PSEDYS | TECHNICAL REFERENCE MANUAL V3.0

TRIX — Triple Exponential Average

TRIX — Triple Exponential Average

Technical Reference Manual v1.0

PSEDYS | Complete Edition

EMA³ · ROC on Triple EMA · Noise Filtering · Zero Cross · Signal Line · Warm-up 3N−2 · MTF · Bot vs TradingView

CONTENTS

1. What is TRIX? Concept and Origin
2. Calculation Formula — Complete
   - 2.1 Step 1 — EMA1 = EMA(Close, N)
   - 2.2 Step 2 — EMA2 = EMA(EMA1, N)
   - 2.3 Step 3 — EMA3 = EMA(EMA2, N)
   - 2.4 Step 4 — TRIX = Percentage ROC on EMA3
   - 2.5 Signal Line
   - 2.6 Complete Numerical Example — 60 bars
3. TRIX Range — Small but Unlimited
4. Lag and Warm-up
5. TRIX Levels — Interpretation
6. Trading Signals
   - 6.1 Zero-line Cross
   - 6.2 Signal Line Crossover
   - 6.3 Divergences
   - 6.4 Combined Filters
7. TRIX vs MACD vs ROC — Comparison
8. TRIX in Sideways and Trending Markets
9. Multi-Timeframe Analysis (MTF)
10. PSEDYS — TRIX as Noise Filter
11. Bot vs TradingView Validation
12. Practical Exercises
13. Cheat Sheet — Quick Summary

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

1. What is TRIX? Concept and Origin

TRIX was created by **Jack Hutson** and published in Technical Analysis of Stocks & Commodities (1983). TRIX = **TRIple EXponential average** — applies EMA three times on Close, then calculates the percentage rate of change (ROC) of this triple EMA.

Philosophy: The triple application of EMA practically eliminates all noise and short-term cycles, leaving only the dominant trend visible. TRIX > 0 = EMA3 rising = bullish trend. Zero-cross = filtered trend change.

Analogy: If MACD is a "first-order derivative" of price (difference between two EMAs), TRIX is a "fourth-order derivative" (ROC of EMA applied 3 times) — much smoother, much slower.

---

2. Calculation Formula — Complete

2.1 Step 1 — EMA1 = EMA(Close, N)

```
k = 2 / (period + 1)
EMA1[period] = SMA(Close[1..period])   ← seed
EMA1[i] = Close[i] × k + EMA1[i−1] × (1−k)   for i > period
```

2.2 Step 2 — EMA2 = EMA(EMA1, N)

```
EMA2[2×period−1] = SMA(EMA1[period..2×period−1])   ← seed with N EMA1 values
EMA2[i] = EMA1[i] × k + EMA2[i−1] × (1−k)
```

First EMA2 value: bar `2×period − 1` (requires `period` EMA1 values for seed).

2.3 Step 3 — EMA3 = EMA(EMA2, N)

```
EMA3[3×period−2] = SMA(EMA2[2×period−1..3×period−2])   ← seed with N EMA2 values
EMA3[i] = EMA2[i] × k + EMA3[i−1] × (1−k)
```

First EMA3 value: bar `3×period − 2`.

2.4 Step 4 — TRIX

```
TRIX[i] = (EMA3[i] − EMA3[i−1]) / EMA3[i−1] × 100
```

First TRIX value: bar `3×period − 1` (requires 2 consecutive EMA3 values).

For period = 14:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
EMA1: first value bar 14
EMA2: first value bar 27 (14+14−1)
EMA3: first value bar 40 (14+14+14−2)
TRIX: first value bar 41 (3×14−1)
Warm-up: 41 bars
```

2.5 Signal Line

```
Signal = SMA(TRIX, 9)   ← Simple 9-period SMA on TRIX
```

First Signal value: bar `3×period − 1 + 9 − 1 = 3×period + 7`.

Signal Line Crossover: like MACD — TRIX cross above Signal = bullish; cross below Signal = bearish.

2.6 Complete Numerical Example — period=14, 60 bars

EMA Cascade — manual verification:

```
Close[1..14] = [100.00, 100.74, 99.33, 98.79, 98.07, 99.15,
                100.02, 101.64, 100.44, 100.42, 99.02, 98.29,
                98.56, 97.15]
EMA1[14] = SMA/14 = 99.4014   (seed)

k = 2/(14+1) = 0.1333
EMA1[15] = 96.35 × 0.1333 + 99.4014 × 0.8667 = 98.9946
```

EMA3 at bar 40 (first value):

```
EMA3[40] = 99.1323
EMA3[41] = 99.3910

TRIX[41] = (99.3910 − 99.1323) / 99.1323 × 100 = +0.2610  ✓  (bullish)
```

Cascade table bars 14–45 (selection):

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Bar	Close	EMA1	EMA2	EMA3	TRIX
14	97.15	99.4014	—	—	—
15	96.35	98.9946	—	—	—
27	99.73	98.7906	98.5409	—	—
28	98.55	98.7585	98.5699	—	—
40	107.96	103.2291	100.6330	**99.1323**	—
41	**108.48**	**103.9292**	**101.0725**	**99.3910**	**+0.2610**
42	109.45	104.6653	101.5515	99.6790	+0.2898
43	108.11	105.1246	102.0279	99.9922	+0.3142
44	107.41	105.4293	102.4815	100.3241	+0.3319
45	106.92	105.6281	102.9010	100.6677	+0.3425

Observation: Although Close[43..45] decreases from the high at bar 42, TRIX continues to rise — EMA3 remains in an upward trend due to triple smoothing inertia.

---

3. TRIX Range — Small but Unlimited

TRIX expresses the percentage rate of change of EMA3 — values are **much smaller** than ROC directly on Close:

```
Typical normal TRIX: ±0.1% to ±0.5%
TRIX in strong crypto trend: ±0.5% to ±2%
TRIX in extreme crash/pump: ±3% to ±5%
```

Zero-line = EMA3 at local maximum/minimum (rate of change = 0 = EMA3 no longer rising/falling).

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

4. Lag and Warm-up

```
Warm-up: 3×period − 1 bars
  period=14: 41 bars
  period=9:  26 bars
  period=18: 53 bars

Composite Lag (standard EMA K=2/(N+1)):
  EMA1 lag: (period−1)/2 = 6.5 bars
  EMA2 lag: 6.5 bars (relative to EMA1) → 13 bars relative to Close
  EMA3 lag: 6.5 bars (relative to EMA2) → 19.5 bars relative to Close

TRIX Lag ≈ 19.5 bars for period=14
```

TRIX is the slowest indicator in the ROC/MOM family — the price has moved ~20 bars before TRIX reflects the change. This is intentional: noise filtering is the main advantage.

Lag comparison:

```
ROC(14):      ~7 bars lag
MACD(12,26):  ~14 bars lag
TRIX(14):     ~20 bars lag  ← slowest, most filtered
RSI(14):      ~14 bars lag
```

5. TRIX Levels — Interpretation

TRIX	Interpretation
> 0	EMA3 rising → confirmed bullish trend
= 0	EMA3 at inflection (local maximum/minimum)
< 0	EMA3 falling → confirmed bearish trend
Positive and rising	Bullish trend with acceleration
Positive and falling	Bullish trend with deceleration (possible top forming)
Negative and rising	Bearish trend with recovery (possible bottom)
Negative and falling	Bearish trend with acceleration

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

6. Trading Signals

6.1 Zero-line Cross

```
TRIX cross zero bullish (from negative to positive):
  EMA3 has changed direction upwards → confirmed bullish trend (with ~20 bars lag)
  → Confirmed Long signal — price has already risen significantly

TRIX cross zero bearish (from positive to negative):
  EMA3 turns downwards → confirmed bearish trend
  → Confirmed Short signal
```

Zero-cross TRIX = medium to long-term trend signal. Not suitable for precise entry on short timeframes.

6.2 Signal Line Crossover (TRIX vs Signal)

```
TRIX > Signal (bullish crossover):
  TRIX momentum rising relative to its average → earlier Long signal
  (about ~4.5 bars before zero-cross)

TRIX < Signal (bearish crossover):
  TRIX momentum falling relative to its average → earlier Short signal
```

Signal Line Crossover is the **standard recommended** signal for TRIX — faster than zero-cross, but more filtered than MACD zero-cross.

6.3 Divergences

```
Bearish divergence: Price High[2] > High[1] + TRIX High[2] < TRIX High[1]
  → EMA3 no longer confirms the new high → bullish momentum weakening deeply

Bullish divergence: Price Low[2] < Low[1] + TRIX Low[2] > TRIX Low[1]
  → EMA3 no longer falls as rapidly → bearish momentum weakening
```

TRIX divergences are rare but **extremely reliable** — triple smoothing eliminates false divergences that frequently appear in RSI/MACD.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

6.4 Combined Filters

```
entry_long = (
    trix > 0 and              # confirmed bullish trend (EMA3 rising)
    trix > trix_signal and    # TRIX above signal
    ema_stack_bullish and     # EMA stack direction confirmation
    adx > 20                  # active trend
)

exit_long = (
    trix < trix_signal or    # TRIX below signal → momentum deceleration
    trix < 0                 # EMA3 reverses → bearish trend
)
```

7. TRIX vs MACD vs ROC — Comparison

Aspect	TRIX(14)	MACD(12,26,9)	ROC(14)
Basis	EMA(EMA(EMA(Close)))	EMA(12) − EMA(26)	Close[i] vs Close[i-N]
Smoothing	Triple EMA	Double EMA	None
Signal line	SMA(9) on TRIX	EMA(9) on MACD	Not standard
Lag	~20 bars	~14 bars	~7 bars
Noise filtering	Maximum	Medium	Minimum
Sensitivity to spikes	Minimum	Medium	Maximum
False divergences	Rare (filtered)	Medium	Frequent
Warm-up	41 bars (period=14)	34 bars (EMA26 seed)	14 bars

When to use TRIX:
- Large timeframes (4H, 1D) where 20-bar lag is acceptable
- Systems with zero tolerance for false signals
- Secondary trend confirmation (not primary entry timing)

8. TRIX in Sideways and Trending Markets

Sideways: TRIX remains close to zero and oscillates slowly. Frequent zero-crosses with small amplitude. Not suitable for range trading — too slow and too filtered.

Bullish trend: TRIX stays positive for a long time. Falling towards zero = trend weakening warning. Cross below zero = reversal confirmation (price has already dropped significantly).

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Bearish trend: TRIX stays negative. Rising towards zero and bullish cross = bottom confirmation (with significant lag).

---

9. MTF

Level	Timeframe	Long Condition
Macro	4H	TRIX > 0 (confirmed bullish trend on 4H)
Meso	1H	TRIX > 0 or TRIX > Signal (bullish crossover)
Entry	5M	MACD or RSI for exact timing (TRIX too slow on 5M)

Important observation: TRIX on timeframes below 1H with period=14 has a warm-up of 41 bars and a lag of ~20 bars → extremely delayed signal. On 5M = late confirmation signal, not entry.

Indicator manual: TRIX — Triple Exponential Average Part 2 of 2.

10. PSEDYS — TRIX as Noise Filter

In PSEDYS, TRIX is ideal as a **macro trend filter** on 4H:

```
# TRIX trend filter on 4H
trend_confirmed_bull = trix_4h > 0 and trix_4h > trix_signal_4h
trend_confirmed_bear = trix_4h < 0 and trix_4h < trix_signal_4h

# Long Signal on 5M valid only with bullish TRIX 4H
entry_long_5m = (
    trend_confirmed_bull and  # macro trend confirmed
    rsi_5m < 50 and           # pullback on entry timeframe
    ema_stack_5m_recovering   # EMA stack 5M recovering
)
```

Advantage vs EMA stack: TRIX filters more aggressively in sideways markets. If TRIX(4H) < 0 = market likely choppiness or bearish trend → avoid Long completely.

---

11. Bot Validation vs TradingView

Main sources of divergence:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
□ EMA seed: SMA on the first N bars (not first value = Close[0])
□ k = 2/(period+1) — standard EMA, not Wilder K=1/N
□ Cascade: EMA2 applied on EMA1 (not on Close), EMA3 on EMA2
□ TRIX = (EMA3[i] / EMA3[i-1] - 1) × 100 — identical to formula in section 2.4
□ Off-by-one warm-up: bars 3×period−1, not 3×period or 3×period−2
```

Checklist:

```
□ k = 2 / (period + 1)
□ EMA1 seed = SMA(Close[1..period]) at bar period
□ EMA2 seed = SMA(EMA1[period..2period-1]) at bar 2×period-1
□ EMA3 seed = SMA(EMA2[2p-1..3p-2]) at bar 3×period-2
□ TRIX = (EMA3[i] - EMA3[i-1]) / EMA3[i-1] × 100
□ Tolerance: < 0.0001 (small values, ±0.5% normal)
```

Python Script:

```
def trix(closes, period=14):
    k = 2 / (period + 1)
    n = len(closes)

    def ema_from_seed(data, start_idx):
        """Calculate EMA on data[start_idx:] with seed SMA"""
        result = [None] * n
        if start_idx >= n:
            return result
        result[start_idx] = sum(data[start_idx-period+1:start_idx+1]) / period
        for i in range(start_idx + 1, n):
            if data[i] is not None and result[i-1] is not None:
                result[i] = data[i] * k + result[i-1] * (1 - k)
        return result

    ema1 = ema_from_seed(closes, period - 1)
    ema2 = ema_from_seed(ema1, 2 * period - 2)
    ema3 = ema_from_seed(ema2, 3 * period - 3)

    trix_v = [None] * n
    for i in range(1, n):
        if ema3[i] is not None and ema3[i-1] is not None and ema3[i-1] != 0:
            trix_v[i] = (ema3[i] - ema3[i-1]) / ema3[i-1] * 100
    return trix_v
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

12. Practical Exercises

Exercise 1: TRIX(4H) > 0 but TRIX < Signal — Long entry?

Situation: On 4H, TRIX = +0.15%, Signal = +0.22%. EMA stack bullish. ADX = 31. Price in 8% pullback.

Answer: Long with reduced sizing (50%). TRIX > 0 = bullish trend confirmed at macro level. TRIX < Signal = momentum deceleration (deeper pullback possible). With ADX = 31 and EMA stack bullish, the trend is active. Enter now with reduced sizing; add full sizing at TRIX > Signal or at bounces off key EMA. SL below the last swing low.

Exercise 2: TRIX(4H) cross zero bearish — exit Long immediately?

Situation: Long position open with +5% profit. On 4H, TRIX cross zero bearish (from +0.05% to −0.02%). EMA 200 4H still below price.

Answer: Tighten trailing SL, do not exit immediately. TRIX zero-cross bearish on 4H = serious trend change signal — price has already dropped ~20 bar equivalent. EMA 200 4H below price = macro support intact. If trailing SL has not been hit, tighten to −1.5× ATR below current Close. Forced exit at EMA 200 4H breach or trailing SL hit.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

13. Cheat Sheet — Quick Summary

Concept	Value / Rule
EMA1	`EMA(Close, period)` — seed SMA
EMA2	`EMA(EMA1, period)`
EMA3	`EMA(EMA2, period)`
TRIX	`(EMA3[i] − EMA3[i−1]) / EMA3[i−1] × 100`
k (EMA)	`2 / (period + 1)` — standard EMA, NOT Wilder
Standard Period	14
Warm-up	`3 × period − 1` bars = **41 bars** (period=14)
Lag	`~3 × (period−1)/2` ≈ **19.5 bars** (period=14)
Range	Unlimited, typically ±0.1% to ±0.5%
> 0	EMA3 increasing → bullish trend
< 0	EMA3 decreasing → bearish trend
Zero cross bull	TRIX from negative to positive → bullish trend
Signal Line	`SMA(TRIX, 9)`
Signal crossover bull	TRIX > Signal → accelerating momentum
Divergence	Rare but very reliable
Noise Filtering	Maximum (triple EMA)
vs MACD	TRIX slower (~6 extra bars lag), more filtered
vs ROC	TRIX much smoother (ROC = 2 close, TRIX = EMA³)
Optimal Use	Macro trend filter on 4H/1D
Cause #1 divergence	Standard EMA K=2/(N+1) vs Wilder K=1/N
Cause #2 divergence	Warm-up off-by-one (3N−1 not 3N)

PSEDYS TRIX Technical Manual v1.0 — May 2026

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS