

MCP SERVER

NO CODE

CLOUD HOSTED

Crossflow Filtration Optimizer MCP

Balance wine throughput against membrane fouling in real time.

Crossflow Filtration Optimizer MCP manages the complex variables of membrane filtration for winemakers. It analyzes wine composition, including colloids and polysaccharides, to help you maintain high throughput without destroying your membranes. Your AI client uses this data to suggest pressure and velocity adjustments that prevent rapid fouling and extend equipment life.

A+ Quality Score 100/100

filtration

winemaking

optimization

membrane

crossflow



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.

Crossflow Filtration Optimizer MCP

4 tools available

Cloud-hosted on Vinkius

Managing crossflow filtration in a winery is a constant tug-of-war between speed and equipment longevity. If you push the pressure too hard to increase throughput, you risk rapid, irreversible fouling. This MCP gives your AI client the technical data it needs to help you find that sweet spot. By feeding the composition of your wine—specifically looking at polysaccharide and colloid levels—into the system, your agent can calculate real-time performance and predict when you'll need to pull a membrane for cleaning. Instead of guessing at velocity or pressure settings, you can ask your AI to run the numbers based on your specific wine profile. It turns raw filtration data into actionable maintenance schedules and optimized operating parameters, keeping your production lines moving without unexpected downtime.

Core Capabilities

01 — Fouling Risk Assessment

Your agent checks wine composition to identify batches that might clog membranes quickly.

02 — Real-time Flux Monitoring

The AI calculates immediate filtration performance based on your current settings.

03 — Parameter Optimization

Your client suggests specific velocity and pressure adjustments to maximize output.

04 — Maintenance Forecasting

The AI estimates how much longer a membrane can run before it needs cleaning.

One Click on Vinkius — From Prompt to Execution

Available at vinkius.com/en/ai-agent-connect/crossflow-filtration-optimizer — connect your AI agent in three steps.

- 01

Connect your preferred MCP-compatible client to Vinkius.
- 02

Provide your wine composition and current operating parameters to your agent.
- 03

The AI uses the MCP tools to calculate flux, risk, or optimal settings.
- 04

Apply the suggested velocity and pressure to your filtration hardware.

Get your filtration data into your AI client and start optimizing immediately.

Built For

This MCP is built for professionals managing industrial filtration processes in the wine industry.

Winemakers

They use the AI to adjust filtration settings based on specific wine batches.

Production Managers

They rely on the AI to schedule membrane maintenance and prevent downtime.

Enologists

They use the tool to analyze how wine composition affects filtration efficiency.

What Changes When You Connect

- 01

Reduces unexpected downtime by predicting membrane life.
- 02

Maximizes throughput by calculating optimal velocity and pressure.
- 03

Protects expensive membranes from irreversible fouling.

04 Provides data-driven settings based on wine colloid and polysaccharide levels.

Real-World Applications

Batch-Specific Optimization

Adjust settings for a new batch of wine with high polysaccharide levels to prevent clogging.

Performance Monitoring

Track real-time flux to ensure the filtration system is hitting target rates.

Maintenance Planning

Use membrane life predictions to schedule cleaning during natural production gaps.

Risk Mitigation

Evaluate the fouling risk of a specific wine profile before starting a filtration run.

4 Tools Available

#	TOOL	DESCRIPTION
01	evaluate_fouling_risk	This tool assesses how likely a specific wine profile is to cause rapid, irreversible fouling. It uses your wine's composition to flag high-risk batches.
02	get_current_flux	This tool calculates your immediate filtration performance. It looks at your current operating settings to report real-time flux.
03	optimize_parameters	This tool suggests the best velocity and pressure settings. It aims to maximize your throughput while protecting the membrane.
04	predict_membrane_life	This tool estimates the remaining operational time for your membrane. It helps you plan for cleaning or replacement before a failure occurs.

See It in Action

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

U What is my current flux rate for a wine with 5.0 colloids and 2.0 polysaccharides at 20°C, 50 velocity, and 1.5 pressure?



The current flux rate is 12.4 L/m²h with a fouling coefficient of 0.15.

U Suggest optimal settings for a wine with 8.0 colloids and 5.0 polysaccharides to achieve a throughput of 15.0 with at least 30 days of membrane life.



To meet your targets, use an optimal velocity of 65.0 and an optimal pressure of 1.2. This is expected to yield a flux of 15.2 and 35 days of life.

U Is there a high risk of fouling for a wine with 10.0 polysaccharides at a velocity of 30.0?



The risk level is High. The high polysaccharide concentration relative to the low velocity suggests a high fouling rate. It is recommended to increase crossflow velocity.

Frequently Asked Questions

01 How does this MCP help with membrane fouling?

It analyzes wine composition, like polysaccharides and colloids, to evaluate the risk of fouling and suggests settings to prevent it.

02 Which AI clients can I use with this MCP?

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

03 Can I use this to predict when to clean my membranes?

Yes, the `predict_membrane_life` tool estimates how much longer a membrane can operate before it requires cleaning or replacement.

04 Does this MCP work with my existing filtration hardware?

This MCP provides the data and optimized settings for your agent to suggest; you then apply those settings to your hardware.

05 What data do I need to provide for optimization?

You typically provide wine composition (colloids and polysaccharides) and current operating settings like velocity and pressure.

06 How can I maximize my filtration throughput?

You can use the `optimize_parameters` tool to find the best combination of crossflow velocity and transmembrane pressure to meet your target throughput while respecting membrane life constraints.

07 How do I know when to replace my membrane?

The `predict_membrane_life` tool analyzes your flux history and current operating conditions to provide an estimated replacement date and remaining days of useful operation.

08 Can I assess the risk of fouling for a new batch of wine?

Yes, the `evaluate_fouling_risk` tool assesses the likelihood of rapid fouling based on the wine's organic composition and your planned crossflow velocity.

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>"crossflow-filtration-optimizer": { "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

Crossflow Filtration Optimizer 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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