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Center Of Gravity Oscillator Reversal

Expert Advisor Documentation

PLATFORM	TYPE	TIMEFRAME	WEBSITE
MetaTrader 5 (MT5)	Mean Reversion (Cycle Oscillator)	M15 – H1 (Intraday)	www.algobot.live

> ⚠ **Important Disclaimer** This document is for educational and informational purposes only. It does not constitute financial or investment advice. Trading forex, CFDs, and other leveraged instruments involves substantial risk of loss and is not suitable for all investors. Past backtest performance does not guarantee future results. Never trade with capital you cannot afford to lose.

Overview

Center Of Gravity Oscillator Reversal is a mean-reversion swing strategy built on John Ehlers' *Center of Gravity* (COG) oscillator — a low-lag indicator designed to catch the turning points of a price cycle. Rather than chasing trends, the EA waits for a cyclic swing to exhaust itself and reverse, then enters in the direction of the emerging bounce.

The "center of gravity" of a rolling price window is the price-weighted average position of the bars inside it. Over the last `CgPeriod` median prices (P[i], where i = 0 is the newest bar) the raw value is computed as:

```
CG = −( Σ (1 + i)·P[i] ) / ( Σ P[i] )  +  (N + 1) / 2
```

The `+(N+1)/2` centring term makes COG oscillate around zero: it reads **positive** when the price mass leans toward the most recent bars (relative strength) and **negative** when it leans toward the older bars (relative weakness). Because it is a *ratio of price sums*, the oscillator is naturally normalised — it does not scale with the absolute price level, so identical thresholds behave consistently across EUR/USD, XAU/USD, and other instruments.

The strategy is best suited to **ranging or cyclic majors and metals** (e.g. EUR/USD, XAU/USD) on intraday timeframes, but the code is entirely timeframe-agnostic and will run on whatever primary timeframe the chart or backtest selects.

> **Why smooth the oscillator?** The raw COG can be jittery bar-to-bar. The EA applies an exponential moving average (EMA) of length `SmoothPeriod` to the raw value, producing a cleaner line whose local minima and maxima correspond to genuine cycle turns rather than tick noise.

How It Works

Bar-by-Bar Processing

The EA acts **once per closed bar**. On each new bar it records the freshly-closed candle, computes the median price `(High + Low) / 2`, and appends it to a rolling window (capped at 800 bars for memory efficiency). No action is taken until at least `CgPeriod` median prices are available.

Oscillator Construction

- **Raw COG** — computed over the last `CgPeriod` median prices using the centred formula above. Older bars carry a larger index weight, and the centring term keeps the output oscillating around zero.
- **EMA smoothing** — the raw COG is passed through an EMA with `alpha = 2 / (SmoothPeriod + 1)`. The smoothed value is stored in a history buffer so that turning points can be confirmed.

Turning-Point Detection

The EA needs **three consecutive smoothed values** to confirm a pivot at the *middle* one. Label them `s2` (t−2), `s1` (t−1, the candidate pivot), and `s0` (t, the confirmation):

```
troughUp = (s2 >= s1) && (s0 > s1) && (s1 < 0)   // local minimum below zero
peakDown = (s2 <= s1) && (s0 < s1) && (s1 > 0)   // local maximum above zero
```

Entry Logic

- **LONG** — triggered when a smoothed COG **trough** is confirmed (a local minimum) *while the oscillator is below zero*. This marks a cyclic swing low forming in the lower half of the cycle — the EA "buys the dip" at market (Ask).
- **SHORT** — triggered when a smoothed COG **peak** is confirmed (a local maximum) *while the oscillator is above zero*. This marks a cyclic swing high forming in the upper half of the cycle — the EA "sells the rally" at market (Bid).

Only **one live position per magic number** is permitted at a time. While a trade is open, no new signals are acted upon — the position is left entirely to its stop-loss and take-profit to manage.

Stops & Targets (ATR-Scaled)

Risk adapts to current volatility using the Average True Range of the just-closed bar:

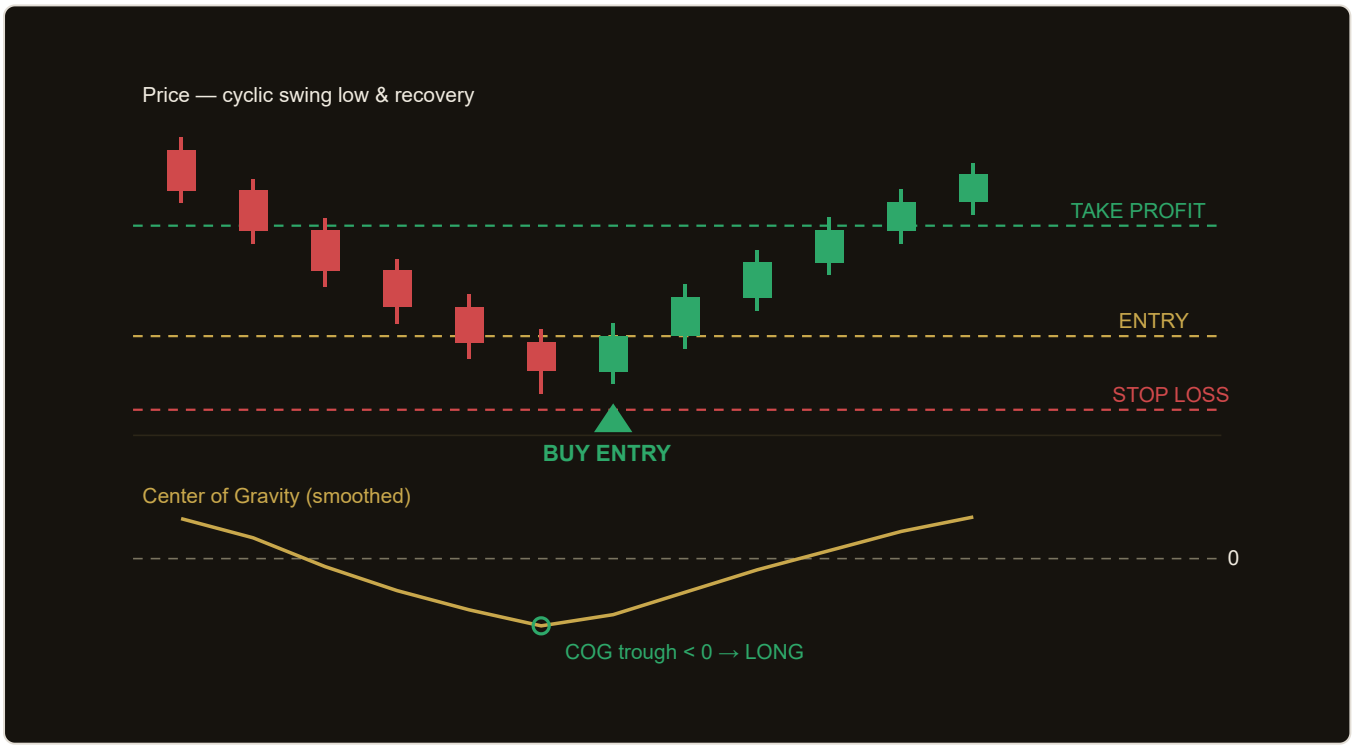
- **Stop distance** = `ATR × StopMult`
- **Long:** SL = entry − stopDist, TP = entry + stopDist × `RewardRatio`
- **Short:** SL = entry + stopDist, TP = entry − stopDist × `RewardRatio`

Because the stop scales with ATR, the same parameter set self-adjusts between calm and volatile market conditions. If ATR (or the resulting stop distance) is not positive, the signal is skipped.

> **Signal at a glance:** confirmed COG trough below zero → **buy**; confirmed COG peak above zero → **sell**. Every trade carries a fixed, ATR-based SL and a reward-multiple TP set the moment it opens.

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.

In this example the smoothed COG falls into negative territory and carves a **local minimum (trough)** below the zero line. The moment the next value ticks higher, the pivot is confirmed and the EA buys at market. A stop is placed one ATR-multiple below the entry, and the take-profit is set at `RewardRatio` times that distance above it — here the recovering swing carries price up to the target.

Parameters

Parameter	Default	Description
CgPeriod	`10`	Number of median prices in the Center of Gravity window. Larger values track slower cycles; range 5–40.
SmoothPeriod	`3`	EMA smoothing period applied to the raw COG. Higher values reduce noise but add lag; range 1–12.
AtrPeriod	`14`	ATR lookback used to scale the stop-loss and take-profit distances; range 5–50.
StopMult	`1.6`	ATR multiple that sets the stop distance (stopDist = ATR × StopMult); range 0.5–4.0.
RewardRatio	`1.5`	Reward-to-risk multiple. Take-profit distance = stop distance × RewardRatio; range 0.5–5.0.
Lots	`0.10`	Fixed trade volume in lots; range 0.01–1.0.
Magic	`5120`	Magic number identifying this EA's positions, so it manages only its own trades.

> **Tuning tip:** `CgPeriod` and `SmoothPeriod` together define how the oscillator "breathes." Shorter periods make it more reactive (more signals, more noise); longer periods produce fewer, cleaner turns. Adjust them to match the dominant cycle length of the instrument and timeframe you trade.

Recommended Settings

The defaults are a balanced starting point for intraday trading on cyclic majors and metals. Consider the following guidance before deploying:

- **Instruments:** ranging or cyclic majors and metals such as **EUR/USD** and **XAU/USD**. The normalised oscillator lets the same thresholds work across instruments.
- **Timeframe:** intraday charts (**M15–H1**) tend to expose the clearest cycles for a COG-based reversal system, though the code runs on any timeframe.
- **Market condition:** the strategy is designed for **ranging / mean-reverting** conditions. In strong, persistent trends a reversal system can be repeatedly stopped out, so favour conditions where price oscillates around a mean.
- **Risk:** keep `Lots` conservative relative to account size. With `RewardRatio = 1.5` the target is 1.5× the risk on each trade.

Example configuration — XAU/USD, M15

CgPeriod = 10, SmoothPeriod = 3, AtrPeriod = 14, StopMult = 1.8, RewardRatio = 1.5, Lots = 0.05. A slightly wider `StopMult` gives gold's larger intraday swings more breathing room before the stop is hit.

Always backtest first. Run the EA in the MT5 Strategy Tester across a representative date range and, ideally, forward-test on a demo account before committing real capital. Optimise `CgPeriod`, `SmoothPeriod`, and `StopMult` to your chosen instrument rather than assuming the defaults are optimal.

How to Install on MetaTrader 5

1. Copy `CenterOfGravityOscillatorReversal.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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