

M C P S E R V E R

N O C O D E

C L O U D H O S T E D

ESP Sizing & Configuration MCP

Get precise pump configurations and electrical specs for your wells.

ESP Sizing & Configuration MCP handles the heavy lifting for electric submersible pump design. Your AI client uses this tool to run nodal analysis, determine pump stages, select motors and cables, and verify that your entire system fits the wellbore geometry and safety constraints.

A+ Quality Score 100/100

esp

nodal-analysis

pump-sizing

oil-field

submersible-pumps



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

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

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.

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 — connect your AI agent in under 60 seconds.

ESP Sizing & Configuration MCP

4 tools available

Cloud-hosted on Vinkius

You can stop manually iterating through pump curves and electrical specs. This MCP gives your AI client the engineering logic needed to design electric submersible pump (ESP) systems from the ground up. You start by using the tool to find the equilibrium between reservoir delivery and system requirements through nodal analysis. Once you have that operating point, the MCP calculates the exact pump hardware you need, factoring in things like gas handling and viscosity derating. It doesn't stop at the pump; it also picks the right motor, cable, and VFD based on your specific depth and load. Finally, it runs a feasibility check to make sure your proposed setup actually works within your wellbore's physical limits and safety rules. It turns a complex multi-step engineering process into a direct conversation with your agent.

Core Capabilities

01 — Nodal Analysis

Your agent uses this to find the intersection of reservoir delivery and system requirements.

02 — Hardware Sizing

The AI calculates specific pump stages and models based on fluid properties.

03 — Electrical Selection

Your client identifies the correct motor, cable, and VFD for the job.

04 — Feasibility Checking

The tool validates that the design meets wellbore geometry and safety limits.

05 — Fluid Correction

The MCP accounts for viscosity derating and gas handling during pump calculations.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/esp-sizing-configuration — connect your AI agent in three steps.

- 01 Connect your preferred client like Claude or Cursor to the Vinkius hosted MCP.
- 02 Provide reservoir and system data to your agent.
- 03 The agent uses the MCP tools to calculate the operating point and pump hardware.
- 04 The agent selects the electrical components and validates the final design.

Connect your AI client to Vinkius to start running engineering calculations immediately.

Built For

This MCP is built for petroleum engineers and production specialists who need to automate ESP design workflows.

Production Engineer

Hands off reservoir data to the AI to get rapid pump sizing and electrical specs.

Field Engineer

Uses the tool to validate if a proposed pump configuration fits the current wellbore setup.

Operations Manager

Relies on the feasibility checks to ensure equipment choices meet safety constraints.

What Changes When You Connect

- 01 Automates the calculation of pump stages and models.
- 02 Accounts for viscosity and gas handling in hardware selection.
- 03 Matches electrical components to specific depth and load requirements.

04 Verifies design safety against wellbore geometry.

Real-World Applications

Initial Pump Sizing

Generate a baseline pump configuration using reservoir inflow and system head curves.

Design Validation

Check a completed pump design against safety and operational constraints before deployment.

Electrical Component Selection

Determine the specific motor and cable requirements for a deep well installation.

Fluid Property Adjustment

Recalculate pump efficiency when dealing with high viscosity or gas-heavy fluids.

4 Tools Available

#	TOOL	DESCRIPTION
01	get_operating_point	This tool finds the equilibrium where reservoir delivery matches your system lifting needs.
02	calculate_pump_configuration	This tool determines the specific hardware and physical requirements for the pump unit.
03	select_electrical_system	This tool picks the necessary motor, cable, and surface control components.
04	validate_system_feasibility	This tool checks your final configuration against operational safety and wellbore geometry constraints.

See It in Action

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

- U** Find the operating point for a well with an inflow performance of 'IPR_001' and a system head curve of 'SHC_99'.



The equilibrium production rate is 1,250 barrels per day with a total dynamic head of 4,500 feet.

- U** Calculate the pump configuration for a target flow rate of 2000 bpd, 5000 ft head, 50 cP viscosity, and 5% gas.



The required configuration is 142 stages of the High-Efficiency Model X, with an efficiency derating factor of 0.88.

- U** Select the electrical system for a 250 HP motor at 8,000 ft depth with a fluid density of 0.85 spgr.



The recommended setup is a 450V motor with #4 AWG heavy-duty cable, and a VFD is required for startup torque management.

Frequently Asked Questions

01 What kind of data do I need to provide for pump sizing?

You typically need inflow performance data, system head curves, target flow rates, and fluid properties like viscosity and gas content.

02 Does this MCP handle electrical components?

Yes, it includes a tool to select the appropriate motor, cable, and VFD based on your depth and load.

03 Can it account for non-ideal fluid conditions?

Yes, the pump configuration tool specifically accounts for viscosity derating and gas handling.

04 How does it ensure the design is safe?

The validation tool checks the entire configuration against wellbore geometry and safety constraints.

05 Which AI clients can use this MCP?

You can use this with any MCP-compatible client, including Claude, Cursor, Windsurf, and VS Code.

06 How does the tool handle high-viscosity fluids?

The ``calculate_pump_configuration`` tool applies a viscosity derating factor to the pump performance curves to ensure the selected hardware can handle the increased resistance.

07 Can I validate if my pump fits in the wellbore?

Yes, use the ``validate_system_feasibility`` tool. It checks the pump diameter and electrical system against the provided wellbore geometry and constraints.

08 What information is needed to find the operating point?

You need to provide the inflow performance description and the system head curve description to the ``get_operating_point`` tool.

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 <code>"esp-sizing-configuration": { "url": "..." }</code>
 Windsurf	MCP Settings → <code>mcp_settings.json</code> → 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

ESP Sizing & Configuration 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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DOCUMENT INFORMATION

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Platform	Vinkius Cloud for AI Agents
Endpoint	<code>https://edge.vinkius.com/{token}/mcp</code>

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