

# Arcsine Extremum Trend

Expert Advisor Documentation

PLATFORM	TYPE	TIMEFRAME	WEBSITE
MetaTrader 5 (MT5)	Statistical Trend (Drift Detection)	Intraday–Swing (M15–H4)	<a href="http://www.algotbot.live">www.algotbot.live</a>

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## Overview

**Arcsine Extremum Trend** is a trend detector built from first principles of random-walk fluctuation theory rather than from any conventional indicator, chart pattern, or support/resistance rule. It reads only raw OHLC order statistics over a rolling window of closed bars and compares them against the exact distribution a *driftless* market would produce — the two arcsine laws of Paul Lévy.

Under a symmetric (driftless) random walk two quantities each follow the same U-shaped arcsine density,  $f(x) = 1 / (\pi \cdot \sqrt{x \cdot (1-x)})$ : the normalised time at which the running maximum occurs, and the occupation time — the fraction of the window spent above the walk's starting level. When these quantities become *lopsided*, the driftless null is being rejected in favour of a genuine directional drift, and the sign of that asymmetry tells you which way. Arcsine Extremum Trend measures two such statistics, requires them to agree, and trades only in the direction of the confirmed drift with volatility-scaled risk.

**Why it is different:** the strategy has a known *null model*. Both measured statistics are exactly zero-mean and symmetric when there is no drift, so the same threshold keeps the same statistical strictness across regimes, timeframes, and symbols — no re-tuning of "levels" per market.

# How It Works

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## 1. The two arcsine statistics

On every newly-closed primary-timeframe bar the EA looks back over the last `Window` closed bars (the random-walk horizon) and computes two self-normalising statistics, each bounded to `[-1, +1]`.

### A — EXTREMUM-RECENCY ASYMMETRY (E)

Let `iHigh` and `iLow` be the *bars-ago* (0 = newest bar in the window) at which the window's highest high and lowest low sit.

```
E = (iLow - iHigh) / (Window - 1)           range [-1, +1]

E > 0 → the HIGH is the more recently renewed extreme → up-drift
E < 0 → the LOW is the more recently renewed extreme → down-drift
```

Under no drift the timing of the maximum and the minimum are exchangeable — neither extreme is systematically more recent. A positive drift renews the running maximum again and again (pushing its timing toward "now") while the minimum is stamped early in the window; negative drift does the reverse.

### B — OCCUPATION IMBALANCE (OB)

Relative to the window's first close `c0` (the walk's origin):

```
0 = (# closes strictly above c0) / Window   range [0, 1]
Ob = 2·0 - 1                               range [-1, +1]

Ob → +1 : the walk sat mostly ABOVE its origin → up-drift
Ob → -1 : the walk sat mostly BELOW its origin → down-drift
```

For a driftless walk the occupation time is centred (median  $\frac{1}{2}$ , so `Ob` is zero-mean). Drift drags it toward the sign of the trend.

## 2. Entry logic

Requiring *both* statistics to depart from the null in the *same* direction by at least `DriftThreshold` is a conservative, self-normalising rejection of the driftless hypothesis. A freshness filter (`Recency`) additionally requires that the favoured extreme was renewed recently — so the trend is still being pushed, not stale.

```
LONG  : E ≥ Thr AND Ob ≥ Thr AND iHigh ≤ Recency
SHORT : E ≤ -Thr AND Ob ≤ -Thr AND iLow ≤ Recency
```

A new entry is skipped if the current spread (in points) exceeds `MaxSpreadPoints`, protecting against poor fills during illiquid conditions.

### 3. Exit logic & position management

Only **one position per magic number** is ever held — the EA never stacks trades. While a position is open, the EA keeps evaluating the statistics: if an *opposite* drift signal appears (the null has now been rejected the other way) the position is closed immediately, freeing a fresh entry to form on a later bar.

- **Stop loss / take profit:** each position also carries hard ATR-scaled levels set at entry (see below), so trades exit on protective stops even without a drift flip.
- **Drift-flip close:** a long is closed when a fresh short signal fires; a short is closed when a fresh long signal fires.

### 4. Volatility-scaled risk

Distances are measured in Average True Range so risk auto-rescales with market volatility across instruments and regimes:

```
ATR          = Average True Range over AtrPeriod bars
Stop dist    = AtrStopMult × ATR   (default 2.0 × ATR)
Target dist  = AtrTpMult  × ATR   (default 3.0 × ATR)
```

**Self-adapting by design:** the window statistics renormalise to `[-1, +1]` automatically, the ATR stop/target rescale with volatility, and the arcsine null means one `DriftThreshold` preserves the same rejection strictness across symbols and timeframes.

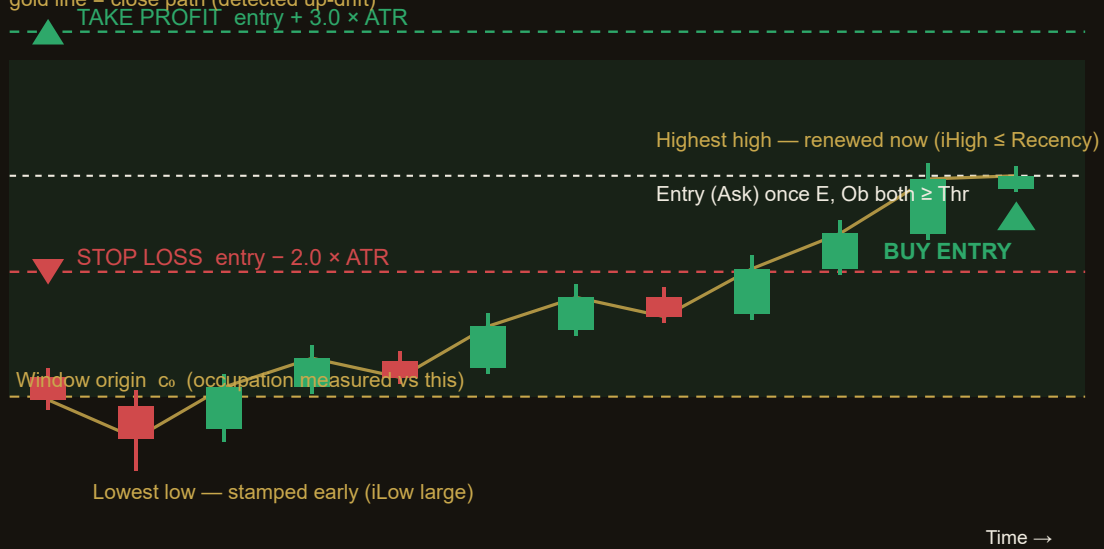
## Strategy in Action

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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.

### Driftless null rejected upward — long confirmed

gold line = close path (detected up-drift)



*Illustrative example only. Actual market behaviour varies.*

#### Reading the setup above

The lowest low is stamped early in the window while the highest high is renewed on the most recent bars, so the extremum-recency asymmetry  $E$  is strongly positive. Most closes sit above the window origin  $c_0$ , so the occupation imbalance  $Ob$  is also positive. With both past  $DriftThreshold$  and  $iHigh \leq Recency$ , a long is opened at the Ask with a stop  $2.0 \times ATR$  below and a target  $3.0 \times ATR$  above.

## Parameters

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Parameter	Default	Description
Window	40	Number of closed bars in the fluctuation window — the random-walk horizon over which both statistics are measured. Range 15–150, step 5.
Recency	3	Freshness filter: the favoured extreme (high for longs, low for shorts) must have been renewed within this many bars-ago. Range 0–15, step 1.
DriftThreshold	0.25	How far <i>both</i> arcsine statistics (E and Ob) must depart from the zero-mean null before a trade is allowed. Higher = stricter/fewer trades. Range 0.05–0.80, step 0.05.
AtrPeriod	14	ATR lookback used to scale stop and take-profit distances. Range 5–30, step 1.
AtrStopMult	2.0	Stop-loss distance from entry, in ATR multiples (stop = AtrStopMult × ATR). Range 0.5–5.0, step 0.5.
AtrTpMult	3.0	Take-profit distance from entry, in ATR multiples (target = AtrTpMult × ATR). Range 0.5–8.0, step 0.5.
MaxSpreadPoints	60	Skip new entries when the current spread (in points) is wider than this. Range 5–300, step 5.
Lots	0.10	Fixed order volume in lots. Range 0.01–1.0, step 0.05.
Magic	8842	Magic number identifying this EA's positions (one position per magic). Range 0–9,999,999, step 1.

## Recommended Settings

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The strategy is designed for any liquid, trend-capable instrument — FX majors, indices, and metals — on intraday-to-swing bars. Because the arcsine null renormalises automatically, the same defaults transfer reasonably well across symbols; tune `DriftThreshold` and `Window` for the character you want.

Setting	Suggested	Notes
Timeframe	M15 – H4	H1 is a balanced starting point; lower TFs generate more, noisier signals.
Window	30 – 60	Shorter windows react faster to fresh drift; longer windows demand more persistent trends.
DriftThreshold	0.20 – 0.35	Raise toward 0.40+ for fewer, higher-conviction entries; lower for more frequent trading.
Recency	2 – 5	Smaller values insist the trend is being pushed right now; 0 requires the extreme on the newest bar.
AtrStopMult / AtrTpMult	2.0 / 3.0	Keeps a positive reward:risk of 1.5:1; widen the stop on choppy instruments.

**Tip:** always validate on the specific broker, symbol, and timeframe in the MT5 Strategy Tester before live use — spread, volatility, and session structure differ between instruments, and `MaxSpreadPoints` should reflect your broker's typical spread.

## How to Install on MetaTrader 5

- 1 Copy `ArcsineExtremumTrend.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

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