

MCP SERVER

NO CODE

CLOUD HOSTED

# Electrical Load Calculator MCP for AI Agents

Determine Panel Sizing and Circuit Requirements for Any Build

The Electrical Load Calculator MCP determines the exact power requirements for any room, circuit, or panel. It helps electrical engineers and building professionals size panels correctly by calculating total wattage from lights, wall outlets, and fixed appliances. You'll determine safe current draw and check if a circuit adheres to NEC standards before laying wire.

**A+** Quality Score 100/100

electrical

load-calculation

nec-standards

circuit-safety

engineering-tools



# The connectivity layer between AI and the world's software.



Vinkius sits between AI and every application. All communication passes through Vinkius Cloud via the Model Context Protocol (MCP) — with governance, observability, and security at every layer.

# Your AI Connections Run Through Vinkius Cloud

The world's largest  
managed MCP catalog

Vinkius is the connectivity layer where AI connects 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

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## 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.

### 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.

### 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.

### 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**

Encryption at rest

**Ed25519**

PKI vault signatures

**24h TTL**

Ephemeral session keys

**V8 Isolate**

Sandboxed execution

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## 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

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## 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.

### 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.

### 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.

### 06 — Honeypot Trap System

Phantom credentials are injected into isolated environments. If a honeypot 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.

**FinOps**

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

**Firewall & DLP**

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

**Agent Activity**

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

**Tool Health**

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

**Incident Log**

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

Get started at [cloud.vinkius.com](https://cloud.vinkius.com) — connect your AI agent in under 60 seconds.

# Electrical Load Calculator MCP

4 tools available

Cloud-hosted on Vinkius

Designing an electrical system is complicated; you can't just eyeball the power needs. This MCP lets your AI client calculate exactly how much electricity any space or group of fixtures will consume, ensuring you don't undersize a panel or risk overloading a circuit. Instead of cross-referencing multiple code books and doing manual math for every room, you feed the details (room size, fixture count, appliance type) to your agent. It runs those numbers instantly, checking against safety rules like the 80% breaker capacity rule. When you connect this through Vinkius, your AI client gets access to professional-grade tools that suggest appropriate wire gauges and breaker sizes based on current NEC standards. You get precise electrical load calculations without leaving your chat interface.

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## Core Capabilities

### 01 – Calculate total lighting demand

Determine the required wattage for fixtures in a specific room type, considering its area.

### 03 – Determine appliance power draw

Find both the running and peak wattage requirements for specific, fixed appliances in your build.

### 02 – Estimate outlet power consumption

Calculate the combined VA load from a specified number of general wall receptacles.

### 04 – Verify circuit safety compliance

Check if a proposed load exceeds safe limits and recommends necessary hardware upgrades like breakers or wire gauge.

# One Click on Vinkius — From Prompt to Execution

Available at [vinkius.com/mcp/electrical-load-calculator](https://vinkius.com/mcp/electrical-load-calculator) — connect your AI agent in three steps.

- 01** Provide the AI agent with the specific parameters of the installation, such as room dimensions (e.g., '200 sq ft kitchen') and fixture counts.
- 02** The MCP processes this data using specialized electrical formulas to calculate component-specific loads (lights, outlets, appliances).
- 03** Your agent receives a final report detailing the total required wattage, confirming if it meets code standards, and suggesting optimal breaker and wire sizing.

The bottom line is you get an instant, code-compliant estimate of every electrical load needed for your project.

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## Built For

This MCP is essential for electrical engineers and construction professionals who deal with panel sizing and circuit design. If manual calculations or cross-referencing the NEC guide eats up your day, you need this. It cuts down hours of arithmetic into a single prompt.

### Electrical Engineer

Uses this MCP to validate proposed panel loads and ensure designs meet all local building codes before submitting plans.

### Construction Project Manager

Quickly estimates the required circuit count for new builds, helping budget allocation by preventing costly electrical oversights.

### Architectural Designer

Determines the necessary power density for specific areas (like commercial kitchens or large bathrooms) to ensure functional design integrity.

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## What Changes When You Connect

- 01** Avoid costly site errors. Use `evaluate_circuit_safety` to check if current loads exceed the 80% safety threshold, guaranteeing your design meets code.

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- 02 Instantly calculate room power needs. The `get_lighting_load` tool figures out exact wattage based on square footage and intended use, eliminating guesswork for every space.

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  - 03 Accurately size outlet circuits. Run `calculate_receptacle_load` to estimate the total VA load for groups of wall outlets in a single prompt.

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  - 04 Account for major fixed items. `lookup_appliance_impact` finds both running and peak power draw for specific appliances, ensuring you don't forget high-draw equipment.

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  - 05 Know your wire gauge upfront. The MCP suggests appropriate breaker and wire sizes immediately after calculating the load, saving time in material ordering.
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## Real-World Applications

### Sizing a new commercial kitchen panel

A project manager needs to know if their main electrical service is big enough for new appliances. They prompt the agent with appliance specs and room size, using `lookup_appliance_impact` alongside `get_lighting_load` to confirm the entire system can be powered safely.

### Designing bathroom receptacles

An architect must confirm enough power for multiple outlets. They use `calculate_receptacle_load`, specifying the number of outlets and their type, getting an immediate VA estimate to pass to the electrical design team.

### Checking existing residential circuit safety

A homeowner is worried about an old breaker. They input the current load and breaker specs, letting `evaluate_circuit_safety` tell them if the wiring or breaker needs to be upgraded before they plug in a new unit.

### Calculating load density per square foot

An engineer needs to determine optimal lighting requirements for a large office space. They use `get_lighting_load` by inputting the room's dimensions, receiving a clear wattage requirement based on industry standards.

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## Patterns to Avoid

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### Assuming loads are linear

#### X AVOID

Simply adding up the wattages of every light fixture and appliance without checking for safety thresholds or room type requirements.

#### ✓ INSTEAD

You must use `get_lighting_load` to calculate the base requirement, then combine that with `lookup_appliance_impact` data. Finally, run `evaluate_circuit_safety` to ensure the total load is actually safe for your proposed breaker size.

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### Ignoring outlet grouping rules

#### X AVOID

Estimating receptacle load by multiplying 10 outlets by a guess wattage (e.g., 150W), which leads to inaccurate panel sizing.

#### ✓ INSTEAD

Always use `calculate_receptacle_load`. This tool handles the specific VA estimation required for groups of wall outlets, giving you a reliable total.

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### Forgetting peak draw

#### X AVOID

Only calculating appliances based on their average running wattage, which fails when high-draw items (like pumps) cycle on simultaneously.

#### ✓ INSTEAD

Use `lookup_appliance_impact`. It specifically provides the necessary peak power requirements for fixed equipment, giving you a worst-case scenario calculation.

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## The Right Fit

Use this MCP if your project involves sizing electrical panels, designing new circuits, or verifying load compliance against code standards. You need it when determining total wattage from lights, outlets, and appliances before construction starts. Don't use it if you are simply drafting conceptual floor plans that don't involve power calculations; in that case, a basic drawing tool suffices. Also, if you only need to know the voltage for one piece of equipment, a simple datasheet check is enough—you don't need full circuit evaluation. But if you have multiple interconnected loads or must verify safety against an 80% rule, this MCP is required.

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## Electrical Load Calculator: Solving Panel Sizing Problems with Electrical Loads

Right now, sizing a new electrical panel feels like detective work. You're juggling multiple spreadsheets—one for lighting, one for outlets, and separate notes on appliances. Then you spend hours cross-referencing that total load against the NEC code book to make sure your breaker isn't going to trip during peak usage.

With this MCP, the process collapses into a single chat exchange. You give the agent the room type and the fixture count; it runs the numbers for lighting demand instantly. The punchline? You get a total wattage calculation that's already optimized against standard code requirements.

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## Electrical Load Calculator: Determining Circuit Safety with Wall Outlets

Manually calculating the load for multiple wall outlets is tedious. You have to estimate the draw of every possible plugged-in device, making it hard to hit an accurate VA total without risking oversizing or undersizing the circuit.

This MCP handles that complexity automatically. By using `calculate_receptacle_load`, your agent calculates the estimated total load for a whole group of outlets in seconds. You know exactly what hardware you need before the first wire is pulled.

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## 4 Electrical Load Calculation Tools for Construction Engineering

Run detailed calculations on lighting, receptacles, appliances, and overall circuit capacity using specialized tools designed for electrical design compliance.

#	TOOL	DESCRIPTION
01	lookup_appliance_impact	Retrieves the required wattage and peak power consumption numbers for fixed appliances like water heaters or HVAC units.
02	evaluate_circuit_safety	Checks if an existing circuit load is safe, comparing it against the 80% breaker capacity rule, and recommends necessary hardware upgrades.
03	calculate_receptacle_load	Estimates the total VA load that a group of wall outlets can safely handle for general-purpose circuits.
04	get_lighting_load	Calculates the required electrical demand based on a room's dimensions and its intended use (e.g., kitchen, bedroom).

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## See It in Action

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

**U** What's the minimum power needed for a 30×12 ft master bedroom?



### Lighting Load Calculation

Based on standard residential density (assuming recessed lighting):

- Room Type: Bedroom
- Area: 360 sq ft
- Required Wattage: **720 Watts**

This estimate is based on a minimum of 2.0 W/sq ft for optimal ambient light.

**U** I have three kitchen outlets and one dishwasher. What's the total load?



### Load Summary (VA)

- Receptacle Load (3 Outlets): 750 VA
- Dishwasher Unit: 1200 VA (Peak)
- **TOTAL ESTIMATED LOAD: 1950 VA**

This total requires a minimum of a 20 Amp circuit.

**U** Is a 15A breaker safe for a 1400W load at 120V?



### ⚠ Circuit Status: OVERLOADED

The proposed current draw is calculated at **11.67 Amps**. This exceeds the safe operating threshold of 12 Amps (80% capacity for a 15A breaker).

**Recommendation:** Upgrade to a minimum 20 Amp breaker and check wire gauge.

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# Frequently Asked Questions

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## 01 How do I use the Electrical Load Calculator MCP to size my main panel?

You provide the agent with all major room loads, appliance specs, and total area. The MCP consolidates this information, ensuring every fixture and unit contributes accurately to a single, code-compliant total for your main service entrance.

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## 02 Does the Electrical Load Calculator MCP account for breaker safety rules?

Yes. It checks loads against industry standards, specifically verifying if circuits adhere to the 80% capacity rule before recommending hardware. This prevents costly overloads and fire hazards.

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## 03 What kind of information do I need for appliance load lookup?

You need the specific name or type of fixed appliance (like a water heater) and its known running wattage, so the MCP can retrieve both its continuous and peak power draw requirements.

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## 04 Can this tool calculate lighting needs for commercial vs. residential?

Yes. The `get_lighting_load` function accepts room type (e.g., 'Kitchen' or 'Office') so the calculation uses the correct wattage density per square foot, giving you an accurate estimate regardless of scale.







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# Go Live in 60 Seconds

Get your connection token from [cloud.vinkius.com](https://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
 <b>Claude AI</b>	Profile → Customize → Connectors → "+" → Add custom connector → Paste endpoint
 <b>Cursor</b>	Settings → Features → MCP Servers → "+ Add New MCP Server" → Type: SSE → Paste endpoint
 <b>VS Code</b>	Ctrl/Cmd+Shift+P → "MCP: Add Server" → add <code>"electrical-load-calculator": { "url": "..." }</code>
 <b>Windsurf</b>	MCP Settings → <code>mcp_settings.json</code> → Add endpoint URL
 <b>ChatGPT</b>	Settings → Tools & plugins → Add MCP server → Paste endpoint
 <b>Gemini</b>	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 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](https://cloud.vinkius.com) →

[vinkius.com](https://vinkius.com) · [support@vinkius.com](mailto:support@vinkius.com)

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