



# TSO Signal Builder

v2.0

Quick Start Guide

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## About this Expert Advisor

Signal Builder is a MetaTrader 4 Expert Advisor that provides a solid platform to quickly build test and develop automated trading strategies based on indicator signals. It combines a large library of indicators with a wide array of basic as well as advanced order management and lot size adjustment features. Every trader this expert advisor, from a novice trader learning how to develop a trading strategy, to the advanced trader wishing to test complex trading strategies with multiple parameters.

It contains a library of 29 indicators, including trend and volume indicators, oscillators as well as many indicators described by Bill Williams. It allows to configure and combine all these indicators to create strategies with different entry and exit signals as well as reverse orders.

Except from the basic order management tools (i.e. take profit, stop loss and trailing stop), more advanced features like parabolic trailing stop, time stop and balance target are also included.

- The parabolic trailing stop creates a trailing stop based on the parabolic SAR indicator, creating a trailing stop that adapts to different market environments.
- The time stop allows to stop trades at a set time because many times testing can show that longer lasting trades have a higher chance to create losses.
- The balance target allows to set a target profit relative to the balance on which the expert advisor will stop.

Lot size adjustment tools include automated risk management as well as lot adjustment based on custom progressions created by the user.

- Automated risk management adjusts the lot size so that a set percentage of balance is risked for each trade.
- Infinite custom progressions for the lot size can be created as the expert advisors allows the user to create custom equations.

Detailed explanations for all the features of the expert advisor can be found in the input descriptions.

## Inputs

### Input Mode

- Custom: The EA runs based on the parameters input by the user.
- Default: The EA ignores all inputs and follows the default parameters that are recommended.
- Manual Trades: The EA ignores all inputs and a manual trading panel appears when the EA is executed. Positions are opened only manually through the panel.

### Basic Order Management

The first section of the Expert Properties is Order Management. In this section, the order conditions can be selected, e.g. the lot size, stop loss and take profit.

Table 1: Basic Order Management Inputs

ab	BASIC ORDER MANAGEMENT	////////////////////	BASIC ORDER MANAGEMENT	/...
123	Magic Number	123456789		
Va	Static Balance	0.0		
ab	-----	-----		
123	Stop Loss & Take Profit Units	Pips		
Va	Stop Loss Value [0 = Disable]	0.0		
Va	Take Profit Value [0 = Disable]	0.0		
ab	-----	-----		
123	ENABLE Trailing Stop	Disable		
Va	Trailing Stop Activation Level	0.0		
Va	Trailing Stop Distance	50.0		
ab	-----	-----		
✓	ENABLE Parabolic Trailing Stop	false		
Va	Acceleration Factor Step	0.02		
Va	Acceleration Factor Maximum	0.2		
ab	-----	-----		
✓	Time Filter (Away From Markets)	false		
ab	Use only COMMA(,) and DASH( ) to seperate months,days and hours	e.g Hours = 21 - 23 , 0 - 9 , 15 (The second term of the dash must be greater than first)		
ab	Months			
ab	Days Of The Month			
ab	Days Of The Week			
ab	Hours			
123	Time Stop (Number Of Bars) [0 = Disable]	0		
ab	-----	-----		
Va	Percentage Of Static Balance To Stop [0 = Disable]	0.0		
ab	-----	-----		

### Static Balance

The initial balance available. It is recommended to always update this value in case the EA is stopped while trades are still active. It allows the EA's mechanisms that need an initial balance input to "remember" the original initial balance before the EA was stopped, instead of the balance available when restarted. Notice that the Magic Number of the EA when restarted should also be the same as the one it had before it was stopped for it to be able to manage positions that have been left open.

### Stop Loss & Take Profit Units

Sets the units for the following two inputs, i.e. *Stop Loss (SL)* and *Take Profit (TP)*.

- Pips: the input values for SL and TP represent pips in the unfavourable or favourable direction respectively.
- Percentage: the input values for SL and TP represent a percentage of the opening price in the unfavourable or favourable direction respectively.

*Stop Loss Value [0 = Disable]*

Stop-loss for the initial trade in pips or as a percentage. Set to 0 to disable stop-loss.

*Take Profit Value [0 = Disable]*

Take-profit for the initial trade in pips or as a percentage. Set to 0 to disable take-profit.

*ENABLE Trailing Stop*

- **Disable:** No trailing stop is used.
- **Pips:** Activate trailing stop for the initial trade. The activation level and distance will be measured in pips in the following inputs.
- **Percentage:** Activate trailing stop for the initial trade. The activation level and distance will be measured as a percentage of the opening price in the following inputs.

*Trailing Stop Activation Level*

The amount of pips in the favourable direction to activate the trailing stop.

*Trailing Stop Distance*

Distance of trailing stop from the Maximum Favourable Excursion (MFE) in pips. A smaller value creates a tighter stop while a larger value creates a wider stop.

*ENABLE Parabolic Trailing Stop*

Trailing Stop based on the Parabolic SAR indicator. The trailing stop value is equal to that of the Parabolic SAR based on the acceleration factor step and maximum given in the following two inputs.

*Time Filter (Away From Markets)*

Enter the time periods (months, days of the month, days of the week, hours) when the EA should not open new positions. The inputs should be numbers, e.g. for months January = 1, for days of the week Monday = 1, for hours 01:00 – 01:59 = 1. Commas (,) and dashes (-) can be used. Dashes are inclusive of the first and last numbers and the second number should always be larger than the first. For example, to avoid trades between 21:00 – 10:00 (not including 10:00) and 15:00 – 16:00 (not including 16:00) the *Hours* input would be 21-23, 0-9, 15.

*ENABLE Time Stop (Number of Bars) [0 = Disable]*

The number of bars at which the initial trade will be closed, irrespective of profit or loss. The bar within which the position is opened is also counted. The position will be closed at the start of the following bar after the set number of bars has been reached. For example, if this input is set to 5, the bar within which the position was opened will be counted as the first bar, another 4 complete bars will follow and the position will be closed at the start of the 6<sup>th</sup> bar.

*Percentage Static Balance to Stop*

The net profit at which the EA will stop working. It is measured as a percentage of initial balance. For example, if the initial balance is \$10,000 and this parameter is set to 60, then all trades will be closed once their net profit together with the current balance equal \$16,000. Set to 0 to disable.

## Lot Size Features

Table 2: Lot Size Features Inputs

Initial Lot Size	0.01
ENABLE Dynamic Lot Size	Disable
Percentage Of Risk [ONLY FOR RISK MANAGEMENT]	5.0
Adjust Lot Size At Every Balance Change Of [ONLY FOR EQUATION]	100.0
a [ONLY FOR EQUATION]	1.0
b [ONLY FOR EQUATION]	1.0
c [ONLY FOR EQUATION]	0.0

### Initial Lot Size

The starting lot size of the initial trade. It will apply to all initial trades if Dynamic lot size is disabled in the following input.

### ENABLE Dynamic Lot Size

- **Equation:** The lot size is adjusted based on the equation  $X_n = a * X_{n-1}^b + c$ , where  $X_n$  is the lot size for the position to be opened and  $X_{n-1}$  is the lot size of the last position opened. The lot size remains constant ( $X_n = X_{n-1}$ ) for  $a = 1, b = 1, c = 0$
- **Risk Management:** The lot size of the initial order is adjusted so that a pre-set percentage of the current balance is always risked based on the stop loss set for the order. A stop loss value must be set for this mechanism to work. For example, if the current balance is \$10,000, the risk is set to 5% (i.e. \$500) and the stop loss is set to 50 pips, the lots of the new order will be calculated so that they return a loss of \$500 once the stop loss is reached. This allows for a more dynamic lot size adjustment that increases or decreases proportional to the current balance.
- **Adjustable:** Lot size is set to hold the proportionality ratio of the initial lot size (previous input) relative to the initial balance (*Static Balance* input in *Basic Order Management*). For example, if the lot size is initially set to 0.1 and the initial balance is \$100,000, then the lot size will be 0.15 when balance reaches \$150,000.
- **Disable:** Lot size remains constant for the initial trades.

### Percentage of Risk [ONLY FOR RISK MANAGEMENT]

The percentage of current balance that will be risked if the *Risk Management* mechanism has been selected in the *ENABLE Dynamic Lot Size* input. For example, a value of 5 would mean that 5% of the current balance will be risked. Used only if *Risk Management* has been selected from the *ENABLE Dynamic Size* drop-down list.

### Adjust Lot Size At Every Balance Change of [ONLY FOR EQUATION]

The amount by which the balance has to increase or decrease for the lot size to be increased or decreased respectively. Used only if *Equation* has been selected from the *ENABLE Dynamic Size* drop-down list.

### a [ONLY FOR EQUATION]

The amount by which the new lot size ( $X_n$ ) is a multiple of the previous lot size ( $X_{n-1}$ ). It cannot be a negative number because this would result in a negative lot size.

For  $a > 1$ : the lot size is increased for each balance increment

For  $a = 1$ :  $X_n = a * X_{n-1}^b + c$ , i.e. the multiplication factor is neutralised and  $X_n$  is affected only from b and c.

For  $0 < a < 1$ : the lot size is decreased for each balance increment

For  $a = 0$ :  $X_n = c$ , therefore the lot size will get a fixed value  $c$  once the balance changes by the amount specified in the previous cell.

$a < 0$  is not accepted as a value because it would result in a negative number for the lot size, which is impossible.

#### *b [ONLY FOR EQUATION]*

The factor by which  $X_n$  increases exponentially relative to  $X_{n-1}$ .

For  $b > 1$ : the lot size is increased exponentially for each balance increment.

For  $0 < b < 1$ : the lot size is increased exponentially for each balance increment.

For  $b = 1$ :  $X_n = a * X_{n-1} + c$ , the exponential multiplication factor is neutralised and  $X_n$  is affected only from  $a$  and  $c$ .

For  $b = 0$ :  $X_{n-1} = 1$ , therefore the lot size becomes constant ( $X_n = a + c$ ) after the first lot adjustment.

#### *c [ONLY FOR EQUATION]*

The amount added each time to the lot size.

For  $c > 0$ : the lot size is increased for each balance increment.

For  $c < 0$ : the lot size is decreased for each balance increment.

For  $c = 0$ : the lot size is not affected by  $c$ ,  $X_n = a * X_{n-1}^b$

## Entry Signal Settings

A total of 28 indicators are offered, based on MetaTrader's default indicators. Information for all of them can be found on MT5's Help page ([metatrader5.com/en/terminal/help/indicators](https://metatrader5.com/en/terminal/help/indicators)).

- Trend Indicators
  - Average Directional Index (ADX)
  - Standard Deviation
  - Simple Moving Average (SMA)
  - Double Crossover Moving Averages
  - Bollinger Bands (Breakout – Re-entry)
  - Envelopes (Breakout – Re-entry)
  - Parabolic SAR
  - Ichimoku Kinko Hyo
- Oscillators
  - Average True Range (ATR)
  - Stochastic Oscillator
  - Relative Strength Index (RSI)
  - Moving Average Convergence / Divergence (MACD)
  - Bulls And Bears Power
  - Commodity Channel Index (CCI)
  - DeMarker
  - Force Index
  - Momentum
  - Moving Average Of Oscillator (OSMA)
  - Relative Vigor Index (RVI)
  - Williams' Percent Range (%R)
- Volume Indicators
  - Accumulation / Distribution
  - Money Flow Index (MFI)
  - On Balance Volume (OBV)
  - Volumes
  - Accelerator Oscillator (AC)
- Bill Williams Indicators
  - Alligator
  - Awesome Oscillator
  - Fractals
  - Gator Oscillator

The indicator(s) selected will determine the entry strategy followed. It is possible to enable more than one indicators for entry. Once all enabled indicators return the same signal within the same bar, then the EA will open a long or short position accordingly.



## Exit Signal Settings

### ENABLE Exit Signals

- **Disable:** No indicator will be used for exit. Exit will be based on Basic Order Management (i.e. Take Profit, Stop Loss, Trailing Stop etc.)
- **Auto:** The exit will be based on the indicators and the parameters set in the Entry Signal Settings. Once all indicators return a signal opposite to the currently open position within the same bar, the EA will close that position and wait for the next entry signal.
- **Reverse:** The exit will be based on the indicators and the parameters set in the Entry Signal Settings. Once all indicators return a signal opposite to the currently open position within the same bar, the EA will close that position and at the same time open a new opposite position.
- **Custom:** The exit will be based on the indicators and the parameters set in the Exit Signal Settings. If more than one indicators are enabled, then all indicators must return a signal within the same bar for the EA to close that position.

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### ENABLE Manual Panel

If enabled (*true*), a panel for manual trading appears when the EA is executed.

### ENABLE Comments

If enabled (*true*), useful information appears at the top left of the chart relating only to the specific chart.

1. Account balance: The current balance of the account.
2. Current profit: The profit or loss from the currently opened positions.
3. Current lots: The total amount of lots in all currently open positions.
4. Max lots: The maximum amount of lots that has ever been open at the same time.
5. Max drawdown %: The maximum drawdown as a percentage of the balance.
6. Spread: The current spread.

