PSEDYS | TECHNICAL REFERENCE MANUAL V3.0

EMA — Technical Reference Manual v3.0

EMA — Technical Reference Manual v3.0

PSEDYS | Complete Corrected Edition

Formula · Variants · Lag · Spikes · Cold Start · Ribbon · Divergence · MTF · Bot vs TradingView

CONTENTS

1. What is EMA? Definition, Concept, EMA vs SMA
2. Calculation Formula — 3 Steps + Complete Numeric Example (corrected)
   - 2.1 Multiplier K
   - 2.2 First EMA Value (Seed)
   - 2.3 Recursive Formula
   - 2.4 Complete Numeric Example — EMA 9 (12 candles)
   - 2.5 Technical Implications for Algorithm
   - 2.6 Cold Start and Restart Feed
   - 2.7 Wilder's Smoothing (RMA/SMMA) — K = 1/N
   - 2.8 EMA on Different Price Sources
3. EMA Lag — Quantified and Compared to SMA
4. Sensitivity to Spikes and Outliers
5. Standard EMA Values and Their Role on the Chart
6. Trading Signals — Bullish, Bearish, Neutral
   - 6.1 Golden Cross and Death Cross + False Crossover Filters
   - 6.2 EMA as Dynamic Support and Resistance
   - 6.3 EMA Ribbon — The EMA Fan
   - 6.4 EMA Divergence from Price
7. EMA Slope — Formula, Context, Calibration
8. Multi-Timeframe Analysis (MTF) — Complete and Partial Scenarios
9. Flat EMA (Sideways Market)
10. Bot vs TradingView Validation
11. Practical Exercises with Complete Answers
12. Cheat Sheet — Quick Summary

1. What is EMA? Definition, Concept, EMA vs SMA

The Exponential Moving Average (EMA) is a **trend-following** indicator that calculates the average price of an asset by giving more weight to recent data. Unlike the Simple Moving

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Average (SMA), which treats all candles in the interval with equal weight, EMA applies a weight that decreases **exponentially** for older data.

On the chart, it appears as a smooth line that smooths out price fluctuations to highlight the trend direction.

Note: EMA confirms an existing trend, it does not predict it. The larger the timeframe, the stronger the EMA signal.

EMA vs SMA — Technical Comparison

Feature	EMA	SMA
Weight of recent data	Exponentially higher	Uniform (equal)
Reaction to current price	Aggressive	Uniform
Sensitivity to spikes	High — spike distorts immediately	Low — spike diluted over N bars
Lag (center of mass)	(N−1)/2 bars (identical to SMA!)	(N−1)/2 bars
Half-life (weight halves)	ln(0.5)/ln(1−K) bars (much smaller)	N/2 bars
Trend behavior	Stays closer to price	More lagged behind price
Sideways behavior	More whipsaws	Fewer whipsaws
Ideal for	Entry timing, immediate momentum	Trend confirmation, macro filters

> **Key Conclusion:** EMA does not reduce lag compared to SMA of the same period — the centers of mass are identical. The real advantage of EMA is that it **reacts more aggressively to recent price** through the exponential distribution of weights, not through a smaller lag in absolute terms. A trader who believes that EMA 50 has a lag of ~5 bars (compared to ~25 of SMA 50) misjudges the indicator.

---

2. Calculation Formula — 3 Steps

2.1 Step 1 — Multiplier K

The multiplier K determines how much weight the EMA gives to the most recent price. The smaller the N, the larger the K, and the faster the EMA reacts.

```
K = 2 / (N + 1)
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

EMA	K Formula	Exact Value	Current Price Weight
EMA 9	2 / (9+1)	0.200000	20.0000%
EMA 20	2 / (20+1)	0.095238	~9.5238%
EMA 50	2 / (50+1)	0.039216	~3.9216%
EMA 100	2 / (100+1)	0.019802	~1.9802%
EMA 200	2 / (200+1)	0.009950	~0.9950%

Interpretation: EMA 9 gives 20% weight to the current price — it reacts extremely quickly to any movement. EMA 200 gives less than 1% — it is extremely stable, hard to move.

2.2 Step 2 — First EMA Value (Seed)

The EMA formula is recursive: each value depends on the previous one. The first value cannot be an EMA (no previous EMA exists). By universal convention:

```
EMA_seed = (P₁ + P₂ + P₃ + ... + Pₙ) / N   ← SMA of the first N candles
```

Example for EMA 9 (prices: 100, 102, 101, 103, 105, 104, 106, 108, 107):

```
EMA_seed = (100 + 102 + 101 + 103 + 105 + 104 + 106 + 108 + 107) / 9
         = 936 / 9
         = 104.00
```

2.3 Step 3 — Recursive EMA Formula

```
EMA_current = EMA_previous + K × (Current_Price − EMA_previous)
```

Algebraic equivalent (expanded form):

```
EMA_current = (Current_Price × K) + (EMA_previous × (1 − K))
```

Both forms are mathematically identical. The first form (delta) is more computationally efficient.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

2.4 Complete Numerical Example — EMA 9 (K = 0.200)

Candle #	Close Price	EMA 9	Detailed Calculation
1	100.00	N/A	Seed: accumulating SMA
2	102.00	N/A	Seed: accumulating SMA
3	101.00	N/A	Seed: accumulating SMA
4	103.00	N/A	Seed: accumulating SMA
5	105.00	N/A	Seed: accumulating SMA
6	104.00	N/A	Seed: accumulating SMA
7	106.00	N/A	Seed: accumulating SMA
8	108.00	N/A	Seed: accumulating SMA
9	107.00	**104.000**	SMA(9) = 936/9 = 104.000 [SEED]
10	110.00	**105.200**	104.000 + 0.20 × (110.00 − 104.000) = 104.000 + 1.200 = **105.200**
11	108.00	**105.760**	105.200 + 0.20 × (108.00 − 105.200) = 105.200 + 0.560 = **105.760**
12	112.00	**107.008**	105.760 + 0.20 × (112.00 − 105.760) = 105.760 + 1.248 = **107.008**
13	115.00	**108.606**	107.008 + 0.20 × (115.00 − 107.008) = 107.008 + 1.598 = **108.606**
14	113.00	**109.485**	108.606 + 0.20 × (113.00 − 108.606) = 108.606 + 0.879 = **109.485**
15	116.00	**110.788**	109.485 + 0.20 × (116.00 − 109.485) = 109.485 + 1.303 = **110.788**

> **Note v3.0:** Candle 12 was incorrect in the previous version (displayed value: 107.41). The correct value is **107.008**. The error stemmed from an incorrect intermediate rounding — calculations must be done with full precision and rounded only at final display.

2.5 Technical Implications for Algorithm

Memory effect: EMA does not "forget" any past price. Each value contains a microscopic fraction of all previous prices, decreasing exponentially over time.

Warm-up period: The first N bars generate the SMA seed. Bar N+1 produces the first true EMA. However, EMA values in the first ~2×N bars are influenced by the seed and have reduced

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

precision. **Rule of thumb: calculate EMA on at least 2×N historical bars before using the signal.**

EMA	Recommended Minimum Bars
EMA 9	18+ bars
EMA 20	40+ bars
EMA 50	100+ bars
EMA 200	400+ bars

Candle CLOSED mandatory: The bot calculates EMA ONLY on closed candles (closed candle[-1]), never on the currently open candle. The value of the ongoing candle changes continuously and produces false signals (repainting).

2.6 Cold Start and Restart Feed

This is one of the most common sources of bot vs. TradingView divergence, rarely documented.

Problem: If the bot restarts or receives a new feed (e.g., WebSocket reconnection after a disruption), the EMA seed calculated on the available data at the time of restart may differ significantly from the "true" EMA — that is, the EMA calculated with 400+ complete bars from origin.

Why divergence occurs:

```
Example EMA 200:
- TradingView: calculated from 2+ years of data → seed from 2022 → stabilized EMA
- Bot after restart with 400 bars: seed calculated from bar 0 of the buffer → different
- Typical difference: 0.1% – 0.8% depending on the trend during the warm-up period
```

Correct cold start procedure:
1. At start, download at least 2×N historical bars (for EMA 200 → 400 bars)
2. Calculate seed = SMA of the first N bars
3. Apply the recursive formula on all bars in the buffer
4. Invalidate signals generated in the first N bars (until warm-up completes)
5. Bar N+1 is the first valid signal bar

Robust solution — double warm-up:
Some implementations use 3×N or 10×N bars to minimize seed impact. The longer the warm-up period, the more securely the EMA converges to the "true" value. Cost: increased memory and start time.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

2.7 Wilder's Smoothing (RMA / SMMA) — K = 1/N

This is the most important EMA variant to know in bot trading context, because RSI, ATR, and ADX — all key indicators in the PSEDYS strategy — use Wilder's Smoothing, not standard EMA.

Wilder's multiplier formula:

```
K_wilder = 1 / N          ← Wilder's RMA / SMMA
K_standard = 2 / (N + 1)  ← Classic EMA
```

Period N	Standard K (EMA)	Wilder K (RMA)	Relative Difference
9	0.2000 (20.00%)	0.1111 (11.11%)	Standard EMA is 80% faster
14	0.1333 (13.33%)	0.0714 (7.14%)	Standard EMA is 87% faster
21	0.0952 (9.52%)	0.0476 (4.76%)	Standard EMA is 100% faster
50	0.0392 (3.92%)	0.0200 (2.00%)	Standard EMA is 96% faster

Half-life comparison (period after which the weight of an old price drops to 50%):

Period N	Half-life Standard EMA	Half-life Wilder RMA
9	3.11 bars	5.88 bars
14	4.84 bars	9.35 bars
21	7.04 bars	14.27 bars
50	17.33 bars	34.31 bars

Wilder RMA is ~2× slower than the standard EMA of the same period.

Practical impact — why it matters:

If the bot calculates ATR(14) with the standard K (`K = 2/15`) instead of Wilder's K (`K = 1/14`), ATR values will be **~30–50% more reactive** compared to TradingView. The same applies to ADX and RSI. Consequence: strategy thresholds (e.g., ADX > 18) will trigger at different times compared to what the trader sees on the chart.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
# WRONG — for ATR, ADX, RSI:
K = 2 / (period + 1)   # Standard EMA

# CORRECT — for ATR, ADX, RSI:
K = 1 / period          # Wilder's RMA

# CORRECT — for classic EMA on price (EMA 20, EMA 50, etc.):
K = 2 / (period + 1)   # Standard EMA
```

Summary: when to use what:

Indicator	K Formula	Name
EMA 9, 20, 50, 100, 200 on price	`2/(N+1)`	Standard EMA
RSI (internal smoothing)	`1/N`	Wilder RMA
ATR	`1/N`	Wilder RMA
ADX, +DI, −DI	`1/N`	Wilder RMA
DEMA, TEMA	`2/(N+1)` twice/thrice	EMA Variants

2.8 EMA on Different Price Sources

Standard PSEDYS EMA is calculated on **closing price (close)**. There are variants that use other sources:

Price Source	Formula	Characteristic
Close	`C`	Standard — most used
HL2 (median)	`(H + L) / 2`	Symmetric to the bar range
HLC3 (typical)	`(H + L + C) / 3`	More representative for volume
OHLC4 (average)	`(O + H + L + C) / 4`	Smoother, slower
HLCC4 (weighted)	`(H + L + C + C) / 4`	Double emphasis on close

Practical impact: If the bot and TradingView use different sources, the EMAs **will never coincide**, regardless of parameters. Explicitly check the platform setting (TradingView default = close for EMA, HLC3 for some VWAP-adjacent variants).

PSEDYS Rule: All EMAs in the strategy are calculated on **close**. No other source is used without explicit documentation.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

3. EMA Lag — Quantified and Compared with SMA

This is one of the most common misconceptions about EMA.

3.1 Lag as Center of Mass

The lag of a moving average indicator is measured by the **center of mass** of the weight distribution — the weighted average of temporal positions.

Mathematical Calculation:

```
SMA(N):  lag = (N − 1) / 2 bars   ← equal weights, center exactly in the middle

EMA(N):  lag = (1 − K) / K bars   = (N − 1) / 2 bars   [with K = 2/(N+1)]
```

Result: The lag as the center of mass is **identical** for EMA and SMA of the same period N.

EMA/SMA	Lag Center of Mass	Half-life EMA	Half-life SMA
N = 9	4.00 bars	3.11 bars	4.5 bars
N = 20	9.50 bars	6.93 bars	10.0 bars
N = 50	24.50 bars	17.33 bars	25.0 bars
N = 200	99.50 bars	69.31 bars	100.0 bars

3.2 Where EMA is Actually Faster: Half-life

Although the average lag is identical, the **half-life** of EMA is about ~30% shorter than that of SMA. This means that EMA "forgets" old data faster and **reacts visibly more aggressively to recent price changes**, even if the weighted average remains at the same temporal distance.

Conclusion: EMA does not reduce lag — it redistributes weights towards the recent. Visible effect: EMA follows the price more closely in an active trend but generates more whipsaws in sideways compared to SMA of the same period.

---

4. Sensitivity to Spikes and Outliers

EMA is **more vulnerable to extreme spikes** than SMA. The explanation is straightforward: the coefficient K gives a disproportionately large weight to the current price compared to the entire previous history.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

4.1 Spike Example on EMA 9 (K = 0.20)

```
Current EMA = 50,000 USD
Extreme spike on a single bar: price = 60,000 USD (+20%)

EMA after spike = 50,000 + 0.20 × (60,000 − 50,000) = 50,000 + 2,000 = 52,000
→ EMA jumps by 4% on a single bar
→ Requires ~5 normal bars to return to the pre-spike level
```

Comparison with SMA 9:

```
SMA 9 after spike = (50,000×8 + 60,000) / 9 ≈ 51,111
→ Spike diluted to ~2.2% of the SMA value
→ Automatically returns when the spike bar exits the window (after 9 bars)
```

4.2 Types of Spikes in Crypto

Spike Type	Risk for EMA	Typical Causes
Flash crash (wick down)	EMA drops sharply → false negative slope	Cascade liquidations, exchange errors
Instant pump (wick up)	EMA rises → false positive slope	Manipulation, whale buy
Opening gap (weekends)	N/A (crypto 24/7)	Irrelevant for crypto
Extreme wick on 4H candle	Significant distortion of EMA 20/50	Macro news, FOMC, massive liquidations

4.3 Recommended Filters for Spikes

If the current bar has a range (High − Low) greater than 3× ATR(14), the EMA signal generated on that bar or immediately after should be invalidated or treated with increased caution:

```
# Simple spike filter:
spike = (candle_high - candle_low) > 3 * atr_14
if spike:
    skip_ema_signal = True   # do not execute signal on the spike bar
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

5. Standard EMA Values and Their Role on the Chart

5.1 Complete Table — EMA 9 / 20 / 50 / 100 / 200

EMA	Speed	Main Role	Who Watches It	Ideal Timeframe
EMA 9	Ultra-fast	Immediate momentum, entry/ exit scalp	Scalpers, HFT bots	1M, 3M, 5M
EMA 20	Fast	Short-term session trend	Intraday traders	5M, 15M, 30M
EMA 50	Medium	Swing trend, dynamic support/ resistance	Swing traders	15M, 1H, 4H
EMA 100	Slow	Medium-term trend, macro intraday filter	Positional traders	1H, 4H
EMA 200	Ultra-slow	Bull/bear separator, major macro trend	Institutions, funds, banks	4H, 1D, 1W

5.2 PSEDYS Adapted EMA Values on Timeframes

TF	EMAs Used	ROLE IN PSEDYS	Condition
1M	EMA 9, EMA 20	Ultra-fast scalp / Instant momentum	Instant entry/exit
5M	EMA 9, EMA 20, EMA 50	ENTRY SIGNAL (Standard PSEDYS)	price > EMA20 > EMA50, both sloping up → LONG
15M	EMA 20, EMA 50	TREND FILTER (Mandatory confirmation)	price > EMA20 > EMA50 → LONG bias confirmed
1H	EMA 20, EMA 50, EMA 200	Swing trading / Medium-term trend	price > EMA200 → macro bullish
4H	EMA 50, EMA 200	MACRO DIRECTION (Main filter)	price > EMA200 → LONG only / price < EMA200 → SHORT only
1D	EMA 50, EMA 100, EMA 200	Global macro context	EMA 200 Daily = absolute bull/bear separation line

6. Trading Signals — Bullish, Bearish, Neutral

BULLISH Signals — Long

- Price breaks above EMA from below (breakout) on increased volume and candle closed above

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

- Smaller EMA crosses above larger EMA → Golden Cross
- Price pulls back to EMA and bounces → EMA acts as dynamic support
- EMAs aligned: EMA_fast > EMA_mid > EMA_slow → confirmed bullish stack
- EMA sloping upward and widening distance from slower EMA → active momentum
- On 15M: price > EMA20 > EMA50, both sloping up → Long trend confirmed

BEARISH Signals — Short

- Price falls below EMA from above (breakdown) confirmed on closed candle
- Smaller EMA crosses below larger EMA → Death Cross
- Price retests EMA from below and rejects → EMA acts as dynamic resistance
- EMAs aligned inversely: EMA_fast < EMA_mid < EMA_slow → bearish stack
- EMA sloping downward with increasing distance from price
- On 15M: price < EMA20 < EMA50, both sloping down → Short trend confirmed

NEUTRAL / To Avoid

- Flat and repeatedly crossed EMAs → sideways/chop → DO NOT trade
- Choppiness Index > 61.8 combined with flat EMA → MANDATORY SKIP (PSEDYS)
- ADX < 18 on 5M or < 20 on 15M → weak trend, avoid entry
- Price oscillates chaotically above and below EMA without clear direction

6.1 Golden Cross and Death Cross + False Crossover Filters

Definitions:

Signal	Definition	Timeframe	Significance
GOLDEN CROSS	EMA 50 crosses EMA 200 from BELOW to ABOVE	4H or 1D for major signal	Long-term BULLISH trend change
DEATH CROSS	EMA 50 crosses EMA 200 from ABOVE to BELOW	4H or 1D for major signal	Long-term BEARISH trend change
MINI CROSS	EMA 9 crosses EMA 20 on small TF	5M, 15M for intraday entry	Tactical entry/exit signal

Filters for False Crossover (Whipsaws):

A false crossover occurs when two EMAs cross repeatedly in a short interval without a real trend. Mandatory filters for validating a crossover:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
1. CANDLE CLOSED CONFIRMATION:
   Valid crossover = EMA_fast has crossed EMA_slow on a CLOSED candle.
   Intra-bar crossing (wicks touching) → DO NOT count.

2. MINIMUM SPREAD:
   At the time of crossover: |EMA_fast − EMA_slow| / EMA_slow × 100 > 0.05%
   Crossover with spread < 0.05% = compression zones → high probability of whipsaw.

3. ADX AT CROSSOVER:
   ADX > 18 on 5M / ADX > 20 on 15M at or immediately after crossover.
   Crossover with ADX < threshold = non-trending market → invalid signal.

4. CONSISTENT DIRECTION (anti-chop):
   Last 3 closed candles before crossover must be in the direction of the crossover:
   → Golden Cross: last 3 bars have rising close
   → Death Cross: last 3 bars have falling close

5. CHOPPINESS INDEX:
   Choppiness < 61.8 at the time of crossover.
```

If all 5 conditions are met → high probability crossover. If any of the first 3 fail → mandatory skip.

6.2 EMA as Dynamic Support and Resistance

Unlike static S/R levels (horizontal lines), EMA provides **dynamic** levels — moving with price and trend.

In a bullish trend: EMA acts as dynamic SUPPORT. Price pulls back to EMA, touches it, and bounces up. Optimal entry = at EMA touch in confirmed bullish trend.

In a bearish trend: EMA acts as dynamic RESISTANCE. Price rises to EMA, touches it, and rejects down. Optimal short entry = at EMA retest in confirmed bearish trend.

In sideways: EMA loses its role as dynamic S/R. Price repeatedly pierces it in both directions without significance. EMA is not used as a reference level in range.

EMA strength as S/R level is proportional to:
- EMA period (EMA 200 > EMA 50 > EMA 20 in magnitude)
- Timeframe (4H EMA 200 > 5M EMA 200)
- Number of previous touches without breach (more bounces = more tested level = stronger)
- Volume at touch (bounce on high volume = stronger confirmation)

6.3 EMA Ribbon — EMA Fan

EMA Ribbon = multiple EMAs displayed simultaneously on the same chart. The relative configuration of the "fan" communicates the strength and stage of the trend, not just direction.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Main configurations:

```
BULLISH EXPANSION (active bullish trend):
EMA9 > EMA20 > EMA50 > EMA200 with INCREASING distances between them
→ Trend accelerates, increasing momentum
→ Ideal context for long entry, NOT for fade

BULLISH COMPRESSION (trend weakening / pullback):
EMA9 ≈ EMA20 ≈ EMA50, all close to EMA200
→ Trend temporarily halts, possible consolidation
→ Caution: breakout in either direction imminent

BEARISH EXPANSION (active bearish trend):
EMA9 < EMA20 < EMA50 < EMA200 with INCREASING distances
→ Bearish trend accelerates
→ Ideal context for short, NOT for long countertrend

BEARISH COMPRESSION (inverse of bullish expansion):
Similar to bullish compression but below EMA200

DIVERGENT FAN (disorder / transition):
EMAs crossed chaotically, without clear order
→ Transition regime or extreme choppy
→ TOTAL SKIP according to PSEDYS rules
```

Distance between EMAs as a measure of momentum:

```
# Bullish ribbon expansion indicator:
ribbon_spread = (ema9 - ema50) / ema50 * 100
# > +0.5%  → active bullish momentum
# 0 – 0.5% → weak momentum / consolidation
# < 0%     → bearish ribbon (reversal)
```

6.4 EMA Divergence from Price

Divergence occurs when price and EMA move in opposite directions — a signal of trend exhaustion before reversal.

Bearish divergence (top signaled):

```
Price: Higher High (makes a new higher peak)
EMA:  Lower High (EMA peak is lower than previous)
→ Decreasing momentum, even if price rises
→ Probability of significant reversal or pullback
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Bullish divergence (bottom signaled):

```
Price: Lower Low (makes a new lower minimum)
EMA:  Higher Low (EMA minimum is higher than previous)
→ Weakening bearish momentum, even if price falls
→ Probability of significant reversal or bounce
```

Hidden bullish divergence (trend continuation):

```
Price: Higher Low (smaller pullback)
EMA:  Lower Low (EMA falls lower in pullback)
→ Signal that bullish trend continues after pullback
```

Conditions for validating EMA divergence:
1. Divergence is measured on **significant peaks and troughs**, not on any oscillation
2. EMA used: EMA 20 or EMA 50 (not EMA 9 — too noisy)
3. Divergence timeframe: minimum 15M (on 5M → frequent false signals)
4. Confirmation: divergence is confirmed with closed candle in reversal direction, not on mere appearance

---

7. EMA Slope — Formula, Context, Calibration

EMA slope measures the **rate of change** of the EMA value over a defined period, expressed as a percentage.

7.1 Available Formulas

Original PSEDYS Formula (Rate of Change over 2 periods):

```
slope = (ema[-1] - ema[-3]) / ema[-3] * 100
# ema[-1] = current bar (last closed)
# ema[-3] = bar from 2 periods ago
# Measures percentage change over 2 bars
```

Technical Note: Index `[-3]` represents the third bar from the end of the series — thus measuring change over **2 intervals** (from [-3] to [-1]), not 1. It is more stable than 1-period but slower than 3-period.

Alternative Formula — Rate of Change over 1 period (more sensitive):

```
slope_1p = (ema[-1] - ema[-2]) / ema[-2] * 100
# More reactive, noisier on small TFs
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Robust Formula — normalized on ATR (recommended for multi-asset):

```
slope_atr = (ema[-1] - ema[-2]) / atr14[-1] * 100
# Independent of the asset's absolute price
# Threshold: > +0.10 = valid bullish | < -0.10 = valid bearish
```

7.2 Fixed Threshold Issue of 0.05%

The threshold of `±0.05%` works in the specific context for which it was calibrated. The issue arises when applied uniformly to assets with very different volatility.

Asset	Typical Price	0.05% of EMA20	Interpretation
BTC	~90,000 USD	~45 USD move	Reasonable on 5M
ETH	~3,500 USD	~1.75 USD	Reasonable on 5M
Mid-cap Altcoin	~0.50 USD	~0.0025 USD	Possibly too sensitive
Micro Altcoin	~0.0010 USD	~0.0000005 USD	Practically unusable

Solution: adaptive calibration based on ATR:

```
# Dynamic threshold:
atr_pct = atr14 / ema20 * 100          # ATR as % of EMA20
slope_threshold = atr_pct * 0.05        # 5% of ATR in %

# Or simply: slope_threshold = max(0.02, min(0.15, atr_pct * 0.05))
# Clamped between 0.02% and 0.15% for stability
```

PSEDYS Recommendation on crypto mid-cap:
The threshold of `±0.05%` remains valid for assets with ATR% in the range of 0.3%–2.0% on 5M. Outside this range, recalibration is necessary.

7.3 Slope Interpretation per Timeframe

Timeframe	Bullish Slope	Flat Slope (skip)	Bearish Slope
5M	> +0.05%	−0.05% → +0.05%	< −0.05%
15M	> +0.03%	−0.03% → +0.03%	< −0.03%
1H	> +0.02%	−0.02% → +0.02%	< −0.02%
4H	> +0.01%	−0.01% → +0.01%	< −0.01%

On larger timeframes, per-bar movements are naturally smaller → threshold is reduced.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

8. Multi-Timeframe (MTF) Analysis — Complete and Partial Scenarios

An EMA value cannot be analyzed in isolation. Each timeframe tells a different story. **The higher timeframe ALWAYS DOMINATES.**

8.1 MTF PSEDYS Hierarchy

Level	Timeframe	EMA Used	ROLE	Action
1 (Macro)	4H or 1D	EMA 200	Determines the overall trend direction	price > EMA200 → global LONG bias
2 (Meso)	1H or 4H	EMA 50, EMA 200	Confirms medium-term trend	Alignment with level 1 is mandatory
3 (Micro)	15M	EMA 20, EMA 50	PSEDYS FILTER: trend confirmation	price > EMA20 > EMA50 = confirmed bullish
4 (Entry)	5M	EMA 9, EMA 20, EMA 50	Precise execution timing	LONG entry only if levels 1+2+3 = bull

MTF Golden Rule: If the major timeframe (4H) is Bullish (price > EMA 200), on the minor timeframe (15M) we COMPLETELY IGNORE all Short signals (Death Cross). We execute ONLY Long signals aligned with the strong trend from the 4H. Trading against the major trend = the most common reason for loss.

8.2 MTF Alignment Score

Not all timeframes are always perfectly aligned. The alignment score quantifies the strength of the setup:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

TF1 (4H)	TF2 (1H)	TF3 (15M)	TF4 (5M)	Score	Action
□ Bull	□ Bull	□ Bull	□ Bull	4/4	Entry with full sizing
□ Bull	□ Bull	□ Bull	⚠ Neutral	3/4	Entry with reduced sizing (50–75%)
□ Bull	□ Bull	⚠ Neutral	□ Bull	3/4	Wait for 15M confirmation → entry when 15M turns bull
□ Bull	□ Bull	□ Bear	□ Bull	3/4 bearish conflict	DO NOT enter — 15M bearish against 4H bullish = reversal risk
□ Bull	□ Bear	any	any	2/4	DO NOT enter — macro conflict
□ Bear	any	any	□ Bull	any	DO NOT enter Long — 4H bearish absolutely dominates

8.3 Most Common Partial Scenario — 3 out of 4 bullish

Scenario: 4H bullish, 1H bullish, 5M bullish, but **15M neutral or slightly bearish**.

```
Correct action:
1. DO NOT ignore 15M bearish — it is the mandatory PSEDYS filter
2. DO NOT enter immediately on the 5M signal
3. Wait for 15M to align (EMA20 > EMA50, positive slope)
4. When 15M aligns → entry on 5M with fully confirmed setup
5. If 15M does not align within 2-3 bars → setup invalidated, skip completely

Reason: 15M bearish in a 4H bullish context = likely retracement in progress.
Entering on 5M bullish in the middle of a 15M retracement → easy stop-loss hit.
```

Scenario: 4H bullish, 1H neutral, 15M bullish, 5M bullish.

```
Correct action:
1H neutral = medium-term trend with no clear direction.
This signals that the 4H trend has not yet confirmed on 1H.
→ Possible entry but with reduced sizing (50%)
→ Strict stop-loss (closer than standard)
→ TP1 mandatory at 50% of position before TP2
```

---

9. Flat EMA (Sideways Market)

EMA is an indicator designed to operate in clear trends and **completely loses its utility when the market lacks direction**.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

9.1 Visual Identification

- The EMA line loses its slope, becoming almost horizontal
- Candles oscillate chaotically above and below it
- EMA is repeatedly breached in both directions without clear momentum
- Golden Cross and Death Cross appear repeatedly in a short interval → whipsaws

9.2 Algorithmic Detection

```
# Slope over 2 periods (PSEDYS formula):
slope = (ema20[-1] - ema20[-3]) / ema20[-3] * 100

# Interpretation:
# slope > +0.05%  → EMA sloped BULLISH → LONG valid
# slope < -0.05%  → EMA sloped BEARISH → SHORT valid
# -0.05% ≤ slope ≤ +0.05% → FLAT EMA → MANDATORY SKIP

# Additional confirmation with EMA20 distance from EMA50:
ema_compression = abs(ema20[-1] - ema50[-1]) / ema50[-1] * 100
# < 0.1% → Compressed EMAs → sideways confirmed
```

9.3 PSEDYS Rule

Combination that blocks ANY signal:

```
Flat EMA (slope ±0.05%) + Choppiness Index > 61.8 = TOTAL SKIP, no trades
```

Mathematical logic: when EMA is flat, the difference between consecutive values tends toward zero, indicating a total lack of directional volatility. Any entry under this condition guarantees negative yield over a long series.

---

10. Bot vs TradingView Validation

Discrepancies between EMA values from the bot and those visible on TradingView are one of the main sources of inconsistent signals. The procedure below eliminates the source of discrepancy.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

10.1 Validation Checklist

```
STEP 1 — Check K formula:
□ EMA on price (20, 50, 200): K = 2/(N+1)  ← standard
□ ATR, ADX, RSI internals: K = 1/N         ← Wilder RMA
□ If incorrect → correct and revalidate

STEP 2 — Check price source:
□ TradingView default EMA: close
□ Your bot: close? HLC3? HL2?
□ If different → align or explicitly document

STEP 3 — Check seed / warm-up:
□ Does the bot have at least 2×N historical bars at start?
□ EMA 200 → 400 bars available before the first signal?
□ If not → increase buffer or invalidate the first N signals

STEP 4 — Comparative numeric test:
□ Take the last 5 closed candles on chosen symbol/TF
□ Manually calculate EMA using the bot's formula
□ Compare with TradingView value
□ Acceptable tolerance: < 0.05% difference
□ If > 0.05% → step 1 or 2 is incorrect

STEP 5 — Check Wilder vs Standard:
□ If bot's ADX differs from TradingView ADX on the same TF/symbol
□ Ensure ADX uses K = 1/N and not K = 2/(N+1)
□ Even 1 period difference in smooth factor → ADX diverges in a few hours
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

10.2 Quick Validation Script (Python)

```
def ema(prices: list, period: int, wilder: bool = False) -> list:
    """
    prices: list of closes (chronological, oldest first)
    period: N
    wilder: True = K=1/N (ATR/ADX/RSI), False = K=2/(N+1) (standard EMA)
    """
    k = 1 / period if wilder else 2 / (period + 1)
    result = [None] * (period - 1)
    seed = sum(prices[:period]) / period
    result.append(seed)
    for price in prices[period:]:
        result.append(result[-1] + k * (price - result[-1]))
    return result

# Validation: compare result[-1] with TradingView value
# Difference < 0.05% = OK
```

Indicator manual: EMA — Technical Reference Manual v3.0 Part 6 of 6.

11. Practical Exercises with Complete Answers

Exercise 1 (corrected): Golden Cross on 5M vs EMA 200 on 4H

Situation: On the 5M chart, EMA 9 has just crossed above **EMA 20** (Mini Cross). On the 4H chart, the price is WELL BELOW EMA 200.

Question: Do you go Long? Why?

Answer:

NO — you do not go Long, even if the Mini Cross on 5M seems attractive.

- **MTF Rule:** EMA 200 on 4H is the MACRO timeframe and absolutely dominates any signal on 5M.
- **Real Context:** Price well below EMA 200 on 4H = strong medium-term bearish trend. The Mini Cross on 5M is just a temporary bounce within a major downtrend.
- **What happens in practice:** The price rises slightly after the cross, hits EMA 200 on 4H as resistance, and violently rejects downward. The trader goes Long and exits with a loss.
- **Correct Action:** Completely ignore the Mini Cross on 5M. Wait for SHORT signals aligned with the bearish trend on 4H. Or do not trade until the price surpasses EMA 200 on 4H with a confirmed closed candle and ADX > 20.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

> **Note v3.0:** The previous version incorrectly mentioned "EMA 21" instead of EMA 20 (PSEDYS standard). EMA 21 is not used in the strategy.

Exercise 2: Flat EMA on 4H with apparent bullish setup on 5M

Situation: On the 4H chart, EMA 200 is FLAT (slope almost zero) and the price oscillates above and below it chaotically. On 5M, an apparent bullish setup appears: EMA 20 > EMA 50, price above EMA 20.

Question: Do you go Long? What do you do?

Answer:

DO NOT enter — a flat EMA on 4H is a clear signal of a sideways market (range).

- **Logic:** Flat EMA 200 on 4H = directionless market in the medium term. In this condition, any signal on 5M is noise, not a trend.
- **What happens:** The price reaches the upper level of the range and turns back. There is no momentum to push the price higher.
- **PSEDYS filters confirm SKIP:** Choppiness Index > 61.8 in sideways + flat EMA → the bot does not execute any trades by design.
- **Correct Action:** Wait for the range breakout with a strong (closed) candle above or below EMA 200 on 4H, with increased volume and EMA slope becoming positive again (> +0.01% on 4H).

Exercise 3: Bullish alignment on all TFs

Situation: 4H: price ABOVE EMA 200 (macro bullish). 1H: EMA 20 > EMA 50, price above both. 15M: price > EMA 20 > EMA 50, both sloping upwards. 5M: EMA 20 > EMA 50, positive slope, price 0.8% above EMA 20.

Question: What do you do? Is it a valid setup? What else do you check before entry?

Answer:

YES — this is the strongest possible EMA configuration: bullish alignment on ALL timeframes simultaneously. MTF Score = 4/4.

- **Distance checked:** 0.8% above EMA 20 on 5M = within the optimal range (−1.5% to +1.5%). No overextension.

What you must check before entry:
- ADX on 5M: must be > 18 and rising (strong trend)
- ADX on 15M: must be > 20 and rising (confirmation)
- Choppiness Index: must be < 61.8 (not in sideways)
- Ribbon 5M: EMA9 > EMA20 > EMA50 with increasing distances (bullish expansion)
- Slope EMA 20 on 5M: > +0.05%

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

- Funding Rate: must not be > +0.1% (Level 0 PSEDYS filter)
- BTC Filter: BTC has not moved > 2.5% on the last 1H candle

If all filters are OK: **High probability LONG setup.** Entry at market or on a minor pullback to EMA 20 on 5M.

Exercise 4 (new): MTF Conflict — 3 out of 4 aligned

Situation: 4H bullish (price > EMA 200). 1H bullish (EMA 20 > EMA 50). 5M bullish (correct EMA stack). But **15M: EMA 20 < EMA 50** and EMA 20 slope is negative (−0.08%).

Question: What do you do? Do you enter on the 5M signal?

Answer:

DO NOT enter now — 15M bearish is the mandatory PSEDYS filter, regardless of the other TFs.

- **Situation diagnosis:** 4H and 1H bullish + 15M bearish = likely an active pullback in progress on 15M, within a larger bullish trend. This is a normal situation (pullback in a bullish trend).
- **Risk of premature entry:** Stop-loss extremely easy to hit — the price is in active pullback on 15M, and entering Long on 5M bullish in the middle of this pullback means entry against the immediate move.
- **Correct Action:**
  1. Monitor 15M until EMA 20 surpasses EMA 50 with a closed candle and slope becomes positive
  2. When 15M aligns → check that 5M is still bullish at that moment
  3. Entry at the confluence: 15M aligns + 5M mini cross or bounce at EMA 20
  4. This is actually a better entry than the original — you enter after the pullback, not in the middle of it

---

Exercise 5 (new): EMA Divergence on 15M

Situation: On 15M, the price makes a new High (Higher High visible on the chart). EMA 20 on 15M makes a Lower High compared to the last peak. ADX = 22, Choppiness = 45.

Question: What does this configuration signal? Do you go Long?

Answer:

DO NOT go Long — this is a **bearish EMA divergence**, a signal of exhaustion in the bullish trend.

- **Interpretation:** The price makes a new peak, but EMA 20 does not confirm — it means the last bullish impulse has lost momentum compared to the previous one. The trend is active (ADX 22 > 20, Choppiness 45 < 61.8) but weakening.
- **Correct Action for an active Long trader:**

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

- If you are already in a Long position → move stop-loss higher (aggressive trailing), prepare for exit at TP
- Do not add to Long position in bearish divergence
- **Correct Action for a new entry:**
- Do not enter Long at bearish divergence on 15M
- Wait for confirmation of reversal or trend continuation (divergence can be nullified)
- If divergence confirms with a closed candle below EMA 20 on 15M → possible Short setup aligned with 15M

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

12. Cheat Sheet — Quick Summary

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Concept	Value / Rule
PSEDYS standard EMA	EMA 20 + EMA 50 on 5M and 15M
Long Condition 5M	price > EMA20 > EMA50, slope > +0.05%
Long Condition 15M (filter)	price > EMA20 > EMA50 (trend confirmation)
Short Condition 5M	price < EMA20 < EMA50, slope < −0.05%
Macro filter 4H	price > EMA200 → LONG only | price < EMA200 → SHORT only
Sideways filter	Slope between −0.05% and +0.05% → FLAT EMA → SKIP
Optimal entry range	−1.5% < price-EMA20 distance < +1.5%
Marginal zone	±1.5% – ±2.0% → possible entry with reduced sizing (50%)
Overextension hard stop	price-EMA distance > ±2.0% → mandatory SKIP
Golden Cross	EMA 50 × EMA 200 from below → Major Bullish (4H/1D)
Death Cross	EMA 50 × EMA 200 from above → Major Bearish (4H/1D)
False crossover filter	Confirmed closed candle + spread > 0.05% + ADX > 18/20 + Choppiness < 61.8
Candle data	ALWAYS closed candle[-1], not current candle
Minimum warm-up	Minimum 2×N candles (EMA 200 → 400 candles)
Standard K multiplier	K = 2/(N+1) | EMA9: K=0.2000 | EMA200: K=0.00995
Wilder K multiplier	K = 1/N — for ATR, ADX, RSI (NOT for price EMA)
First EMA value	SMA seed = simple average of the first N candles
Center of mass lag	(N−1)/2 bars — identical to SMA (lag ≠ half-life)
EMA half-life	ln(0.5)/ln(1−K) bars — shorter than SMA
EMA14 vs RMA14 half-life	EMA14: 4.84 bars | RMA14: 9.35 bars
Price source	Close (default) — DO NOT mix with HLC3/HL2 compared to TradingView
EMA swing 1H/4H	EMA 20 + EMA 50 + EMA 200
EMA macro 1D	EMA 50 + EMA 100 + EMA 200
Slope formula	slope = (EMA[-1] − EMA[-3]) / EMA[-3] × 100
Robust slope (multi-asset)	slope = (EMA[-1] − EMA[-2]) / ATR14[-1] × 100
Distance formula	dist = (price − EMA20) / EMA20 × 100

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Concept	Value / Rule
Bullish ribbon expansion	EMA9 > EMA20 > EMA50 > EMA200, increasing distances
Ribbon compression	Converging EMAs → imminent consolidation
Bearish divergence	Price Higher High + EMA Lower High → bullish exhaustion
Bullish divergence	Price Lower Low + EMA Higher Low → bearish exhaustion
MTF Score 4/4	Entry with full sizing
MTF Score 3/4 (no conflict)	Entry with reduced sizing (50–75%)
MTF Score with 15M conflict	DO NOT enter — wait for 15M alignment
Bot vs TradingView tolerance	< 0.05% EMA difference → OK | > 0.05% → check K and price source

PSEDYS EMA Technical Manual v3.0 — May 2026 Corrections from v2.0: candle 12 calculation error (107.41→107.008), EMA 21→EMA 20 Ex.1, 1.5–2% zone clarified, added sections Wilder RMA, Quantified Lag, Cold Start, Spikes, Ribbon, Divergence, Calibrated Slope, Exercises 4 and 5, Bot vs TradingView Validation.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS