MCP SERVER | NO CODE | CLOUD HOSTED

Electrical Panel Load Calculator MCP

Get Code-Compliant Wiring Specs in Minutes.

Electrical Panel Load Calculator: Determine if your home's electrical panel can handle its current or proposed load. This MCP calculates everything needed for residential wiring, following NEC Article 220 standards. It figures out lighting needs based on square footage, totals up fixed appliance demands like ranges and dishwashers, and finally spits out the exact required amperage and conductor gauge for your main service.

A+ Quality Score 100/100

nec | electrical | load-calculation | residential | engineering

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vinkius.com/mcp/electrical-panel-load-calculator

SCAN TO VIEW

The infrastructure that powers AI agents in the real world.

Vinkius connects AI to the world's software through secure, enterprise-grade infrastructure — enabling real-world execution at scale, built on the Model Context Protocol (MCP).

Your AI Connections Run Through Vinkius Cloud

The world's largest managed MCP catalog

Vinkius is the cloud infrastructure where AI agents connect to the software your business already runs. We handle the hosting, the security, the credentials, the uptime — you get agents that actually do things.

We operate the world's largest managed MCP catalog. Major SaaS platforms, CRMs, databases, and cloud providers — running, monitored, production-ready. This MCP server is hosted and maintained by the Vinkius Cloud for AI Agents.

> *The agent doesn't manage credentials, doesn't manage uptime, doesn't manage security. Vinkius does.*
>
> — Architecture principle

Four Pillars of the Vinkius Runtime

01 — Security by design

Credentials stay encrypted at rest via AES-256. The AI agent never touches raw keys — they're injected into a sandboxed V8 isolate at runtime. Actions are logged, and connections have an emergency kill switch.

02 — Built on MCP Fusion

This MCP server was built with **MCP Fusion**, the open-source framework (Apache 2.0) that powers the entire Vinkius catalog. Schema-as-firewall strips undeclared fields, compiled PII redaction runs at zero overhead, and cryptographic lockfiles produce git-diffable audit trails.

03 — Deterministic observability

Eight immutable metrics per endpoint: request volume, p95 latency, error rate, active connections, cost attribution. A live payload feed logs every tool call with mutation detection.

04 — Autonomous operations

Servers are deployed, monitored, and patched autonomously. New capabilities and security patches ship weekly. Zero-downtime deployments ensure continuous availability across all managed MCP servers.

AES-256	Ed25519	24h TTL	V8 Isolate
Encryption at rest	PKI vault signatures	Ephemeral session keys	Sandboxed execution

One Token. Instant Access.

Every MCP server on Vinkius is accessed through a **Connection Token**. Tokens are generated in the cloud dashboard and produce a unique MCP endpoint URL. Paste this URL into any MCP-compatible client — no SDK required.

A single token can serve **multiple AI clients simultaneously**, or you can issue separate tokens per client for granular access control. Each token tracks its own request count, last activity timestamp, and can be individually enabled or revoked.

MCP ENDPOINT

```
https://edge.vinkius.com/{token}/mcp
```

Claude · Cursor · VS Code · Windsurf · Grok · Gemini

Security Is the Architecture

Security in Vinkius is not a feature — it's the foundation of the runtime. The gateway enforces multiple independent protection layers between AI agents and third-party APIs.

01 — Ed25519 PKI Vault

Every workspace has an Ed25519 Master Key. Session keys are generated ephemerally (24h TTL) and signed by the Master Key. Credentials never leave the vault boundary.

02 — V8 Isolate Sandboxing

Tool code runs inside isolated-vm V8 isolates with 64 MB memory caps and per-request timeouts. No filesystem access, no network access except through the SSRF-guarded fetch bridge.

03 — SSRF Guard

All outbound HTTP requests are DNS-resolved and validated before execution. Private IP ranges (10.x, 172.16-31.x, 192.168.x, AWS metadata 169.254.x) are blocked at the network layer.

04 — DLP & PII Redaction

A ResponseGuard pipeline intercepts every tool response. Configurable redaction patterns strip sensitive fields (emails, SSNs, card numbers) before data reaches the AI agent.

05 — Cryptographic Audit Trail

Every request is signed into a SHA-256 hash chain with Ed25519 signatures. Events form a tamper-proof, SIEM-exportable forensic record.

06 — Honeytoken Trap System

Phantom credentials are injected into isolated environments. If a honeytoken is used outside Vinkius infrastructure, the server is quarantined instantly.

Emergency Kill Switch

EU AI Act Art. 14(1) Compliant

The kill switch is an **emergency halt** mechanism — not a simple toggle. When triggered, it executes three actions atomically:

01 — Server deactivated

The MCP server is immediately taken offline across the entire cluster.

02 — All tokens revoked

Every connection token is invalidated. Total lockout — reconnection blocked until new tokens are issued.

03 — WebSocket connections killed

Active connections terminated via Redis pubsub broadcast. Propagates to every runtime node in the cluster.

Full Visibility. Zero Guesswork.

The Vinkius cloud dashboard includes a full MCP Governance suite — real-time analytics and security controls for production AI operations.

Control Plane

KPI dashboard with request volume, latency, success rate, token consumption, and AI-generated operational briefings.

Agent Activity

Which AI clients are connecting, how often, and what they're doing — real-time session tracking.

FinOps

Cost tracking per tool, payload compression savings, budget optimization signals, and consumption trends.

Tool Health

Slowest and most error-prone tools, with actionable root-cause insights and performance baselines.

Firewall & DLP

PII redaction activity, sensitive data protection counters, and security event timeline.

Incident Log

Error trends, failure rates, status-code breakdowns, and forensic audit trail access.

> Get started at **cloud.vinkius.com** — connect your AI agent in under 60 seconds.

Electrical Panel Load Calculator MCP

4 tools available
Cloud-hosted on Vinkius

Calculating electrical loads is critical work, especially when adding new appliances or renovating a home. This MCP handles the heavy lifting of residential load requirements, sticking strictly to NEC Article 220 standards. You can calculate total lighting demands based on the house's square footage and then accurately sum up the cumulative wattage for fixed items like electric ranges or laundry machines. If you need to account for smaller circuits, it calculates the specific branch circuit demand. Finally, it takes all those numbers—the lights, the appliances, the small circuits—and runs them through a comprehensive calculation to give you the final panel specification. Using Vinkius means you don't have to juggle multiple specialized tools; you connect once and access this entire electrical engineering suite right where your agent needs it.

Core Capabilities

01 — Determine lighting load

It calculates the total required wattage for all lights based on a provided square footage.

02 — Total appliance calculation

You can sum up the cumulative power needs of fixed appliances like ovens, dryers, and water heaters.

03 — Small circuit demand calculation

It figures out the total electrical demand for smaller circuits, such as laundry or small kitchen appliances.

04 — Final service requirement computation

The MCP takes all calculated demands and computes the final necessary panel amperage and conductor size.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/electrical-panel-load-calculator** — connect your AI agent in three steps.

01 First, feed the system your house's square footage to calculate the baseline lighting load. Next, input data for fixed appliances and small circuits separately; this calculates two separate demand totals. Finally, give all those numbers—the light load, appliance total, and circuit total—to compute the final panel specification.

The bottom line is that it automates the complex, multi-step process of calculating electrical capacity, giving you a single, compliant service requirement.

Built For

Electricians, residential architects, and construction project managers use this. They deal with the pain of inaccurate load calculations that lead to expensive delays or code violations on site.

Licensed Electrician

They use this MCP before running any wire to ensure the panel size and gauge are correct, preventing system overload issues.

Residential Architect

They run preliminary load calculations for new builds or major remodels, giving clients a clear estimate of required electrical infrastructure upfront.

Construction Project Manager

They validate that the engineering specs provided match the physical requirements of the site, avoiding costly mid-project revisions.

What Changes When You Connect

01 Avoid costly miscalculations. By using `compute_panel_specification` after running all component demands, you get a single, authoritative answer for panel size and conductor gauge.

02 Ensure NEC compliance from day one. The tool calculates lighting needs first using `calculate_lighting_load`, which is the crucial starting point for any residential electrical design.

03 Accurately account for major appliances. Use `calculate_appliance_load` to sum up the specific wattage of fixed items like HVAC units or electric ranges, preventing under-sizing issues.

04 Don't forget smaller circuits. The dedicated tool `calculate_branch_circuit_load` ensures you capture the demand from laundry rooms and other small appliance circuits.

05 Save time in design review. You run all four calculations—from lighting to final specs—and your agent gives you a complete, traceable engineering package.

Real-World Applications

Adding an electric range during a remodel

A homeowner needs to add a new electric range and dishwasher. They ask their agent to use `calculate_appliance_load` alongside the existing lighting calculations. The MCP immediately tells them if their current panel can handle the extra load, preventing an expensive upgrade later.

Building a multi-story addition

An architect needs to calculate the total service capacity for a new wing. They run `calculate_lighting_load` based on the added square footage and then feed that number into `compute_panel_specification` to determine if the main feeder lines need upgrading.

Troubleshooting an overloaded circuit

An electrician suspects a specific branch circuit is too demanding. They use `calculate_branch_circuit_load` by inputting only the small appliance data, isolating the exact point of failure before checking the main panel.

Initial residential design planning

A client wants to know what kind of electrical service their house needs. The agent uses `calculate_lighting_load` and `calculate_appliance_load`, then plugs both results into `compute_panel_specification` to get a definitive panel requirement.

Patterns to Avoid

Using generic calculators

✗ AVOID

Relying on simple online forms that only estimate total wattage without considering NEC demand factors or specific circuit types.

✓ INSTEAD

Use this MCP. You must calculate lighting first with `calculate_lighting_load`, then run the appliance totals through `calculate_appliance_load` and finally use all inputs to get a professional result from `compute_panel_specification`.

Ignoring circuit types

✗ AVOID

Only calculating for major appliances and forgetting that small, dedicated laundry or HVAC circuits add up quickly.

✓ INSTEAD

Don't just use the appliance tools. You must also run `calculate_branch_circuit_load` to account for every smaller, but critical, circuit demand before computing the final specification.

Manual spreadsheet errors

✗ AVOID

Building a complex Excel sheet that fails when one variable (like square footage) changes, or forgetting which code version applies.

✓ INSTEAD

Let your agent handle it. The MCP processes the inputs and provides an immediate, codified result using `compute_panel_specification`.

The Right Fit

Use this if you need to know *if* a panel can safely support a load or *what size* that panel needs to be, based on current building codes. You must have specific inputs: square footage, fixed appliance wattages, and circuit demands. Don't use it if you just need general wiring diagrams; those are visual tools. Also, don't use it if your only goal is to list available materials—you still need a parts catalog for that. However, if the problem is 'Do I have enough capacity?' or 'What gauge wire do I need?', this MCP is mandatory.

The Nightmare of Manual Load Calculation

Right now, calculating a load requires jumping between multiple documents: the code book, the appliance manual, and complicated spreadsheets. You calculate lighting based on area, then you tally up every single fixed item—the water heater, the range, the dryer—and you have to remember to apply specific demand factors for each circuit type. It's tedious, it’s slow, and one missed factor means a code violation.

With this MCP, the process is streamlined into discrete steps. You tell your agent the square footage; it handles the lighting calculation. Then, you input appliance data, and the MCP automatically combines every component demand before delivering a single panel requirement number. It takes guesswork out of critical engineering decisions.

Compute Panel Specification

Before this tool, getting the final specification meant manually combining inputs from four different sources: lighting load calculations, fixed appliance loads, small circuit demands, and finally cross-referencing those totals against a code book to determine amperage and gauge. It was an error-prone relay race of numbers.

Now you simply feed all the calculated component loads into `compute_panel_specification`. The result is instant: a definitive service requirement—the exact panel size and conductor gauge needed for safe, compliant installation.

Electrical Panel Load Calculator (4 Tools)

Use these specialized tools to calculate every component of a home's electrical demand, from basic lighting needs to final main service requirements.

#	TOOL	DESCRIPTION
01	`calculate_appliance_load`	Calculates the combined wattage required for permanently installed household appliances.
02	`calculate_branch_circuit_load`	Determines the total electrical demand for smaller, dedicated circuits like laundry or small kitchen items.
03	`calculate_lighting_load`	Calculates the necessary lighting load based on the overall square footage of the structure.
04	`compute_panel_specification`	Computes all final electrical service details, including required amperage and conductor size, for the main panel.

See It in Action

Real prompts you can use once this MCP is connected to your AI agent through Vinkius Cloud.

U Calculate the lighting load for a 2500 square foot house.

The calculated lighting load for 2,500 sqft is 7,500 VA.

U What is the total wattage for an electric range and a dishwasher?

The cumulative appliance load for the electric range and dishwasher is 10,500 VA.

U If my total demand is 24,000 VA, what panel size do I need?

For a total demand of 24,000 VA, the required service is 200A, using a 200A panel and 3/0 AWG conductors.

Frequently Asked Questions

01 **Does Electrical Panel Load Calculator handle different regional wiring codes?**

It calculates residential electrical loads following NEC Article 220 standards. While it adheres to this national code, always check local municipal amendments for final sign-off.

02 **How do I calculate the lighting load using Electrical Panel Load Calculator?**

You use the `calculate_lighting_load` tool and input the total square footage of your home. This gives you a baseline requirement based on national code standards for illumination.

03 **Can I calculate my panel size without knowing the lighting load?**

No, you need to include it. The `compute_panel_specification` tool requires all components—lighting, appliances, and circuits—to provide an accurate total demand calculation.

04 **What if I only have a few fixed appliances? Which tool should I use?**

Use the `calculate_appliance_load` tool. This allows you to input any combination of fixed items and get their cumulative wattage for the overall demand calculation.

05 **Is this good for commercial buildings too?**

This MCP is specifically designed for residential load requirements following NEC Article 220. For larger, commercial installations, you'll need a different type of engineering calculator.

Go Live in 60 Seconds

Get your connection token from **cloud.vinkius.com**, then paste the endpoint URL into any MCP-compatible client.

YOUR MCP ENDPOINT

```
https://edge.vinkius.com/[TOKEN]/mcp
```

CLIENT	WHERE TO CONFIGURE
Claude AI	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
Cursor	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
VS Code	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add `"electrical-panel-load-calculator": { "url": "…" }`
Windsurf	MCP Settings → `mcp_settings.json` → Add endpoint URL
ChatGPT	Settings → Tools & plugins → Add MCP server → Paste endpoint
Gemini	Extensions → Add MCP Server → Paste endpoint URL

ASK AN AI ABOUT THIS

Let your preferred AI explain this MCP server

- Ask ChatGPT
- Ask Claude
- Ask Perplexity
- Ask Gemini
- Ask Grok

READY TO CONNECT

Electrical Panel Load Calculator is live on Vinkius Cloud.

Get your connection token, paste it into your AI agent, and start building. No SDK. No deployment. Just results.

Start at cloud.vinkius.com →

vinkius.com · support@vinkius.com

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