

Half Life Reversion Fade

Expert Advisor Documentation

PLATFORM

MetaTrader 5 (MT5)

TYPE

Mean Reversion (Regime-Gated)

TIMEFRAME

Any — M15–H1 recommended

WEBSITE

www.algoBot.live

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Overview

Half Life Reversion Fade is a mean-reversion Expert Advisor that fades stretched prices back toward their average — but only when the market is genuinely mean-reverting. Unconditional band and z-score faders fail because, in a trend or random walk, an “extreme” keeps extending and steadily bleeds the fader. Half Life Reversion Fade removes that failure mode by measuring, in real time, *how fast the market is actually reverting* before it commits to a trade.

To do this it fits a discrete **Ornstein-Uhlenbeck (AR(1)) process** to the recent closes and derives the reversion **half-life** — the number of bars it takes for a deviation from the mean to decay by half. A short half-life means fast, reliable reversion; a long (or absent) half-life means the market is trending and no trade is taken. Only inside a confirmed reversion regime does the EA fade the current stretch, targeting the mean as its profit objective with an ATR-based stop guarding against a genuine breakout.

The strategy operates on a single timeframe, reads all of its data from the chart it is attached to, and evaluates its logic once per closed bar. It maintains at most one open position per magic number at a time.

What makes it different: the reversion *half-life gate*. Most faders react to price being “far” from a mean. Half Life Reversion Fade first proves the mean is actually pulling price back — and pulling it back quickly — before it fades anything. When the market is trending, the gate simply stands the EA aside.

How It Works

On every newly closed bar the EA appends the bar to a rolling buffer and, once enough history is available, runs three sequential tests. A trade is placed only if *all* of them pass.

1. Fit the reversion regime (Ornstein-Uhlenbeck / AR(1))

Across the regression window (the last `RegPeriod` closes), the EA regresses each one-bar price change on the prior price level:

$$dX_t = \alpha + \beta \cdot X_{(t-1)} + e$$

The slope `beta` is estimated as `Cov(X, dX) / Var(X)`. Its sign is the regime signal:

- **`beta < 0`** — the level is being pulled back toward its mean: a *mean-reverting* regime. Trading is allowed.
- **`beta ≥ 0`** — the level tends to keep moving in the same direction: a trending / random-walk regime. The EA *stands aside*.

From `beta` the EA forms the AR(1) coefficient `phi = 1 + beta` and converts it into a reversion half-life in bars:

$$\text{half-life} = -\ln(2) / \ln(\text{phi})$$

If `phi ≤ 0` the series flips sign every bar — extremely fast reversion — and the half-life is treated as 1 bar. The trade is allowed only when the half-life is positive and no greater than `MaxHalfLife`. A half-life longer than that means reversion is too slow to be dependable, so the setup is rejected.

2. Measure the stretch (z-score)

Inside a confirmed reversion regime, the EA measures how far the latest close sits from the window mean, expressed in standard deviations:

```
mean = average of last RegPeriod closes
sd   = population standard deviation of that window
z    = (close - mean) / sd
```

A large negative `z` means price is stretched well below its mean; a large positive `z` means it is stretched well above. If the standard deviation is zero (a flat window), no trade is taken.

3. Fade the extreme

The entry rules are symmetric and mirror each other for long and short:

- **Long (buy)** — reversion regime confirmed *and* $z \leq -\text{EntryZ}$ (price stretched below the mean). Buy at the ask.
- **Short (sell)** — reversion regime confirmed *and* $z \geq +\text{EntryZ}$ (price stretched above the mean). Sell at the bid.

TAKE PROFIT — THE MEAN

Because the thesis is reversion, the take-profit is the **window mean** itself: the level price is statistically expected to return to. For a long, $\text{TP} = \text{mean}$ (above the entry); for a short, $\text{TP} = \text{mean}$ (below the entry). As a safety guard, if the mean happens to sit on the wrong side of the fill, the TP is placed one ATR-multiple away in the profitable direction instead.

STOP LOSS — ATR BEYOND THE EXTREME

The failure mode of any fader is a real breakout. To cut that quickly, the stop is set a volatility-scaled distance beyond the entry using the Average True Range:

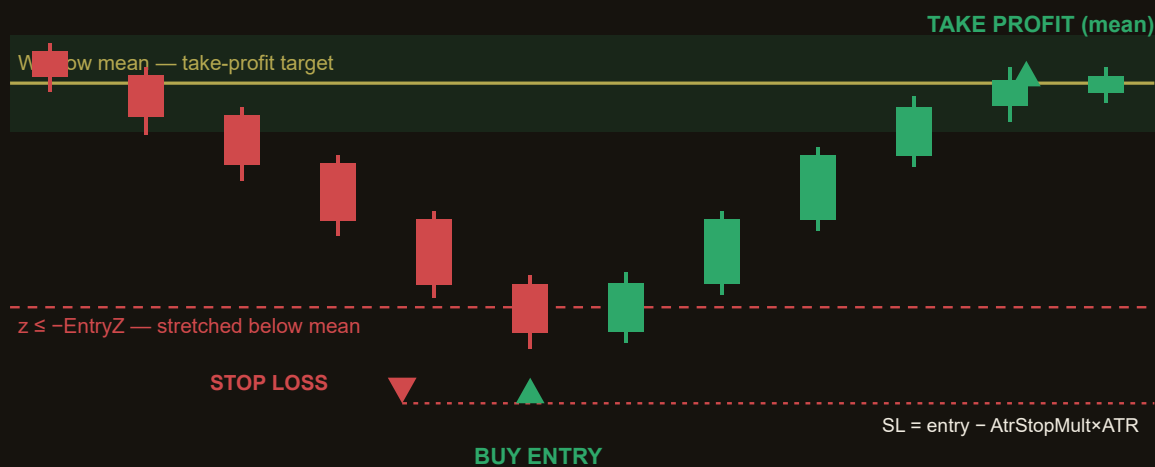
- **Long:** $\text{SL} = \text{entry} - \text{AtrStopMult} \cdot \text{ATR}$
- **Short:** $\text{SL} = \text{entry} + \text{AtrStopMult} \cdot \text{ATR}$

Execution cadence & position management: the EA acts only when a new bar opens (i.e. once the previous bar has closed), so all statistics are computed on completed data. It opens at most one position per magic number at a time — a fresh signal is ignored while a trade is already live.

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.

Reversion regime confirmed (short half-life) — fade allowed



Illustrative example only. Actual market behaviour varies.

Price stretches below the window mean until the z-score crosses the **-EntryZ** threshold. Because the Ornstein-Uhlenbeck fit confirms a short reversion half-life, the fade is permitted: the EA buys at the extreme, places a stop one ATR-multiple below, and targets the mean. Price reverts up to the mean, closing the trade in profit. The short side is the exact mirror image above the mean.

Parameters

Parameter	Default	Description
RegPeriod	40	Ornstein-Uhlenbeck / AR(1) regression window, in bars. Also the window used for the mean and standard deviation of the z-score. Range 20–120, step 5.
EntryZ	2.0	Stretch threshold in standard deviations. A trade is considered only when the close is at least this many z-scores from the window mean. Higher values demand more extreme stretches. Range 1.0–3.5, step 0.25.
MaxHalfLife	20.0	Maximum reversion half-life (in bars) the EA will accept. Setups whose measured half-life exceeds this are rejected as too slow / unreliable. Range 5.0–60.0, step 5.0.
AtrPeriod	14	Averaging period for the Average True Range used to size the stop loss. Range 5–30, step 1.
AtrStopMult	2.0	ATR multiplier for the stop-loss distance beyond the entry. Larger values give the fade more room; smaller values cut losers faster. Range 0.5–5.0, step 0.25.
Lots	0.10	Fixed order volume, in lots, for each position. Range 0.01–1.0, step 0.05.
Magic	7431	Magic number identifying this EA's trades. Used to enforce one open position at a time and to keep positions isolated from other EAs on the same account.

Recommended Settings

The strategy is designed for range-bound, mean-reverting conditions. The reversion gate will suppress trading during trends, so it pairs best with instruments and sessions that spend time oscillating around a level.

- **Symbols:** liquid, range-prone major FX pairs (e.g. EUR/USD, USD/JPY) and mean-reverting cross rates.
- **Timeframe:** M15 to H1. Lower timeframes offer more setups but noisier half-life estimates; higher timeframes yield fewer, cleaner reversions.
- **RegPeriod:** 40 is a balanced default. Shorten toward 20–30 for faster, more reactive windows; lengthen toward 60–120 for smoother, slower regimes.
- **EntryZ:** 2.0 fades roughly two-sigma stretches. Raise to 2.5–3.0 for rarer, more extreme entries; lower toward 1.5 for more frequent, shallower fades.
- **MaxHalfLife:** 20 bars keeps the EA in genuinely fast reversion. Loosen toward 30–40 to accept more setups; tighten toward 5–10 for only the sharpest reversions.
- **AtrStopMult:** 2.0 balances survivability against loss size. Increase in choppy markets, decrease if breakouts are cutting deeply.

Example configuration — EUR/USD, M30

`RegPeriod = 40` , `EntryZ = 2.0` , `MaxHalfLife = 20` , `AtrPeriod = 14` , `AtrStopMult = 2.0` , `Lots = 0.10` . The EA fits an OU process over the last 40 M30 closes; if reversion is confirmed with a half-life of 20 bars or less and price is stretched at least two standard deviations from the mean, it fades back toward the mean with a stop two ATR beyond the extreme.

Tip: always run a backtest and a period of forward (demo) testing on your specific broker's data before committing real capital. Optimise `RegPeriod` , `EntryZ` and `MaxHalfLife` together — they jointly determine how selective the regime gate is and how many trades you will see.

How to Install on MetaTrader 5

- 1 Copy `HalfLifeReversionFade.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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