

Cumulative Sum Drift Shift

Expert Advisor Documentation

PLATFORM

MetaTrader 5 (MT5)

TYPE

Trend / Change-Point Detection

TIMEFRAME

Any (chart timeframe)

WEBSITE

www.algobot.live

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Overview

Cumulative Sum Drift Shift is a statistical change-point detection system that hunts for the exact moment a market stops drifting sideways and begins a genuine directional trend. Instead of reacting to price *level* at a single instant — the way a moving-average cross or momentum threshold does — it borrows the tabular **CUSUM (CUMulative SUM) control chart** from industrial quality-control theory and *accumulates evidence* across many bars.

Each completed bar's close-to-close return is standardized into sigma units over a rolling window, then a small **allowance** (the **Slack**, denoted K) is subtracted before the value is added to a running sum. Pure noise — returns hovering around zero — is continually bled off by K, so the sum stays pinned near zero and the strategy stays deaf to chop. But when a real drift begins, many small same-signed excesses pile up and the running sum climbs. The instant it crosses a decision interval (the **Threshold**, denoted H), a statistically significant regime shift has been confirmed and a trade is opened in the drift's direction.

Because returns are volatility-adjusted before they enter the chart, the detector requires no per-instrument re-tuning and runs on whatever symbol and timeframe you attach it to. Risk is framed with an ATR-based stop and a reward:risk take-profit, and a fresh opposite signal closes the current trade and reverses.

Core idea: a moving average asks "where is price *now*?" — CUSUM asks "how much directional evidence has *accumulated*?" Small moves that individually look like noise are allowed to add up until, collectively, they can no longer be explained by chance.

How It Works

1. Standardizing the return stream

On every newly-closed bar the EA computes the close-to-close return and appends it to a rolling buffer of length `VolPeriod`. Over that window it measures the mean and standard deviation, then converts the newest return into a standardized z-score:

```
z = (return - mean(returns)) / stdev(returns)    over the last VolPeriod bars
```

Expressing every observation in sigma units is what makes the detector volatility-adjusted: a 15-pip move in a quiet session and a 60-pip move in a volatile one can both map to the same z , so the same thresholds work across instruments and timeframes. If the window is perfectly flat (zero deviation), the bar carries no information and is skipped.

2. The two CUSUM accumulators

Two persistent running sums are carried across bars — one watching for an upward drift, one for a downward drift. On each bar they update as:

```
Cplus_i  = max(0,  Cplus_{i-1} + z_i - K)    // watches for UPWARD drift
Cminus_i = max(0,  Cminus_{i-1} - z_i - K)   // watches for DOWNWARD drift
```

The `max(0, ...)` floor prevents the sums from going negative, and subtracting the allowance K on every bar continuously bleeds off noise. As long as returns wander around zero, both sums stay pinned near zero. Only a sustained, same-signed excess lets a sum grow.

3. The entry signal

When an accumulator climbs above the decision interval H (`Threshold`), a change-point has been detected:

- **Cplus > H** → an upward regime shift is confirmed → go **LONG**
- **Cminus > H** → a downward regime shift is confirmed → go **SHORT**

Immediately after a signal fires, *both* sums are reset to zero — the standard CUSUM "restart" — so the next shift is measured from a clean slate. In the vanishingly rare case that both cross on the same bar, the upward signal wins the tie.

4. Position management & exits

The EA holds at most one position per symbol (identified by its **Magic** number) and manages exposure symmetrically:

- If a new signal **agrees** with the open position's direction, it is ignored — no pyramiding.
- If a new signal **opposes** the open position, that position is closed and the EA reverses into the new direction.
- Every trade carries a protective **stop-loss** and a **take-profit** set at entry (see below), so a position can also exit purely on price reaching one of those levels.

5. ATR-based stop & target

Trade risk is sized from the Average True Range of the just-completed bar:

```
risk distance = AtrStopMult × ATR(ATrPeriod)
LONG :  SL = entry - risk      TP = entry + RewardRiskRatio × risk
SHORT:  SL = entry + risk      TP = entry - RewardRiskRatio × risk
```

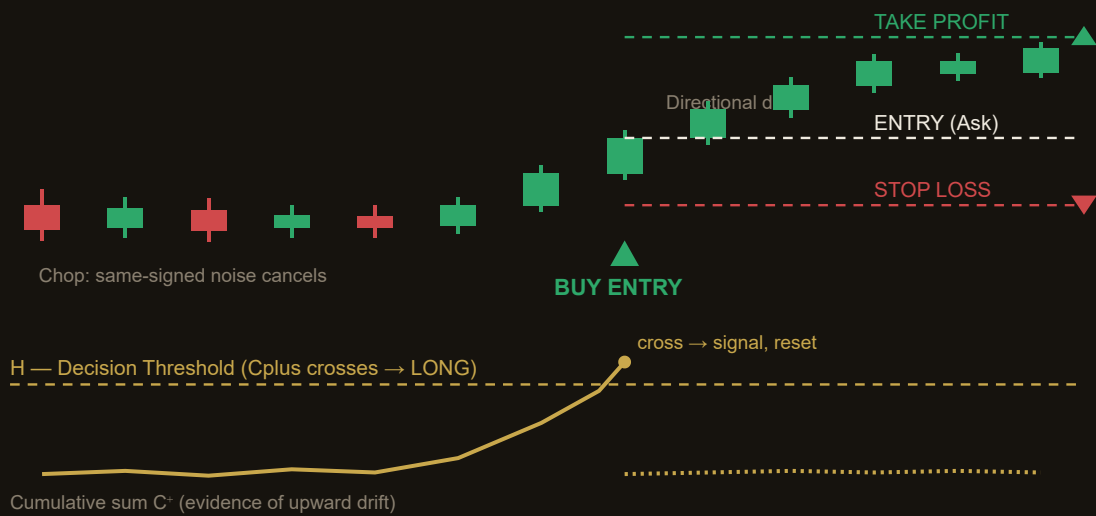
With the defaults, a long entry is protected by a stop 2 ATRs away and targets a profit 1.5× that distance (a 1.5:1 reward:risk framing).

Single-timeframe by design: every bar and indicator read uses the chart's own timeframe, so the strategy adapts to whatever timeframe you attach it to — there is no hidden higher-timeframe dependency to keep in sync.

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.

Cumulative Sum Drift Shift — evidence accumulates, then a regime shift fires



Illustrative example only. Actual market behaviour varies.

Parameters

Parameter	Default	Description
VolPeriod	20	Rolling window (bars) used to standardize returns into sigma units. Range 10–60, step 5. Smaller windows react faster but are noisier.
Slack	0.50	K — the CUSUM allowance / slack in sigma units subtracted each bar. Larger values ignore more noise before evidence accumulates. Range 0.10–1.50, step 0.10.
Threshold	5.0	H — the decision interval in sigma units a sum must exceed to confirm a shift. Larger values produce fewer, stronger signals. Range 2.0–10.0, step 0.5.
AtrPeriod	14	ATR window (bars) used to size the stop and target. Range 5–40, step 1.
AtrStopMult	2.0	Stop-loss distance expressed as this many ATRs from the entry price. Range 0.5–5.0, step 0.5.
RewardRiskRatio	1.5	Take-profit distance as a reward:risk multiple of the stop distance. Range 0.5–5.0, step 0.5.
Lots	0.10	Trade volume in lots. Range 0.01–1.0, step 0.05.
Magic	4816	Magic number used to identify and manage this EA's own positions.

Recommended Settings

Because returns are volatility-normalized, the defaults are a sensible starting point on most symbols and timeframes. As a baseline for evaluation:

- **Timeframe:** H1 offers a good balance — enough bars for the rolling window to be meaningful, without the microstructure noise of very low timeframes.
- **Instruments:** liquid FX majors (e.g. EUR/USD, GBP/USD) and major indices, where directional regimes form cleanly.
- **Sensitivity trade-off:** raise `Threshold` and/or `Slack` to demand stronger, rarer confirmation (fewer whipsaws, later entries); lower them to react sooner (more signals, more noise).

Example — tuning for a slower, higher-conviction profile

Set `VolPeriod = 30`, `Slack = 0.75`, and `Threshold = 7.0`. More noise is bled off each bar and a larger cumulative excess is required, so the EA only acts on well-established drifts. Pair with `AtrStopMult = 2.5` and `RewardRiskRatio = 2.0` to give those confirmed trends more room and a wider target.

Always validate first: backtest and forward-test any parameter set on your specific broker feed and instrument before considering live use. The Strategy Tester's optimization pass can sweep the ranges in the table above to explore the trade-off between signal frequency and quality.

How to Install on MetaTrader 5

- 1 Copy `CumulativeSumDriftShift.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

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