturer approval, listing, or code-compliance result is made by this calculator

Warnings and limitations

This calculator provides preliminary meter-shunt arithmetic only. It is not a resistor selection, not instrument calibration, not thermal analysis, not isolation or safety-rating verification, not manufacturer approval, and not code-compliance. Verify resistor power rating, tolerance, temperature coefficient, heat rise, mounting, calibration, manufacturer instructions, and project conditions before design, installation, or measurement decisions.