

PLC I/O Load Calculator

Enter repeatable PLC, I/O, communication, and field-device rows with manufacturer-supplied current data. Backplane and field-power budgets remain separate.

Generated October 10, 2026

<https://www.elecatrix.com/circuits-components/plc-i-o-load-calculator/>

Inputs

Input	Value	Unit
PLC and field-power rows		Rows: 3
Row 1 - Label	CPU	
Row 1 - Quantity	1	count
Row 1 - Backplane 5 V current per item	0.8	A
Row 1 - Backplane 24 V current per item	N/A	A
Row 1 - Field-side current per item	N/A	A
Row 1 - Simultaneous duty	100	%
Row 2 - Label	Digital I/O	
Row 2 - Quantity	2	count
Row 2 - Backplane 5 V current per item	0.2	A
Row 2 - Backplane 24 V current per item	0.05	A
Row 2 - Field-side current per item	0.35	A
Row 2 - Simultaneous duty	75	%
Row 3 - Label	Communication module	
Row 3 - Quantity	1	count
Row 3 - Backplane 5 V current per item	0.3	A
Row 3 - Backplane 24 V current per item	N/A	A
Row 3 - Field-side current per item	N/A	A
Row 3 - Simultaneous duty	100	%

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Other 24 VDC current	N/A	A
24 V supply basis	24	V
Available supply current	10	A
Planning margin	20	%
Supply efficiency	90	%

Results

Result	Value	Unit
Backplane 5 V current	1.5	A
Backplane 24 V current	0.1	A
Duty-adjusted field current	0.525	A
Total 24 V current before margin	0.625	A
Required 24 V current with margin	0.75	A
Required 24 V output power	18	W
Estimated supply loss	2	W
Available current margin	9.25	A
Counted rows	3	rows

Calculation details

Detail	Value	Unit
Budget comparison	Entered 24 V supply current covers the calculated requirement.	

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Calculation basis

Backplane rail currents remain separate. The 24 V requirement combines module 24 V current, duty-adjusted field current, and other entered 24 V loads before applying the planning margin.

Power-budget boundary

Power-budget review only; verify manufacturer rail limits, startup/boost current, redundancy, expansion, wiring, protection, hazardous-location requirements, and selected supply separately.

Formulas

$$I_{\text{rail}} = \text{sum} (N_{\text{module}} \times I_{\text{manufacturer rail}})$$

$$I_{\text{field}} = \text{sum} (N_{\text{module}} \times I_{\text{field}} \times F_{\text{duty}})$$

$$I_{\text{24V, total}} = I_{\text{backplane, 24V}} + I_{\text{field}} + I_{\text{other}}$$

$$I_{\text{24V, required}} = I_{\text{24V, total}} \times (1 + F_{\text{margin}})$$

$$P_{\text{out}} = V_{\text{supply}} \times I_{\text{24V, required}}$$

$$P_{\text{loss}} = P_{\text{out}} \times (\frac{1}{\eta_{\text{supply}}} - 1)$$

Warnings and limitations

This is a manufacturer-input power-budget review. It does not select a PLC family, power-supply catalog number, redundancy architecture, protection device, hazardous-location arrangement, or code-compliant control panel.