MCP SERVER | NO CODE | CLOUD HOSTED

Kelly Criterion Sizing MCP for AI Agents

Optimizing Bankroll Management and Betting Strategies

Kelly Criterion Sizing calculates optimal betting strategies by determining the mathematically ideal percentage of your bankroll to wager. It helps bettors and traders manage risk, converting raw American odds and win probabilities into precise capital allocation figures for maximum long-term return.

A+ Quality Score 100/100

kelly-criterion | bankroll-management | betting-calculator | capital-allocation | risk-management

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vinkius.com/mcp/kelly-criterion-sizing

SCAN TO VIEW

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.

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.

Kelly Criterion Sizing MCP

4 tools available
Cloud-hosted on Vinkius

Managing a betting portfolio requires more than just gut feeling; it demands strict mathematical discipline. This MCP provides specialized tools for calculating optimal bet sizes and managing your overall bankroll. You can first convert common market odds using the net profit ratio tool, translating them into precise risk percentages. From there, you have choices: use the pure Kelly function to find the maximum mathematically recommended wager, or opt for a more cautious approach with half-Kelly sizing. Before running any calculation, you can check your inputs using parameter validation to make sure everything is sound. Because capital preservation is key in this game, having these tools available through Vinkius lets your AI client perform complex risk calculations on demand.

Core Capabilities

01 — Determine Optimal Wager Size

Calculates the maximum mathematically recommended percentage of your bankroll to wager based on win probability and odds.

02 — Calculate Conservative Bet Sizes

Provides a safer, reduced wagering fraction for those who prefer less aggressive risk management.

03 — Convert Market Odds to Ratio

Translates standard American betting odds into the net profit-to-stake ratio needed for accurate calculations.

04 — Validate Betting Inputs

Checks any set of betting parameters—odds, probabilities, etc.—to ensure they are mathematically sound before calculating a bet size.

One Click on Vinkius — From Prompt to Execution

Available at **vinkius.com/mcp/kelly-criterion-sizing** — connect your AI agent in three steps.

01 Start by converting market odds into the required net profit ratio using the designated tool. This standardizes your input data.

02 Next, run the parameter validator to confirm all inputs (odds and probabilities) are mathematically sound for a reliable calculation.

03 Finally, select your desired strategy—either the pure Kelly method or the more conservative half-Kelly approach—to get your final recommended wager percentage.

The bottom line is that this MCP takes complex betting math and turns it into straightforward, actionable percentages for smart risk management.

Built For

This tool is essential for quantitative bettors, prop traders, and financial analysts who treat betting or speculative markets as a serious investment. If you're tired of relying on gut instinct or simple guesswork when managing large sums of money, this MCP gives your AI client the math tools needed to optimize risk.

Quantitative Trader

Uses the MCP to calculate optimal position sizing for high-stakes trades based on projected win rates and market odds.

Professional Sports Bettor

Checks potential bets against Kelly Criterion formulas before placing money, ensuring maximum long-term growth while mitigating excessive risk.

Risk Manager

Validates betting models and capital allocation plans to ensure they adhere to strict mathematical safety parameters.

What Changes When You Connect

01 Determine your maximum possible wager size with the `calculate_pure_kelly` tool, giving you the highest mathematically optimal bet percentage.

02 Reduce risk immediately by using `calculate_half_kelly`, which provides a safer, more conservative wagering fraction than the pure Kelly method.

03 Standardize data inputs by running `get_net_odds_ratio`, converting raw American odds into usable profit ratios for any calculation.

04 Avoid bad calculations before they happen. The `validate_betting_parameters` tool ensures all your input odds and probabilities are mathematically sound.

05 Focus on capital allocation, not guesswork. You get precise percentages that guide every decision, letting you manage risk professionally.

Real-World Applications

Structuring a High-Stakes Bet

A professional bettor needs to know the best wager for a game with known odds. They use `get_net_odds_ratio` first, then run `calculate_pure_kelly` to find the highest optimal percentage of their bankroll to risk.

Modeling Conservative Bets

A fund manager wants to model several potential bets but needs to keep risk low. They use `calculate_half_kelly` across multiple scenarios, providing a safer bet size recommendation for every outcome.

Pre-Flight Check on Data Integrity

Before running any complex calculation, the user suspects their odds data might be flawed. They run `validate_betting_parameters` to confirm that the input probabilities and ratios are mathematically sound before committing to a bet.

Patterns to Avoid

Ignoring Input Validity

✗ AVOID

Assuming your odds and win probability are correct just because they look plausible. Running calculations based on bad data leads to dangerously overestimated wager amounts.

✓ INSTEAD

Always run `validate_betting_parameters` first. This confirms that every single number you feed into the system is mathematically sound before you trust any resulting bet size calculation.

Over-relying on Pure Kelly

✗ AVOID

Using only the maximum percentage from `calculate_pure_kelly` without considering risk tolerance. This can lead to rapid bankroll depletion if a run of bad luck hits.

✓ INSTEAD

If you're unsure, pair `calculate_pure_kelly` with `calculate_half_kelly`. It gives you the optimal max size but also provides a realistic, safer alternative for better risk control.

The Right Fit

Use this MCP if your primary goal is rigorous capital allocation and mathematical risk management in betting or trading. If you need to calculate an absolute maximum wager percentage based on specific odds and probabilities, the pure Kelly tool is key. However, don't use it if you are just looking for general market trends; this isn't a forecasting tool. Similarly, don't rely solely on half-Kelly sizing if

your strategy requires maximizing returns—you need to compare both calculations. If your problem is simply converting odds without calculating the bet size, then only `get_net_odds_ratio` will do. Always validate inputs first; it's non-negotiable.

Kelly Criterion Sizing: Optimizing Bankroll Management for Professional Bettors

Right now, determining the right bet size feels like a guessing game. You manually look up odds and win probabilities in separate spreadsheets, then try to apply complex formulas by hand. This involves endless copying, cross-referencing tabs, and constantly checking if your variables are compatible—a process that's slow and prone to human error.

With this MCP, you feed the raw data into an agent. The system handles the entire mathematical sequence. You get back a single, precise percentage recommendation for your wager, giving you immediate confidence in your capital allocation.

Kelly Criterion Sizing: Ensuring Accurate Capital Allocation with Betting Math

You currently have to manually check every variable—the odds, the probability, and the stake amount—to make sure they won't throw an error or yield a nonsensical result. This validation step is critical, but it's often overlooked until disaster strikes.

This MCP integrates the `validate_betting_parameters` tool directly into your workflow. It catches mathematical inconsistencies immediately, ensuring every calculation you run—whether pure Kelly or half-Kelly—is built on solid ground.

Kelly Criterion Sizing: 4 Tools for Bet Size Calculation

These tools let you calculate pure or half-kelly wagers, convert odds to ratios, and validate all your inputs before making a high-stakes bet.

#	TOOL	DESCRIPTION
01	`calculate_half_kelly`	Determines a safe, reduced wagering fraction for less aggressive risk management.
02	`calculate_pure_kelly`	Calculates the maximum mathematically optimal percentage of your bankroll to wager on a bet.
03	`get_net_odds_ratio`	Converts American betting odds into the net profit-to-stake ratio needed for accurate calculations.
04	`validate_betting_parameters`	Checks all provided inputs—like win probability or odds—to confirm they are mathematically valid for Kelly calculation.

See It in Action

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

U What's my optimal bet size for a 60% win chance at -120 odds?

Betting Analysis: Optimal Wager Sizing

The recommended wager is **8.37%** of your total bankroll.

Calculated Net Odds Ratio (b): *0.923*
- **Wagering Strategy:** Pure Kelly Criterion
- **Risk Assessment:** High return, maximum theoretical growth rate.

**Note: This calculation assumes the provided win probability is accurate.

U I want a safer bet size for an underdog with 45% chance and +200 odds.

Conservative Bet Sizing Report

Given your risk preference, we recommend using the Half Kelly strategy.

- **Optimal Wager: 7.15%** of your bankroll.
- **Comparison (Pure Kelly):** 10.21% (Too aggressive for safe play)
- **Net Profit Ratio:** 2.0

This approach balances strong potential returns with much better capital preservation.

U Convert +350 odds into a profit ratio for my model.

Odds Conversion Summary

The American odds of +350 convert to the following net profit-to-stake ratio (b):

ODDS	NET PROFIT RATIO (B)
+350	3.5

This means for every $1 staked, you can expect a $3.50 profit.

Frequently Asked Questions

01 **How does the Kelly Criterion Sizing MCP help me manage my betting bankroll?**

The Kelly Criterion Sizing MCP calculates the mathematically optimal wager size based on your win probability and odds. It tells you exactly what percentage of your total money to risk to maximize growth while controlling downside risk.

02 **Should I use pure Kelly or half-Kelly sizing for my bets?**

Pure Kelly gives the absolute maximum bet size, which is best for experienced bettors with high confidence. However, if you want a safer approach that reduces volatility, check the half-Kelly option.

03 **What kind of odds does this MCP support?**

The MCP supports standard American betting odds. It includes tools to convert those raw odds into net profit ratios, making them ready for accurate calculation in your model.

04 **Can I use Kelly Criterion Sizing if my input data feels a little shaky?**

Yes. Before calculating anything, the MCP lets you validate all parameters. This tool checks your odds and probabilities to confirm they are mathematically sound, preventing bad numbers from ruining your strategy.

05 **Is this useful for more than just sports betting?**

Absolutely. Because it deals with pure risk management and capital allocation based on probability ratios, it applies anywhere you're making a calculated bet—like quantitative finance or venture capital modeling.

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 `"kelly-criterion-sizing": { "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

Kelly Criterion Sizing 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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