PSEDYS | TECHNICAL REFERENCE MANUAL V3.0

DPO — Detrended Price Oscillator

Technical Reference Manual v1.0

PSEDYS | Complete Edition
Detrending · Shift N/2+1 · Cycles · Zero Cross · DPO vs CCI vs RSI · Warm-up N+shift · MTF · Bot vs TradingView

CONTENTS

1. What is DPO? Concept and Origin
2. Calculation Formula — Complete
   - 2.1 Formula and Shift
   - 2.2 Why Shift = N/2 + 1?
   - 2.3 Complete Numerical Example — 50 bars
3. DPO Range — Unlimited Relative
4. Lag and Warm-up
5. DPO Levels — Interpretation
6. Trading Signals
   - 6.1 Zero-line Cross
   - 6.2 Relative Extremes (Calibrated OB/OS)
   - 6.3 Divergences
   - 6.4 Combined Filters
7. DPO vs CCI vs ROC — Comparison
8. DPO in Market Cycle Identification
9. Multi-Timeframe Analysis (MTF)
10. PSEDYS — DPO as Cycle Filter
11. Bot vs TradingView Validation
12. Practical Exercises
13. Cheat Sheet — Quick Summary

1. What is DPO? Concept and Origin

DPO (Detrended Price Oscillator) was popularized in classical technical analysis as a tool for **removing the trend component** from prices, leaving only **cycles** (periodic oscillations relative to the trend) visible.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Philosophy: Price = Trend + Cycle + Noise. DPO extracts the Cycle component by subtracting the SMA (proxy for trend) from the price as of N/2+1 bars ago. The result shows how high or low the price was relative to its trend at that time.

Main Use: Identifying the length of market cycles (number of bars between consecutive DPO peaks or troughs) and cycle extremes for range trading.

---

2. Calculation Formula — Complete

2.1 Formula and Shift

```
shift = period / 2 + 1    (integer part)

DPO[i] = Close[i − shift] − SMA(Close, period)[i]
```

Detailed:

```
SMA[i]  = (Close[i] + Close[i−1] + ... + Close[i−period+1]) / period
DPO[i]  = Close[i − shift] − SMA[i]
```

Standard period: 20 (or 14, 21)

For period=20:

```
shift = 20/2 + 1 = 11
DPO[i] = Close[i−11] − SMA(20)[i]
```

2.2 Why Shift = N/2 + 1?

SMA(N) has a **lag of N/2 bars** relative to the center of the calculation window. That is, SMA[i] more accurately reflects the price from bar `i − N/2`.

By shifting Close back by `N/2 + 1` bars, we align the price to the center of the current SMA (plus 1 extra bar for exact centering). The result:
- SMA[i] represents the trend at the moment `i − N/2`
- Close[i−N/2−1] is the price from the moment `i − N/2 − 1`
- Difference = price deviation from trend at that moment = isolated cycle

Practical effect: DPO shows how far from the trend the price was `shift` bars ago — the trend is "eliminated" (detrended).

2.3 Complete Numerical Example — period=20, 50 bars

Parameters:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
period = 20
shift  = 20/2 + 1 = 11
First DPO value: bar period + shift − 1 + 1 = bar 31
Warm-up: 31 bars
```

Verification bar 31 (first value):

```
Close[20] = 98.69  (bar from 11 bars ago, indexed from bar 31)
SMA(20)[31] = 98.2235  (SMA on bars 12–31)

DPO[31] = 98.69 − 98.2235 = +0.4665  ✓  (Close was slightly above the trend)
```

DPO Table bars 31–50:

Bar	Close[cur]	Close[i−11]	SMA20	DPO	Zone
31	99.47	98.69	98.224	**+0.47**	BULL
32	100.79	97.21	98.349	**−1.14**	BEAR
33	101.84	98.53	98.513	+0.02	BULL
34	102.22	99.47	98.766	+0.70	BULL
36	103.95	98.20	99.497	**−1.30**	BEAR
39	106.44	98.55	100.742	**−2.19**	BEAR
40	107.96	97.39	101.206	**−3.82**	BEAR
46	105.70	104.13	103.878	**+0.25**	BULL
49	103.33	105.78	104.705	**+1.08**	BULL
50	104.05	106.44	104.964	**+1.48**	BULL

Observation: When the price was in a strong bullish trend (bars 39–45), DPO was **negative** — Close[i−11] (the price 11 bars before) was below the current higher SMA. This illustrates that DPO does not measure the current trend, but the historical deviation from the trend.

---

3. DPO Range — Unlimited Relative

DPO has no fixed limits — the scale depends on:
- Instrument volatility
- Chosen period (larger N = wider range)
- Timeframe

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
Typical crypto DPO on 4H (period=20): ±500 to ±2000 USD for BTC
Typical crypto DPO on 5M (period=20): ±50 to ±200 USD for BTC
Typical DPO on normalized instrument: ±1% to ±5% relative to SMA
```

Calibration: Run DPO on 200–500 bars and identify historical extremes to set relative OB/OS levels for the respective instrument.

---

4. Lag and Warm-up

```
Shift = period/2 + 1

First DPO value: bar period + shift = bar (period + period/2 + 1)
Warm-up = period + shift − 1 + 1 = period + shift

  period=14: shift=8,  warm-up = 22 bars
  period=20: shift=11, warm-up = 31 bars
  period=21: shift=11, warm-up = 32 bars
```

Semantic Lag: DPO shows information from `shift` bars ago — the current DPO value describes what happened `N/2+1` bars back. This is intentional: DPO is not a future timing indicator, but a retrospective cycle descriptor.

Implication for trading: DPO cross zero at the current bar = the price from 11 bars ago just crossed the trend. It is not a predictive signal like RSI cross 50.

---

5. DPO Levels — Interpretation

DPO	Interpretation
> 0	Close[i−shift] was above SMA → positive cycle component
= 0	Close[i−shift] equal to SMA → no cycle deviation
< 0	Close[i−shift] was below SMA → negative cycle component
Extreme positive	Cycle peak `shift` bars ago
Extreme negative	Cycle trough `shift` bars ago

Cycle Identification:
- Distance between two consecutive DPO peaks = length of a complete cycle
- Distance between DPO minimum and maximum = half a cycle

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

6. Trading Signals

6.1 Zero-line Cross

```
DPO cross zero bullish (from negative to positive):
  Close[i-shift] surpassed SMA → price from shift bars ago returned above trend
  → Signals the middle of a bullish cycle (or reversal of a bearish cycle)

DPO cross zero bearish:
  → Signals the middle of a bearish cycle
```

Limitation: DPO zero-cross is a **retrospective** signal with shift bars. On 5M with period=20 and shift=11, zero-cross at bar 31 describes the price from bar 20. It is not a direct entry signal.

6.2 Relative Extremes (Calibrated OB/OS)

```
DPO > +threshold (e.g., historical positive extreme): cycle peak `shift` ago → potential reversal
DPO < −threshold (e.g., negative extreme): cycle trough `shift` ago → potential bounce follows
```

Thresholds = calibrated on the instrument's history (85/15 percentile of DPO distribution).

6.3 Divergences

```
Bearish divergence: Price HH + DPO LH
  → Bullish cycle weakens at new highs

Bullish divergence: Price LL + DPO HL
  → Bearish cycle weakens at new lows
```

6.4 Combined Filters

```
# DPO as cycle filter
cycle_bullish = dpo > 0      # positive cycle component
cycle_bearish = dpo < 0      # negative cycle component

# Entry confirmation
entry_long = (
    trend_bullish and        # EMA stack or ADX confirms trend
    dpo > 0 and              # cycle in positive phase
    dpo > dpo_prev           # DPO rising (cycle accelerating)
)
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

7. DPO vs CCI vs ROC — Comparison

Aspect	DPO	CCI	ROC
Formula	Close[i-shift] − SMA[i]	(TP−SMA_TP)/(0.015×MAD)	(C/C[N]−1)×100
Deviation Basis	SMA (estimated trend)	SMA (TP average)	Previous bar
Normalization	No (absolute value)	Yes (MAD, ±100 = ~2σ)	Percentage
Temporal Shift	Yes (shift=N/2+1)	No	No
Range	Unlimited absolute	Unlimited (typical ±200)	Unlimited %
Smoothing	SMA for trend	SMA + MAD	None
Primary Use	Cycle / detrend	Deviation vs average	Momentum

Key Distinction DPO vs CCI:
- CCI: deviation of CURRENT price from current SMA → current momentum indicator
- DPO: deviation of PAST price (shift bars back) from current SMA → retrospective cycle indicator

8. DPO in Market Cycle Identification

This is the **primary use** of DPO — not direct trading signals, but **measuring the period of market cycles**:

```
Step 1: Run DPO(20) on 500 bars
Step 2: Identify all DPO peaks
Step 3: Measure the distance in bars between consecutive peaks
Step 4: Average distances = average cycle length

Application: If average cycle = 40 bars on 4H,
             you can anticipate a major peak/trough follows at ~40 bars distance
```

Range trading filter:

```
When DPO at extreme negative (cycle trough) + support confirmation:
  → Entry Long with TP at historical positive extreme
When DPO at extreme positive (cycle peak) + resistance confirmation:
  → Entry Short with TP at historical negative extreme
```

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

9. MTF

Level	Timeframe	DPO Use
Macro	4H	Identify dominant cycle (4H cycle length)
Meso	1H	DPO > 0 = bullish phase of 1H cycle
Entry	5M	No — DPO too delayed for 5M entry

MTF applied:

```
4H: DPO at cycle trough (extreme negative) → potential bullish cycle follows
1H: DPO cross zero bullish or DPO > 0    → confirm entry into positive phase
5M: RSI/Stoch for exact timing          → DPO not used on 5M
```

---

10. PSEDYS — DPO as Cycle Filter

DPO in PSEDYS can be used on 4H for macro cycle filtering:

```
# 4H cycle phase
cycle_phase_bull = dpo_4h > 0        # in positive phase of 4H cycle
cycle_at_bottom  = dpo_4h < -threshold  # at cycle bottom → probable bounce

# Combined with trend
entry_long = (
    ema_stack_bullish_4h and    # trend
    cycle_at_bottom and         # cycle at bottom (DPO extreme negative)
    rsi_1h < 40                 # oversold confirmation on 1H
)
```

Limitation: DPO is not a precision indicator — it is a cycle descriptor. High/low values can persist for multiple bars. It does not generate precise entry signals.

Indicator manual: DPO — Detrended Price Oscillator Part 2 of 2.

11. Validation Bot vs TradingView

Main sources of divergence:

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

```
□ Correct shift: period/2 + 1 (integer part)
  → for period=20: shift=11 (not 10, not 12)
  → for period=21: shift=11 (21/2=10.5 → floor=10 → +1=11)
□ Formula: DPO[i] = Close[i - shift] - SMA(Close, period)[i]
  → Current SMA at bar i, Close from shift bars back
□ Not: DPO[i] = Close[i] - SMA[i - shift] (incorrect inversion)
□ SMA window: [i-period+1:i+1] inclusive
□ First value: bar period + shift (0-indexed: index period+shift-1)
```

Checklist:

```
□ shift = period // 2 + 1
□ SMA[i] = mean(Close[i-period+1:i+1])
□ DPO[i] = Close[i - shift] - SMA[i]
□ First valid value at index: period + shift - 1
□ Tolerance: < 0.001 (simple formula, no cumulative smoothing)
```

Python Script:

```
def dpo(closes, period=20):
    shift = period // 2 + 1
    n = len(closes)
    dpo_v = [None] * n
    for i in range(period + shift - 1, n):
        sma = sum(closes[i-period+1:i+1]) / period
        dpo_v[i] = closes[i - shift] - sma
    return dpo_v
```

---

12. Practical Exercises

Exercise 1: Negative DPO in a bullish trend — what does it mean?

Situation: On 4H, active bullish trend (EMA stack bullish, ADX = 35). DPO(20) = −3.5 (extremely negative).

Answer: Normal and expected. Negative DPO in a strong bullish trend occurs because the price 11 bars back was much lower than the current SMA (which has risen with the trend). This situation is not a bearish signal — it confirms that the trend has risen significantly over the last 11 bars. Negative DPO in trend = past price below current high SMA = valid active trend.

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Exercise 2: DPO cross zero bullish — entry Long?

Situation: On 4H, DPO(20) crosses from −1.2 to +0.3. EMA stack mixed (200 bullish, 50 bearish). ADX = 16.

Answer: Skip. Bullish DPO cross on 4H signals that the price 11 bars back has exceeded the SMA — a retrospective signal. With mixed EMA stack and ADX = 16 (market choppiness), trend confirmation is lacking. DPO zero-cross without confirmed trend = cycle noise, not an entry signal.

---

13. Cheat Sheet — Quick Summary

Concept	Value / Rule
Formula	`Close[i − shift] − SMA(Close, period)[i]`
Shift	`period // 2 + 1`
SMA	`SMA(Close, period)` at the current bar
Standard period	20
Shift for N=20	11 bars
Warm-up	`period + shift` bars = 31 (N=20)
Range	Unlimited (absolute, depends on instrument)
> 0	Close[i−shift] was above SMA → positive cycle phase
< 0	Close[i−shift] was below SMA → negative cycle phase
Zero cross bull	Price re-entered above trend → bullish cycle
Zero cross bear	Price dropped below trend → bearish cycle
Primary use	Cycle length identification + cycle extremes
Not for	Precise entry timing on short TF (< 1H)
OB/OS	Calibrated on instrument history (percentiles 85/15)
vs CCI	DPO: retrospective (shift); CCI: current (TP vs SMA)
vs ROC	DPO: deviation from trend; ROC: speed vs previous bar
Cause #1 divergence	Incorrect shift (N/2 vs N/2+1)
Cause #2 divergence	Inverted formula (SMA[i-shift] instead of SMA[i])
MTF	Macro cycle 4H; not on 5M (too delayed)

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

PSEDYS DPO Technical Manual v1.0 — May 2026

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS

Downloaded from PSEDYS Ecosystem | t.me/PSEDYS