

Reversion Alpha

RISK-WEIGHTED DCA SIMULATION PLATFORM

User Guide · v1.1 · April 2026

A complete guide to the 500-day geometric mean reversion model, dynamic buy zones, take profit engine, and advanced simulation features.

Feature	Description
500-Day GMA Model	Rolling geometric mean as the mean-reversion anchor
Risk Bands 0.0–1.0	Dynamic position sizing from deep value to caution
Direction-Aware Sells	Exit engine behaves differently on the way up vs way down
LEAP Options	Maximum leverage at deep value — risk < 0.10 zone only
Covered Calls	Premium income simulation near market peaks
Deep Value Mode	2x multiplier when risk drops below 0.10

Not financial advice. For simulation and educational purposes only.

What's New in v1.1

- Live price now refreshes every 60 seconds during market hours — was previously cached for up to 5 minutes
- Vector Alpha handshake fixed — ticker loaded from Vector Alpha now always loads correctly on first visit
- Minor internal cleanup — no functional changes to simulation logic or feature behaviour

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1. What Is Reversion Alpha?

Reversion Alpha is a risk-weighted Dollar Cost Averaging (DCA) simulation platform built on a single core insight: price always mean-reverts to its long-term trend. The further price falls below its 500-day geometric moving average, the higher the conviction to accumulate — and the larger the position size. The further it rises above the average, the more caution is warranted.

Unlike traditional DCA which invests a fixed amount at regular intervals regardless of market conditions, Reversion Alpha dynamically scales position size based on a real-time risk score between 0.0 and 1.0. At low risk (price well below the moving average) you buy more. At high risk (price extended above the average) you hold or sell.

Key Philosophy

The model does not predict price direction. It measures how extended price is relative to its own long-term mean, then sizes positions accordingly. Low risk = opportunity. High risk = caution. Simple. Disciplined. Systematic.

What Reversion Alpha Is NOT

Reversion Alpha is a simulation tool. It back-tests your chosen strategy against historical price data and shows you what would have happened. It does not place real trades, connect to any brokerage, or constitute financial advice. All results are hypothetical and past performance does not guarantee future results.

Disclaimer

This tool is for educational and research purposes only. Not financial advice. Always do your own research and consult a qualified financial advisor before making investment decisions.

2. The Risk Model — How It Works

The 500-Day Geometric Moving Average

Reversion Alpha calculates a 500-day rolling geometric moving average (GMA) — not a simple arithmetic mean. The geometric mean is computed in log space, making it far more resistant to price spikes and more representative of compounding growth over time. With 500 days, the average is intentionally slow and sticky — it doesn't react quickly to short-term moves, which is exactly what makes it useful as a mean-reversion anchor.

The Risk Formula

Once the 500-day GMA is computed, the risk score is derived as:

$$\text{Risk} = (\log_{10}(\text{price} / \text{GMA}_{500}) + 0.4647) / 1.0013$$

The result is clamped between 0.0 and 1.0. A risk of 0.0 means price is extremely depressed relative to its long-term average. A risk of 1.0 means price is extremely extended above it.

Risk Score Reference Points

Date	Asset	Price	GMA ~	Risk Score	Zone
Jun/Jul 2022	BTC	\$19k–22k	\$32k–41k	0.155 – 0.192	Deep Value (8x)
Nov 2022	BTC	\$16k	\$32k	0.197	Deep Value (8x)
Apr 2023	BTC	\$30k	\$22k	0.532	Above Buy Zone
Feb 2026	BTC	\$69k	\$95k	0.314	2x Zone

Why Geometric Mean?

A simple (arithmetic) moving average is distorted by large price spikes — one rally can dramatically skew the average up. The geometric mean treats price in log space, giving equal weight to percentage moves rather than absolute dollar moves. This makes it a more stable and fair representation of long-term price trend.

3. Getting Started — Controls Overview

▲ **UPDATED** — v1.1 Live price now refreshes every 60 seconds during market hours. Previously cached for up to 5 minutes.

The top control bar lets you configure your simulation before running it. All settings update the simulation in real time.

Control	Description
Ticker / Asset	Type any stock, ETF, or crypto ticker (e.g. NVDA, BTC, SPY) and press Go. Crypto is sourced from Binance. Stocks and ETFs from Yahoo Finance via a serverless proxy. Live price refreshes every 60 seconds during market hours. Falls back to offline data if the API is unavailable.
USD Amount × Mult	Your base DCA investment per period (e.g. \$1,000). The actual amount deployed each period is this base multiplied by the risk-band multiplier — so at a 4x zone with \$1,000 base, you deploy \$4,000 that period.
Frequency	How often you DCA: Weekly, Bi-Weekly, or Monthly. The simulation places buys on your chosen day of month (or equivalent for weekly/bi-weekly).
Day of Month	The calendar day you make your DCA purchase each month (default: 13th).
Strategy	Linear: multipliers scale evenly across risk bands (4x, 3x, 2x, 1x). Exponential: multipliers scale more aggressively, putting much heavier weight on the deepest value zones.
Simulation Range	Start and end dates for the back-test. Enable 5yr auto to automatically sync the start date to the earliest available data for the selected asset.

Pro Tip Start with a 5-year range on a volatile asset like BTC or PLTR to see the full cycle — deep value accumulation, peak risk, and mean reversion. This gives the model enough history to demonstrate its full power.

4. Buy Zone & Risk Bands

The risk band selector is one of the most important controls in Reversion Alpha. It defines your buy zone — the range of risk scores at which the model actively deploys capital.

The selected band is the right boundary of your buy zone. All bands to the left (lower risk) also buy, with increasing multipliers. All bands to the right (higher risk) are Hold zones — no buys are placed.

Risk Range	Zone	Action	Multiplier
0.00 – 0.099	DEEP VALUE	Maximum accumulation	Highest (2x if Deep Value ON)
0.10 – 0.199	Strong Buy	Heavy accumulation	4x
0.20 – 0.299	Buy	Solid accumulation	3x
0.30 – 0.399	Moderate Buy	Steady accumulation	2x
0.40 – 0.499	Hold / Buy Zone	Default band	1x
0.50 – 0.599	Hold	No buys	—
0.60 – 0.699	Hold	No buys	—
0.70 – 0.799	Hold	No buys	—
0.80 – 0.899	Caution	Take Profit active	—
0.90 – 0.949	High Risk	5% sell (if ON)	—
0.95 – 1.00	Extreme Risk	10% sell (if ON)	—

Choosing Your Buy Zone

The default band is 0.4–0.499 — a balanced zone suitable for most assets. Moving the band left (lower risk) makes you more aggressive, only buying at greater discounts. Moving it right (higher risk) makes you more patient, buying even when the asset is closer to fair value.

Example

Band set to 0.3–0.399: you only buy when risk is below 0.4. At risk 0.10 you deploy 4x your base amount. At risk 0.35 you deploy 1x. At risk 0.45 — no buy. This strategy loads up hard at deep discounts but stays patient near fair value.

5. DCA Strategy Modes

Mode	Description
Precision DCA (Dynamic)	The flagship mode. Buy sizes scale with the risk band multiplier. This is the full risk-weighted DCA model — larger positions at lower risk, smaller at higher risk. All advanced features (Deep Value, Take Profit, LEAP, Covered Calls) are available in this mode.
Equal DCA	Traditional fixed-amount DCA. The same base amount is deployed every period regardless of risk score. Use this as a benchmark to compare against Precision DCA and see the value the risk model adds.
Lump Sum	Deploys your entire simulated capital on day one. The total invested is auto-calculated from what Precision DCA would have spent over the same period. Use this to compare systematic DCA against a single entry at the start.

Linear vs Exponential

Within Precision DCA, you can choose Linear or Exponential multiplier scaling. Linear distributes multipliers evenly across bands (e.g. 4x, 3x, 2x, 1x). Exponential concentrates firepower at the deepest zones — useful for volatile assets like BTC where extreme lows are rare but massively rewarding.

6. Feature Panels — Deep Dive

The feature panel row sits below the risk band selector. Each card is an independent module that layers additional strategy logic onto the base DCA simulation. All features default to OFF and can be toggled independently.

6.1 Auto Risk Offset

The Auto Risk Offset dynamically shifts your effective buy zone based on the asset's current 60-day volatility percentile relative to its own history.

Calm market (low volatility): offset shifts negative — you buy more aggressively because low-volatility environments historically precede sustained moves. Volatile market: offset shifts positive — you become more cautious because high volatility periods carry more risk of further downside.

Example Auto Risk Offset applies -0.069. Your selected band is 0.4–0.499. Effective buy zone becomes 0.331–0.430. The model shifts your entry earlier, catching dips before they become obvious to the market.

6.2 Deep Value Mode

When enabled, Deep Value doubles the buy multiplier whenever risk drops below 0.10 — the extreme fear zone. This is the model's maximum conviction signal: price is massively dislocated from its long-term mean.

In practice, risk below 0.10 is rare but historically marks generational buying opportunities. Deep Value lets you load up hard precisely at those moments. A gold band appears on the chart to highlight when this trigger is active.

When to Use Deep Value works best on volatile assets with long histories (BTC, NVDA, TSLA). For stable ETFs like SPY or SCHD, the 0.10 threshold is almost never reached. Enable it for high-conviction, high-volatility plays.

6.3 Take Profit — The Full Exit Engine

Take Profit is Reversion Alpha's direction-aware exit system. It understands where risk is going, not just where it is — and behaves completely differently on the way up versus the way down.

Why Not a Trailing Stop? Traditional trailing stops trail the high-water-mark price by a fixed percentage. The problem: stops get hunted. A single wick can trigger your stop, only for price to immediately recover. The Take Profit engine uses the risk score instead of price. The 500-day GMA cannot be hunted — it takes 500 days of price history to move it meaningfully.

Upward Triggers (Way Up)

Trigger	Risk Level	Action	Default
0.90 Trigger	Risk \geq 0.90	Sell 5% of remaining shares	OFF
0.95 Trigger	Risk \geq 0.95	Sell 10% of remaining shares	OFF

Descending Trigger (Way Down)

This is the engine's most powerful feature. After risk has visited 0.90 or above, the model enters Descending Mode when risk crosses back below 0.90. This signals that the 500-day moving average has peaked and begun to roll over — confirmed mean reversion is beginning.

Condition	Action
Risk crosses below 0.90 (after visiting 0.90+)	Sell user-defined % of remaining shares (default 25%)
Risk bounces back to 0.91+	Reset — upward sell rules resume
Risk crosses below 0.90 again	Another sell fires — repeats on every bounce
Risk falls to within 0.10 of buy zone	All selling stops — accumulation resumes

The Key Insight When the 500-day MA rolls over from above 0.90, price has typically already peaked and both price and MA are now falling together. This is the most reliable exit signal — not a price target, not a trailing stop, but the actual confirmation that the reversion cycle has begun.

Desc. Sell % The descending sell percentage defaults to 25% per trigger. Each time risk crosses below 0.90 (after visiting it), 25% of your remaining position is sold. Adjust with the +/- buttons. A higher % exits faster but risks selling on a bounce. A lower % gives more time but leaves more exposure.

6.4 LEAP Options

LEAP (Long-term Equity Anticipation Securities) options replace regular share purchases in the 0.0–0.099 deep value zone with 18-month call options. This maximises leverage at the point of maximum market dislocation.

Parameter	Value	Notes
Option Type	Call option	Right to buy shares at strike price
Strike Price	92% of current price	Slightly in-the-money for value
Delta	0.75 (default)	Adjustable 0.60 – 0.90
Term	18 months	Fixed term — expires at entry + 18 months
Cost	40% of stock price	Adjustable 20% – 60%
Zone	Risk < 0.10 only	Toggle 0.00–0.099 zone ON/OFF
Leftover	Buys shares	Unspent budget after contracts buys shares

LEAP vs Shares LEAPs capture maximum leverage on a sharp move within 18 months. However, for assets that trend up slowly over 3-5 years, simply holding shares often outperforms because share gains compound indefinitely while LEAPs expire. Use LEAPs for assets where a sharp recovery is expected within 18 months.

6.5 Covered Calls

Simulates writing covered calls against your position when risk reaches 0.90 or above. When you own shares and sell a call option against them, you collect premium income immediately — boosting total return near market peaks.

The simulation uses half your current position and calculates monthly premium at your configured rate (default: 0.40% of position value per month). Premium income is included in your total return and CAGR calculations but is not reinvested into shares.

6.6 Initial Position

Allows you to log an existing holding before the simulation starts. Enter your actual shares and average cost price — the model incorporates your real position into the simulation so results reflect your true cost basis and share

count, not just the hypothetical DCA.

7. Reading the Charts

Chart 1 — Simulated Strategy Over Time (Risk Chart)

Series	Colour	Description
Risk Score	Blue/White line	0.0–1.0 risk score over time. Left axis.
Price	Orange/Gold dotted	Asset price over time. Right axis.
Green zones	Shaded bands	Your active buy zone — where purchases are made.
Gold band	Bottom zone	Deep Value zone (0.0–0.099) — visible when Deep Value ON.
Buy markers	Right-side labels	Buy \$1k (1x) through Buy \$10k (18x) — bracket legend.

Chart 2 — Portfolio Value Over Time

Line	Colour	Meaning
Portfolio Value	Green solid	Current value of all holdings (shares × price)
Total Invested	White dashed	Cumulative cash deployed into the strategy
Lump Sum	Dim dotted	What a lump sum investment on day 1 would be worth

Lin / Log Toggle

Switch between Linear and Log scale on the portfolio chart. Log scale is highly recommended for assets that have grown 10x+ — it shows percentage growth proportionally, making early accumulation phases visible.

8. Hero Cards & Summary Panels

The Four Hero Cards

Card	What It Shows
Portfolio Value	Current value of remaining shares (shares × last price). Sub-line shows total gain including sell proceeds, CC income, and LEAP value.
DCA CAGR vs Lump	Your annualised return (CAGR) for the full simulation period, including all proceeds from sells, CC income, and LEAP value. Compared against a lump sum on day 1.
Total Invested	Total cash deployed — base DCA purchases plus any LEAP premiums. Shows buy count and average cost per share.
Take Profit	Shows OFF when disabled. When enabled and triggered: total sell proceeds, number of sell events, overall P&L, and % gain including all exit activity.

Collapsible Summary Panels

Panel	Contents
Position Panel	Avg Cost, Shares, Last Price, Risk Now, Buy Count, Periods. Also contains the Real Position Override — enter your actual shares and average price to overlay your real position onto the simulation.
CAGR Analysis	Historical CAGR split into Portfolio DCA, Combined (with all features), and Lump Sum. Forward estimates use mean reversion scaling (75%, 60%, 45%, 35% of historical) for 5yr, 10yr, 20yr, 30yr projections. Not a forecast — for illustrative purposes only.

9. Trade Log

The Trade Log is a full chronological record of every simulated transaction. Expand it with the expand button. Each row shows:

Column	Description
Date	The scheduled DCA date the transaction occurred
Action	Buy 1x / Buy 4x / Sell 5% / Covered Call / LEAP / Initial Position
Risk	Risk score at time of transaction — colour-coded by zone
Price	Asset price on that date
Accumulated	Running total of shares held after this transaction
Invested	Running total of cash invested after this transaction
Value	Portfolio value (shares × price) at time of transaction

Action Colours Buy rows are green. Sell rows are gold. Covered Call rows are cyan. LEAP rows are purple. Initial Position rows are blue. Risk scores are colour-coded: deep green (low risk) through red (high risk).

10. Portfolio Tracker

The Portfolio Tracker tab allows you to track your actual holdings alongside simulated targets. It fetches live prices and calculates current value, gain/loss, and risk scores for each position.

Actual Holdings

Add each real position — ticker, shares held, and your average entry price. The tracker fetches the live price, calculates current value, gain/loss percentage, and the asset's current risk score from the Reversion Alpha model. Historical CAGR (1yr, 3yr, 5yr, 10yr) is shown alongside forward estimates.

Planned / Target Holdings

Add planned positions you intend to buy. The tracker shows the planned value, cost, and projected gain — and compares your total planned portfolio value against your actual portfolio. A Planned vs Actual delta shows how much additional capital your plan would deploy.

Live Prices

Portfolio prices update when you switch to the Portfolio tab, or when you click the refresh icon on individual rows. Prices are fetched via Yahoo Finance for stocks/ETFs and Binance for crypto. Prices reflect current market data within a 60-second window during market hours.

11. Tips, Pitfalls & Best Practice

Tip	Detail
Start Simple	Run the simulation with everything OFF first. Just Precision DCA, your chosen band, and a 5-year range. Understand the base model before layering features.
Use Log Scale	For any asset that has grown more than 3x during your simulation period, switch the portfolio chart to Log scale. Linear scale compresses early growth into an invisible flat line.
Don't Trust CAGR Blindly	Historical CAGR reflects the specific period you chose. A 5-year window that includes 2022's crash will show different results than one that doesn't. Forward estimates are illustrative — not forecasts.
Take Profit Sequencing	Enable Take Profit features in sequence: start with the descending trigger only. Add 0.90 upside if you want to trim on the way up. Add 0.95 for a second trim. Compare before and after each addition.
LEAPs for Volatile Assets	LEAP options dramatically outperform shares when an asset recovers sharply within 18 months. They underperform on slow, multi-year grinders. Test both and compare portfolio value.
Covered Calls Near Peaks	CC income is most valuable when risk is sustained above 0.90 for many months — exactly when you're not buying more shares. It turns a hold-and-wait phase into an income-generating period.
Real Position Override	Always enter your actual shares and average cost in the Real Position Override before running simulations. This aligns the model's output with your real situation.
Save Your Defaults	Use the Settings menu (gear icon, top right) to Save as Default once you've dialled in your preferred asset, band, base amount, and feature settings. These persist in browser storage.
Vector Alpha Integration	Use the → Analyse in Reversion Alpha button on any GEM or LOADING card in Vector Alpha. The selected ticker loads directly into Reversion Alpha. Resolved in v1.1 to load reliably on first click.

Quick Reference Card

Feature	Default	Key Setting	Notes
Risk Model	Always ON	500-day GMA	Cannot be disabled
Buy Zone	0.4–0.499	Risk band selector	Move left = more aggressive
Auto Risk Offset	ON	Auto / Manual	60-day vol percentile
Deep Value	OFF	Toggle	2x at risk < 0.10
Take Profit (Main)	OFF	Toggle	Enables the exit engine
TP — 0.90 Trigger	OFF	ON/OFF per trigger	Sell 5% upward
TP — 0.95 Trigger	OFF	ON/OFF per trigger	Sell 10% upward
TP — Desc. Trigger	25%	+/- stepper	Sell on way down after 0.90+
LEAP Options	OFF	Toggle + sliders	Risk < 0.10 zone only
Covered Calls	OFF	Toggle + slider	Risk ≥ 0.90 trigger
Initial Position	OFF	Shares + Avg \$	Real position overlay
Frequency	Monthly	Weekly/Bi-W/Monthly	DCA interval
Strategy	Linear	Linear / Exp	Multiplier scaling
Currency	USD	USD / CAD	CAD uses live FX rate

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