

# Rank Sum Momentum Shift

Expert Advisor Documentation

## PLATFORM

MetaTrader 5 (MT5)

## TYPE

Momentum / Regime Shift

## TIMEFRAME

H1 · Adaptable

## WEBSITE

[www.algobot.live](http://www.algobot.live)

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## Overview

**Rank Sum Momentum Shift** is a nonparametric drift-regime detector built on the Wilcoxon rank-sum (Mann–Whitney U) test. Its premise is that a trend is born the moment the *distribution* of bar-to-bar returns quietly shifts — when the market begins to print systematically larger (or smaller) moves than it did a short while ago.

Mean-based signals such as a t-statistic or a z-score of raw returns are easily wrecked by a single spike bar. The rank-sum test discards magnitudes entirely and looks only at the *ordering* of returns, so it can identify a genuine location shift in the return distribution while shrugging off outliers. The strategy compares two adjacent windows of returns, standardises the result into a z-score, and trades the **transition** into a new regime — not the state itself — with a lightweight EMA trend filter and ATR-based risk control.

**Why rank the returns?** Because ranks are immune to the size of any one bar, one violent candle cannot manufacture a false signal, nor can it hide a real one. The test responds to how consistently returns have shifted upward or downward — a much cleaner read on an emerging drift than an average.

# How It Works

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## The two return windows

On every completed bar the engine takes the most recent `2 × Window` bar-to-bar returns and splits them into two adjacent, equal-sized groups:

- **OLD** — the `Window` returns before last (the prior regime).
- **RECENT** — the most recent `Window` returns (the emerging regime).

All `2 × Window` returns are pooled and average-ranked (ascending, with ties resolved by mean rank). The rank-sum of the RECENT group yields the Mann–Whitney U statistic, which is standardised into a z-score:

$$\begin{aligned}U &= \text{rankSum}(\text{RECENT}) - w(w + 1) / 2 \\ \text{meanU} &= w^2 / 2 \\ \text{varU} &= w^2(2w + 1) / 12 \\ z &= (U - \text{meanU}) / \sqrt{\text{varU}} \quad (w = \text{Window})\end{aligned}$$

- **$z > 0$**  → recent returns rank higher than older ones → an *upward* drift shift.
- **$z < 0$**  → recent returns rank lower than older ones → a *downward* drift shift.

## Entry logic

The strategy acts on the **fresh crossing** of the z-score through the significance threshold, so it engages a regime as it forms rather than after it is already obvious. A baseline EMA provides trend alignment so the trade joins the new regime instead of fighting a still-dominant opposite trend.

- **Long** — when `z` crosses *up* through `+ZThreshold` and the completed close is above the baseline EMA.
- **Short** — when `z` crosses *down* through `-ZThreshold` and the completed close is below the baseline EMA.

The rules are distinct and symmetric. Because the signal is a threshold *crossing* (previous `z` on one side, current `z` on the other), the strategy fires once per transition and does not re-enter while the z-score simply lingers beyond the band.

## Reversal & position management

An opposite fresh signal closes the current trade and reverses into the new direction. If a same-side position is already open, the strategy does not stack another on top of it — it holds the existing one. Concretely: a long signal closes any open shorts (then opens a long only if none exists), and a short signal closes any open longs (then opens a short only if none exists).

## Exit & risk (SL / TP)

Risk is sized from the Average True Range at entry. Both the protective stop and the profit target are placed as fixed ATR multiples, giving an explicit reward-to-risk ratio through separate multipliers:

- **Long:** Stop = Entry -  $\text{AtrStopMult} \times \text{ATR}$  ; Target = Entry +  $\text{AtrTargetMult} \times \text{ATR}$  .
- **Short:** Stop = Entry +  $\text{AtrStopMult} \times \text{ATR}$  ; Target = Entry -  $\text{AtrTargetMult} \times \text{ATR}$  .

With the defaults (  $\text{AtrStopMult} = 2.0$  ,  $\text{AtrTargetMult} = 3.0$  ) the target sits at a 1.5× reward-to-risk distance. Positions are otherwise carried to their stop, target, or a reversal signal.

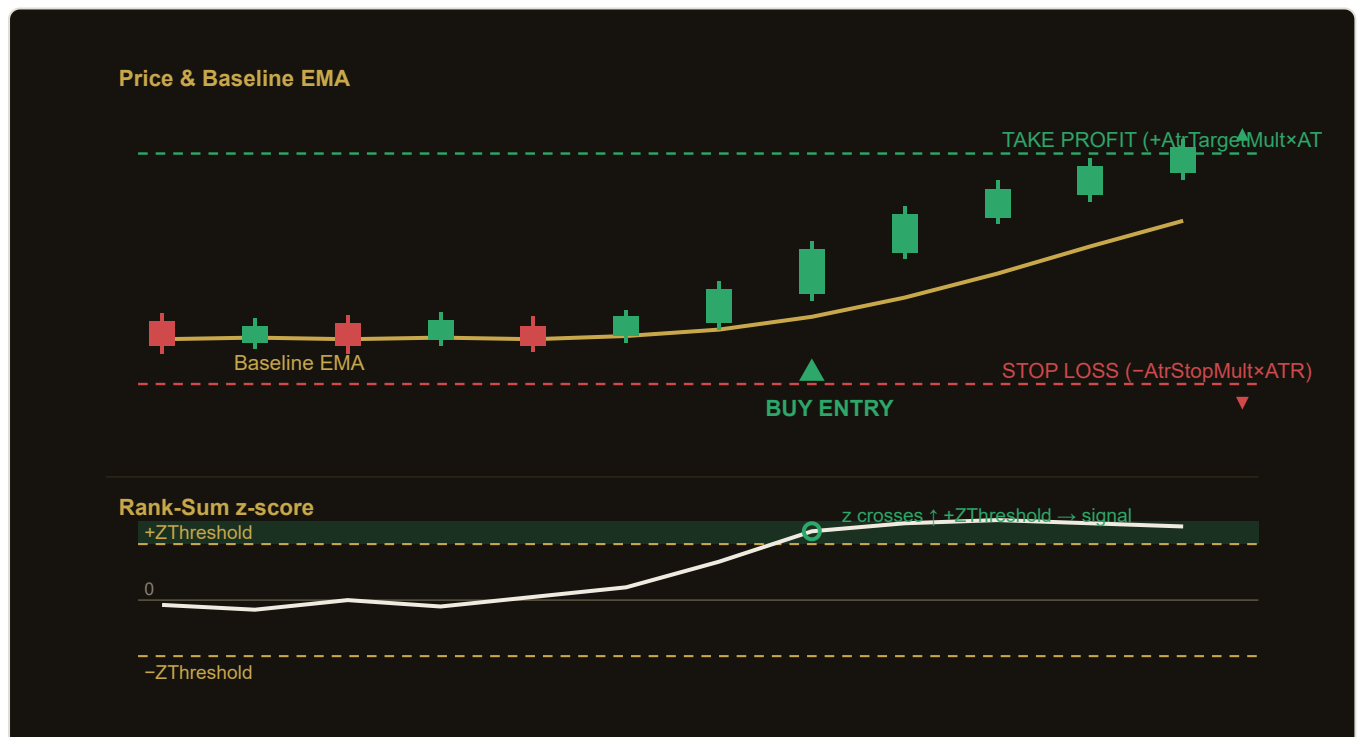
**No repainting.** The EA evaluates only once per completed bar via new-bar detection, and every calculation reads closed bars. Signals do not shift or vanish intrabar, so what you see in backtest is what fires live.

## SINGLE TIMEFRAME

Every price, EMA and ATR read uses the chart's own timeframe. There is no higher-timeframe dependency — the system simply runs on whatever timeframe the chart (or the backtest) is set to.

## Strategy in Action

The illustration below shows an example of how the strategy identifies a setup and triggers its entry and exit. This is a simplified, illustrative example for educational purposes — not real market data.



*Illustrative example only. Actual market behaviour varies.*

### Reading the illustration

The first six candles are choppy — returns are mixed and the rank-sum z-score hovers around zero. As larger up-moves begin to dominate, the z-score climbs and, at candle 8, crosses *up* through `+ZThreshold` . Because the close is also above the baseline EMA, a

**long**

is triggered. The protective stop sits one `AtrStopMult×ATR` below entry and the target one `AtrTargetMult×ATR` above, which is reached as the upward regime plays out.

## Parameters

| Parameter      | Default | Description                                                                                                                                                                          |
|----------------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Window         | 20      | Size of <i>each</i> return window (recent vs. prior); the total sample compared is <code>2 × Window</code> . Range 8–60, step 2. Larger = smoother, slower-reacting shift detection. |
| ZThreshold     | 1.6     | The <code> z </code> the rank-sum shift must clear to be judged significant. Range 0.5–3.0, step 0.1. Higher = fewer, stronger signals.                                              |
| BaselinePeriod | 50      | Period of the baseline EMA used for trend alignment (only shifts that agree with it are taken). Range 10–200, step 5.                                                                |
| AtrPeriod      | 14      | ATR lookback used for risk sizing. Range 5–40, step 1.                                                                                                                               |
| AtrStopMult    | 2.0     | Stop-loss distance as a multiple of ATR from entry. Range 0.5–5.0, step 0.1.                                                                                                         |
| AtrTargetMult  | 3.0     | Take-profit distance as a multiple of ATR from entry. Range 0.5–8.0, step 0.1.                                                                                                       |
| Lots           | 0.10    | Fixed trade volume in lots. Range 0.01–1.0, step 0.05.                                                                                                                               |
| Magic          | 4242    | Magic number identifying this EA's positions so it manages only its own trades.                                                                                                      |

## Recommended Settings

The strategy adapts to whichever timeframe its chart is set to. As a starting point for evaluation:

- **Instruments:** liquid FX majors (e.g. EUR/USD, GBP/USD, USD/JPY) where clean returns keep the rank test meaningful.
- **Timeframe:** H1 as a balanced default; M30–H4 also suit the drift-detection horizon. Very low timeframes add noise that widens the effective threshold needed.
- **Window / ZThreshold:** keep the defaults (20 / 1.6) first. Raise `ZThreshold` toward 2.0–2.5 for fewer but higher-conviction shifts; lower it for more frequent engagement.

- **BaselinePeriod:** 50 aligns entries with the prevailing swing. Increase it to demand agreement with a longer trend, decrease it to react faster.
- **Risk (ATR):** the 2.0 / 3.0 stop/target pairing gives a 1.5× reward-to-risk baseline. Widen `AtrStopMult` in choppy conditions to avoid premature stop-outs.

**Tune before you trade.** Always optimise and forward-test `Window` , `ZThreshold` and the ATR multipliers on your chosen symbol and timeframe in the Strategy Tester before committing real capital. Position size ( `Lots` ) should reflect your account and risk tolerance.

## How to Install on MetaTrader 5

- 1 Copy `RankSumMomentumShift.ex5` to your MT5 `MQL5\Experts\` folder
- 2 Restart MetaTrader 5 and refresh the Navigator panel
- 3 Drag the EA onto a chart matching the recommended symbol and timeframe
- 4 Configure the input parameters and click **OK**
- 5 Enable **Algo Trading** in the MT5 toolbar

## Risk Warning

Trading foreign exchange, CFDs, and other leveraged financial instruments involves substantial risk of loss and is not suitable for all investors. The strategies and tools described in this document are provided for **educational purposes only** and do not constitute financial advice, investment recommendations, or solicitation to trade. Always consult a qualified financial adviser before making trading decisions. Past backtest performance is not indicative of future results.