Description

This is an EA whose primary edge is based on momentum. The idea is that if price has moved a certain distance in one direction, then it's likely to continue moving in that direction for some time and distance.

There are four custom concepts that need to be defined. These are the **hitbox**, the **endzone**, the **level break** and the **relative extrema**.

Using these elements we can trade 6 different 'modes', however most of the modes are simply slight variations on each other with only subtle differences. These are described below.

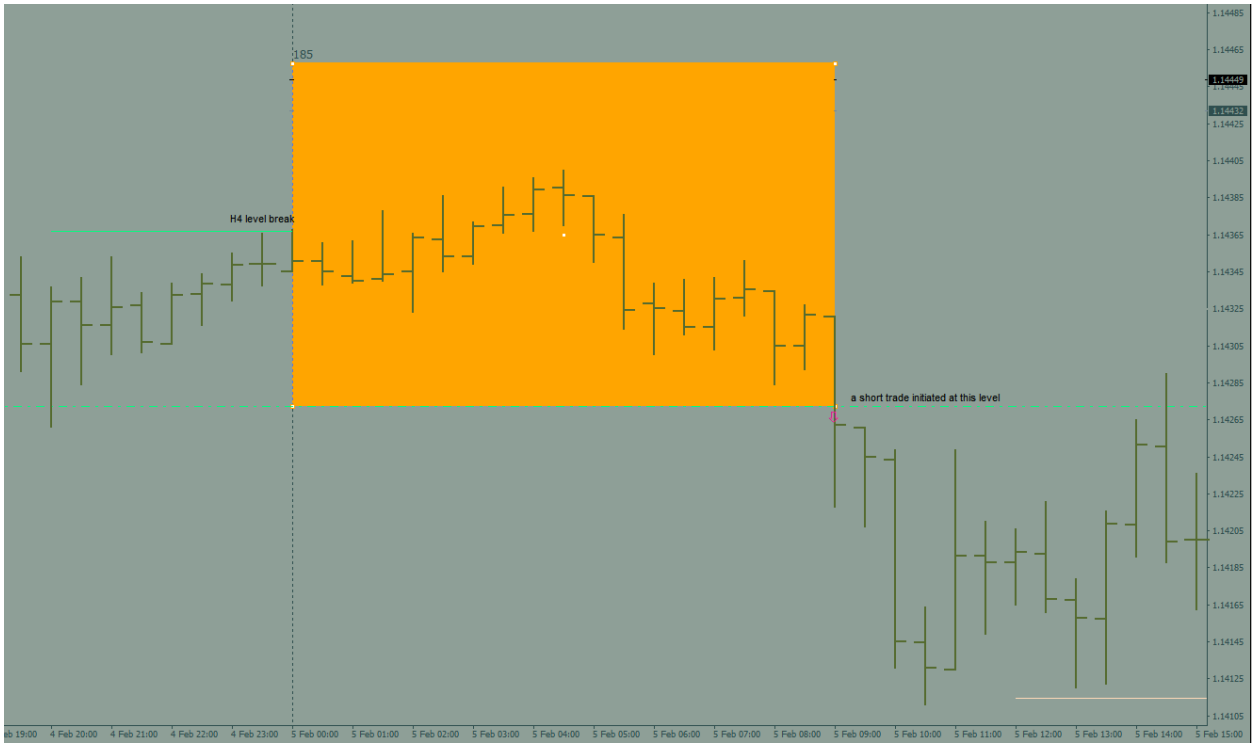
All user input variables that need to be defined in this document are coloured green, and a full list with their default settings is at the end.

Definitions

Hitbox

i. This is a rectangle that defines the initial amount of price movement that we need to see before we can enter a trade. A rectangle is convenient because it can define a time duration and a price amplitude within its area.

Fig. 1.a



In this example the hitbox is the orange rectangle. It has an arbitrary height of 185 points. When price broke up through the level shown by the solid green horizontal line (a level break) the hitbox was placed with its left edge at the price bar when the level was broken and centred vertically on that level. It has an arbitrary default width of 3 bars at creation and it extends with time every new bar until price breaks up through the top or down through the bottom of the rectangle. The hitbox will stop extending after that event. You can see in this case the price broke down and touched the bottom level, triggering a short trade.

The hitbox has some user-defined input settings with these default values:

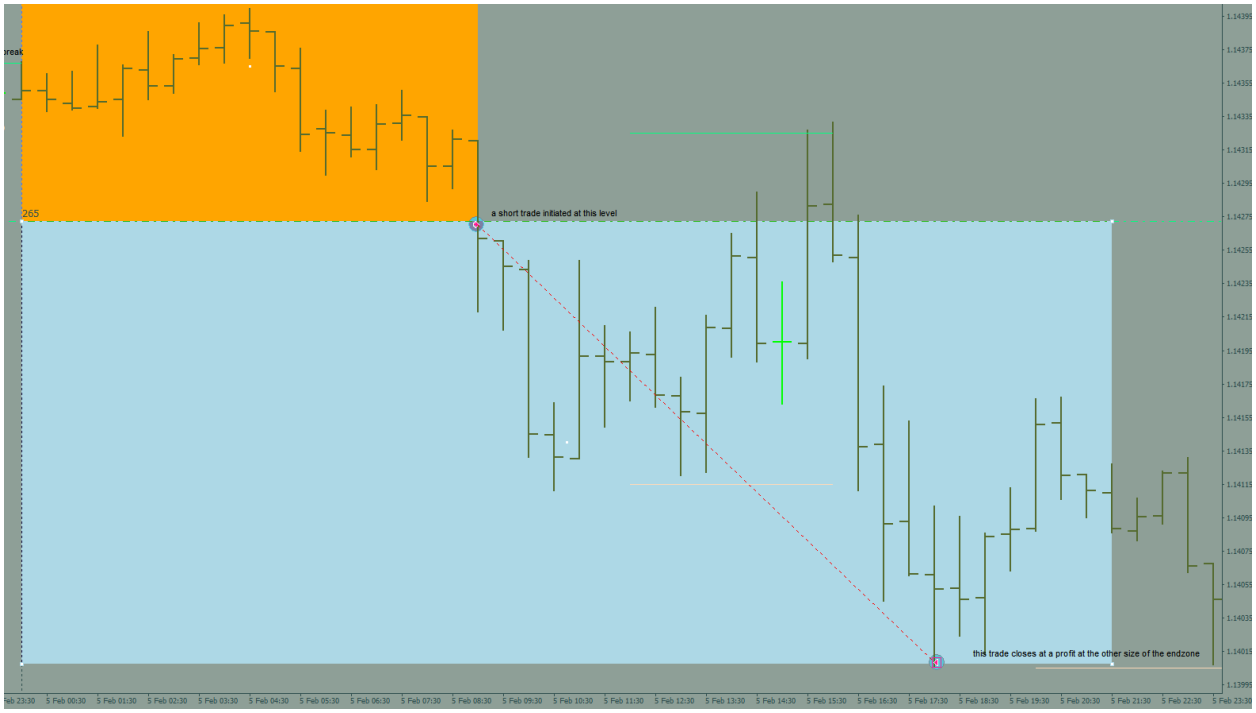
1. HitboxClr: orange (default rectangle colour)
2. HitboxHeight: 185 points (default height in points) when defined explicitly by the user
    a. Or it gets its value from an indicator like ATR (average true range)
3. HitboxWidth: 3 (default width in bars at creation)
    ii. If the hitbox is disabled (height zero) then we'll enter a trade immediately on a valid signal.
    iii. The hitbox placement can have 3 settings
        1. HitboxPlace: centre; (centred vertically at the closing price of the most recently closed bar (default))
        2. HitboxPlace: levelbreak; (centred vertically at a **level break** (defined below))
        3. HitboxPlace: extrema; (at the high or low of the last bar of a **relative extrema** (defined below))
4. HitboxOverlap: false; (if true allow hitbox rectangle overlapping)

a. If we are placing multiple trades, and this setting is true then new hitboxes can be placed on top of existing ones. After a trade has completed, the hitbox should be changed to ‘use background: false’ and become an outlined rectangle. This is so that the current (active) hitboxes are not covered up.
b. If false, enough time must elapse or price must move enough for a hitbox to avoid being created in the same space as an existing one.

Endzone

1. Like the hitbox this is also a rectangle. It also has some default input settings
    a. EndzoneClr: light blue (endzone colour at creation)
    b. EndzoneWidth: 3 bars (endzone width at creation)
    c. EndzoneHeight: 225 points (default height in points) which is either
        i. a fixed size in points
        ii. Or a multiple of the HitboxHeight; default: 1.5x;
2. The endzone defines the price target. It is placed next to the hitbox at the moment that it is breached by price. It uses the same starting time as the hitbox, but most often will move beyond the hitbox as time passes. Like the hitbox, it extends to the right with time at each new bar. When price hits the opposite side of the endzone the trade closes at a profit.

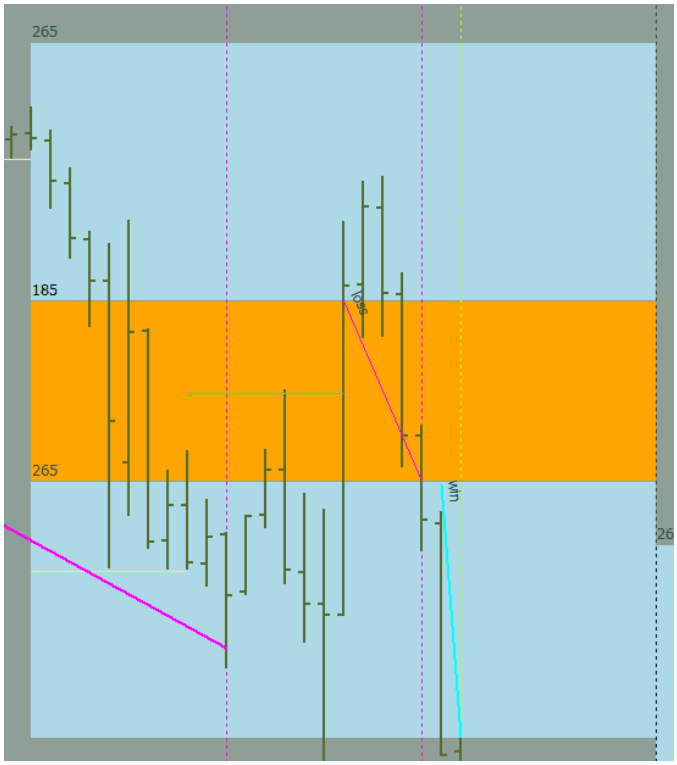
Fig. 2.a



Here is the previous hitbox example after the endzone has been added. The price moved into the endzone, and then touched the other side, resulting in a profitable short trade.

3. If both sides of a hitbox are breached by price, an endzone should be drawn above and below the hitbox.

Fig. 2.b



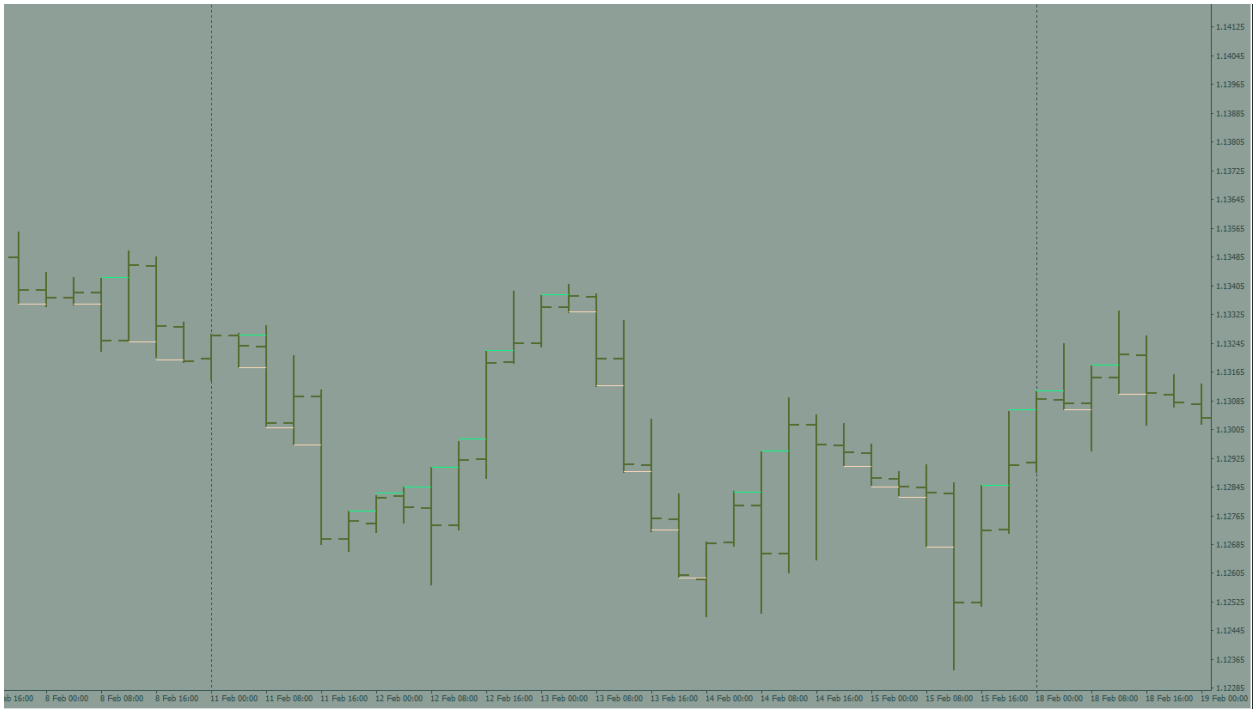
A hitbox with two endzones, one above, and one below as price eventually hit both the top and bottom of the hitbox. In this example, the stop loss level was set to the far side of the hitbox so a long trade closed at a loss, but a second short trade was opened when price crossed below the hitbox and that trade was a winner when price hit the far side of the endzone. The thicker magenta line is from a previous trade.

4. Like hitboxes, when a trade is completed they should be set to ‘use background: false’ so that their fill colour is replaced by an outline to reduce visual clutter.

Level Breaks

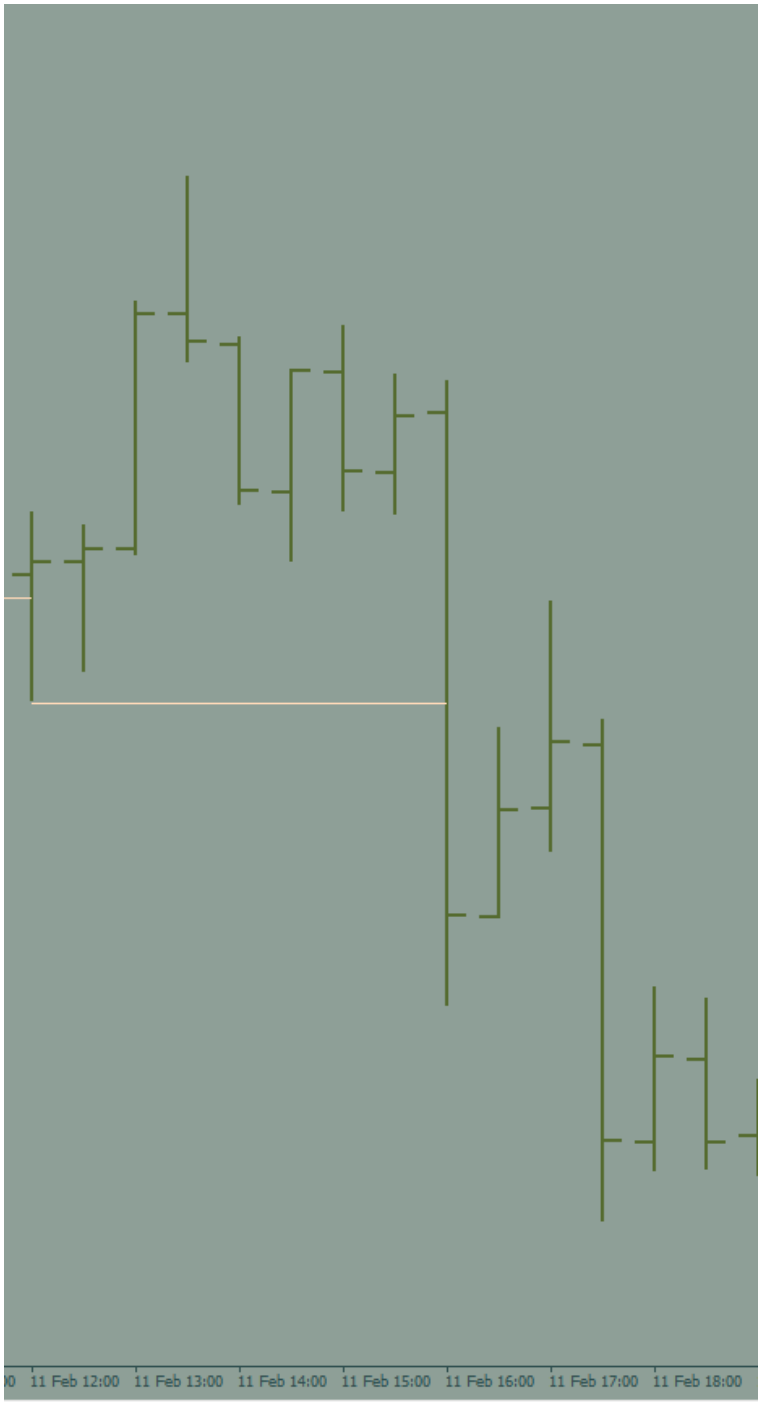
This refers to the level where price breaks down below a previous bar’s low or breaks above a previous bar’s high. These are marked with horizontal trendlines as in the screenshots below.

Fig. 3.a



Here is a section of price history with all the obvious level breaks marked on the H4 timeframe. The bullish breaks are marked with green lines and the bearish ones with pink lines.

Fig. 3.b



Here is a close-up view of one of those breaks as seen on M30. You can see that price dropped and moved down below the low of the first bar in this chart. The low of the first bar is marked with a line that begins at the bar's low price and when it makes contact with a price bar that breaks down below that level the line is terminated. Unlike hitbox/endzone rectangles level breaks are only drawn on the screen after they have occurred.

Level breaks need some user-defined settings:

1. LevClrBullish; default: pale green; (bullish level break line colour)
2. LevClrBearish; default: light pink; (bearish level break line colour)
3. LevLineStyle: solid 1 point (level break line style)
4. LevTimeframe; default: H4
   This is the chart time frame on which to consider level breaks. If the user switches the chart's timeframe that should **not** alter the behaviour of the EA.
5. LevLifetime; default: 1 bar.
   This is the number of bars that should be counted for a level break to be a valid signal. In fig. 3.a the value is 1. If a level break doesn't happen on the following bar then no line is drawn. However in fig. 3.b the value is at least 8, as a signal is shown after 8 bars have formed since the first bar's low price.
6. LevPadding; default: 5 points
   If a level is broken by only 1 point it might not be a very good signal (just as likely to be a reversal) so this is an additional amount in points that price must travel to trigger the level break. This doesn't affect the placement of the level break line.

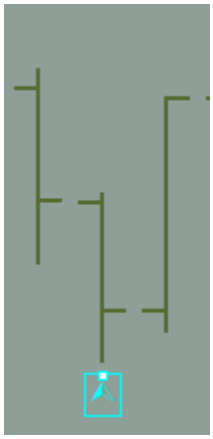
Relative Extrema (RE)

This is simply the mathematical term for what are commonly called 'fractals'. Sometimes these are called 'swing high' or 'swing low'. This pattern is indicative, though not a guarantee of a reversal.

Bullish 3 bar example

Every RE considers an odd number of bars. The following example uses a three bar pattern, the smallest number of bars that can be considered.

Fig. 3.a



1. Here is a bullish RE. It can only be defined after at least 3 bars have formed and closed. It must have these attributes:
   a. It consists of a middle bar with a low that is equal to or lower than the bar to its left and right
   b. At least one of bar 1 or bar 3 must have a higher low than bar 2.

    c. Bar 3 or a later (future) bar must have a high price higher than the high price of bar 2. In other words, the high price level of bar 2 must be broken upwards at some point.
        i. If bar 3 is not the bar that breaks the bar 2 high, a maximum number of ensuing bars should be considered for the bar 2 level break - maybe only four future bars?
2. The middle bar of the pattern is marked with an arrow. Since this is a bullish example the arrow is beneath the low price of bar 2.

Bearish 3 bar example

Fig. 3.b

3. Here is a bearish RE. It can only be defined after at least 3 bars have formed and closed. It must have these attributes:
    a. It consists of a middle bar with a high that is equal to or higher than the bar to its left and right
    b. At least one of bar 1 or bar 3 must have a lower high than bar 2.
    c. Bar 3 or a later (future) bar must have a low price lower than the low price of bar 2. In other words, the low price level of bar 2 must be broken downwards at some point. As before, only about four future bars should be checked to see if this occurs, after that, abandon the signal as invalid.
4. The middle bar of the pattern is marked with an arrow. Since this is a bearish example it is placed above the high of bar 2.

5. Patterns with more bars follow the same rules but consider different bars in relation to the central bar. For example a five bar bearish pattern would compare bars 2,3 and 4 but require bar 5 to have a lower low price than bars 1 and 4.

REs must have some user-defined settings.

1. BullArrowClr: lime green; (default bullish RE arrow colour)
2. BearArrowClr: red; (default bear RE arrow colour)
3. REArrowType: 217; (default RE arrow type)
4. ArrowDist: 5; (default distance of the arrow from the middle bar for both bear and bull signals in points. Bear signals should be above the middle bar, while bull signals should be below the middle bar)
5. PatternBars: 3; (the default number of bars to check for an RE pattern)

Entries, Exits and Re-Entries

Now let's define when to enter, exit and re-enter.

Entry conditions

- No pending orders.
- No stops or limit orders should be sent to the server
- Market orders should be executed when price reaches the levels set by hitboxes, endzones, level breaks or stop loss zones.
- All entries are defined by bid prices so long order measurements and targets should have the value of the spread deducted. Another way to say the same thing is that the EA entries should closely match what is shown in the chart examples.

Re-entry conditions

Re-entries are trades taken immediately after a loss that have different settings than the initial trade that spawns the re-entry chain.

It's important regardless of what trading mode is selected to establish if we are going to allow unlimited simultaneous active trades or limit the number of active trades, both entries and re-entries.
MaxTrades: 2; (if set to zero there is no limit to the number of active trades allowed)
MaxLongTrades: 1; (restrict the number of simultaneous long trades to this number)
MaxShortTrades: 1; (restrict the number of simultaneous short trades to this number)
ReEnterVolMult: 2x; (volume multiple for re-entry; this can be effectively disabled by setting it to 1x)
PlyLevel: 1; (this determines the number of times to respond with a re-entry after a loss, as well as the number of times to boost (or shrink) trading volume if the volume multiplier is > or < than 1.0). If ply level is zero, re-entries are disabled.

Ply level determines how many times the re-entry trade can be ‘martingaled’ (more accurately, volume-boosted or volume-shrunk). For example, suppose a trade closes at a loss with a volume of 0.01. The subsequent trade using the above settings (2x volume) would use volume 0.02. If that trade was a loss the following trade is not a re-entry. It would begin again at the default volume of 0.01 using the standard entry, sl, tp of the method. If ply was set as level 2, then after a second loss, the third trade is a re-entry and would start at volume 0.04. If this third trade is a loss, the subsequent trade will start at 0.01 and is not a re-entry type.

Entries & Exits

Entries, Exits, Re-Entries With No Hitbox

Let’s begin by looking at the three trade modes that use a hitboxHeight:0 (hitbox is disabled)

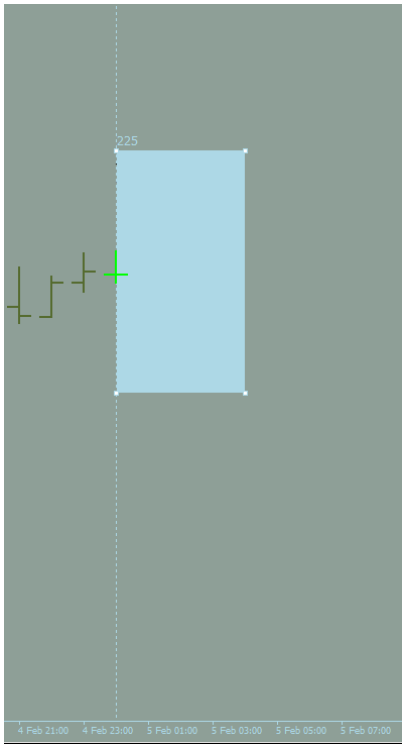
If the hitbox height is set to zero then the hitbox is not used and the endzone is the only element that must be in play. However in that case the endzone needs to have some of the settings associated with the hitbox:

- It must be placed using one of the three options:
    - At the most recently closed bar (MRC) (hitboxPlace: centre)
    - At a level break (hitboxPlace: levelbreak)
    - At a relative extrema (RE) (hitboxPlace: extrema)
    - And the overlapping option HitboxOverlap must be set. By default it is false (overlapping disabled)

Mode 1: No Hitbox; endzone placed at MRC

In this mode, with the endzone centred on a bar, the endzone actually acts the same way as a hitbox, forcing price to move before an entry can happen. The only reason to do this is if you want to focus on reversion instead of trending action.

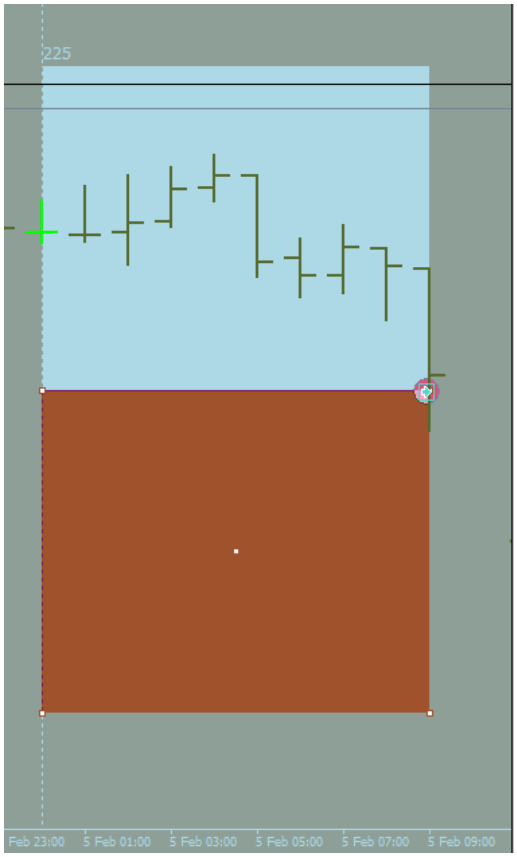
It would look like this initially:
Fig. 4.a



This is an endzone with default values centred on the MRC. Placing the endzone using this option means there is no inherent direction bias. We'll enter in the direction opposite to the endzone side that is crossed first.

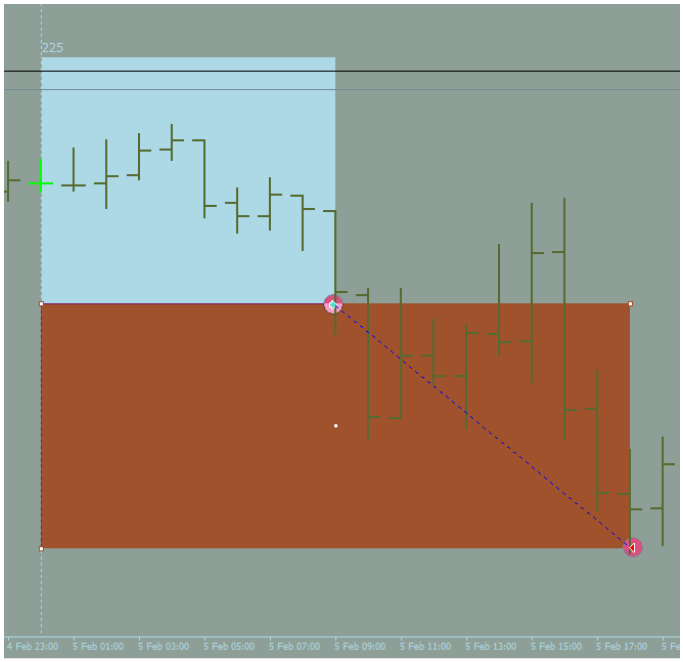
Entry: when price touches one side of the endzone

Fig. 4.b



Here price touches the bottom of the endzone, triggers a **long** trade and triggers the creation of a stop-loss zone. The stop loss zone will have its own settings similar to the endzone.
StopLossZoneHeight: 128;
StopLossZoneClr: sienna;
The stop loss zone is always placed with one edge adjacent to the endzone.

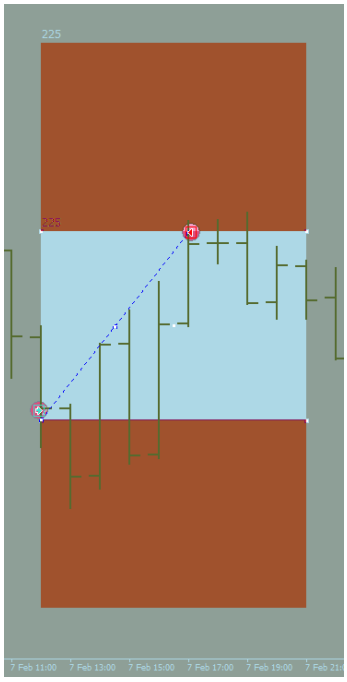
SL: using a stop loss zone which has separate settings from the endzone.
Fig. 4.c



This trade closes at a loss as price crosses the stop loss zone.

TP: when price touches the other side of the endzone

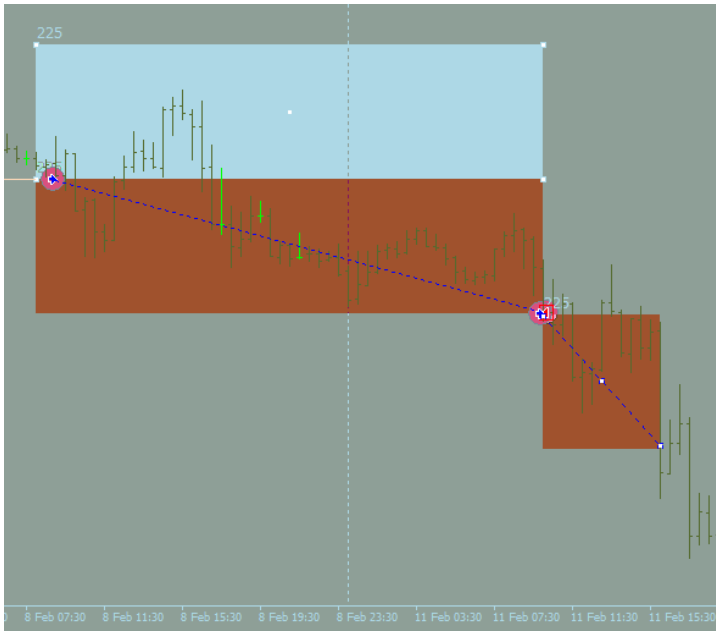
Fig. 4.d



Price drops to the entry level, triggers a long, and this time it hits the other side of the endzone resulting in a profitable trade.

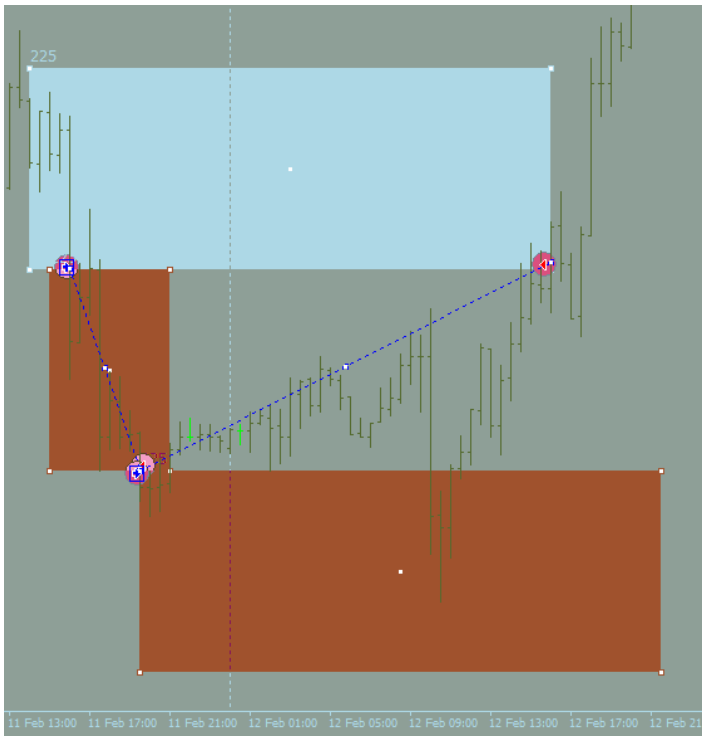
Re-entry: immediately after a loss. If ply level is >= 1, enter a trade immediately using the stop-loss zone as the profit target. Use a second stop loss zone to handle the stop loss for this new trade.

Fig. 4.e



A failed re-entry, going long after the first loss but price continues down to cross the second stop loss zone resulting in a worse loss.

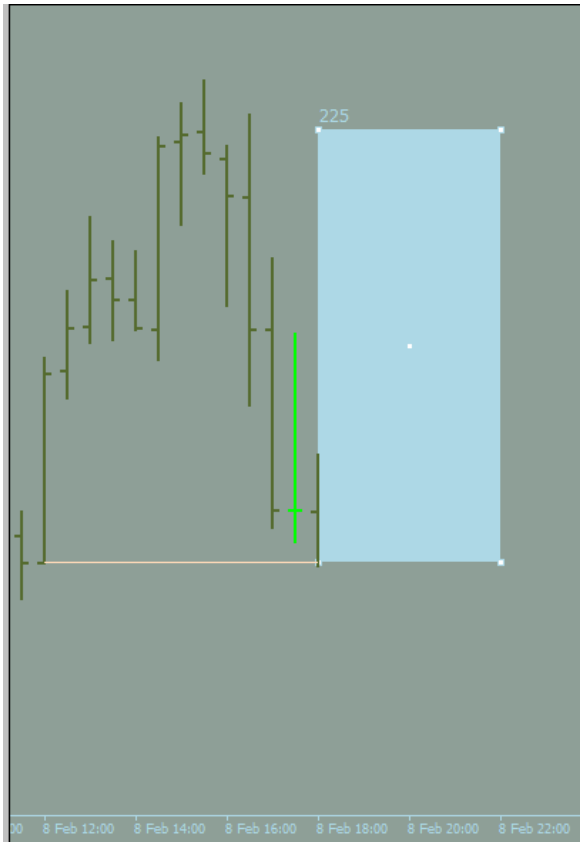
Fig. 4.f



In this case the re-entry is successful. After an initial failed trade, the first stop loss zone acts like an endzone. Maybe its rectangle colour should change as well after initiating the re-entry trade?

Mode 2: No Hitbox; endzone placed at Level Break

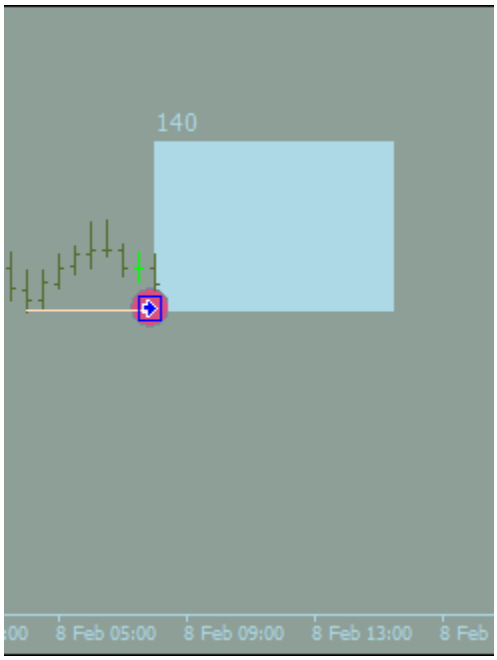
This mode is similar to the previous one but now the endzone is placed using level breaks. Fig. 5.a



When there is no hitbox and we are positioning using level breaks, the endzone is **not** centered vertically along the level break level as a hitbox would be. It is placed with one edge at the same level as the level break. Since we expect a *reversion* trade the example shown here, with a bearish level break triggers a *long* trade as soon as the level break forms, with a target at the top of the endzone. Therefore the endzone is aligned with its bottom edge at the level break level.

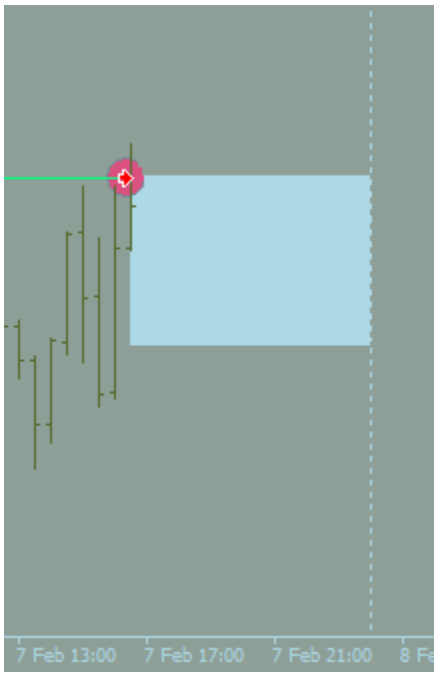
Entry: Enter in the direction opposite to the level break immediately after its formation. In this example the entry is long as the level break (using timeframe H4) is bearish.

Fig. 5.b



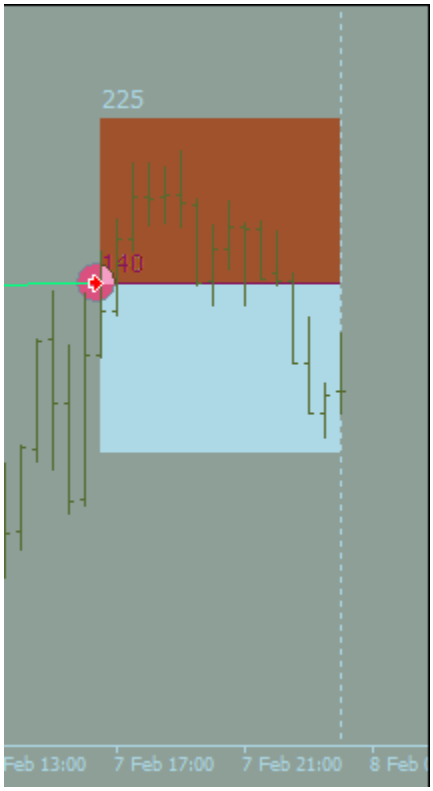
The endzone is placed above the level break with the bottom edge aligned with the broken level. This initiates a long trade.

Fig. 5.c



The endzone in this example is placed below the bullish level break with the top edge aligned with the broken level. This will initiate a short trade.

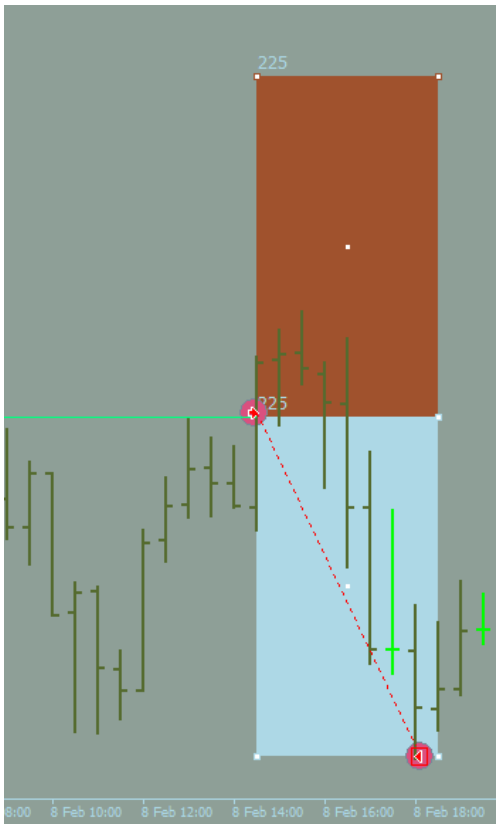
SL: When price moves away from the endzone it triggers the formation of a stop-loss zone.



In this example if the short trade rose to the top of the new stop loss zone rectangle it would close at a loss but it appears that won't happen. Since price hasn't hit the far side of the endzone this trade is still active.

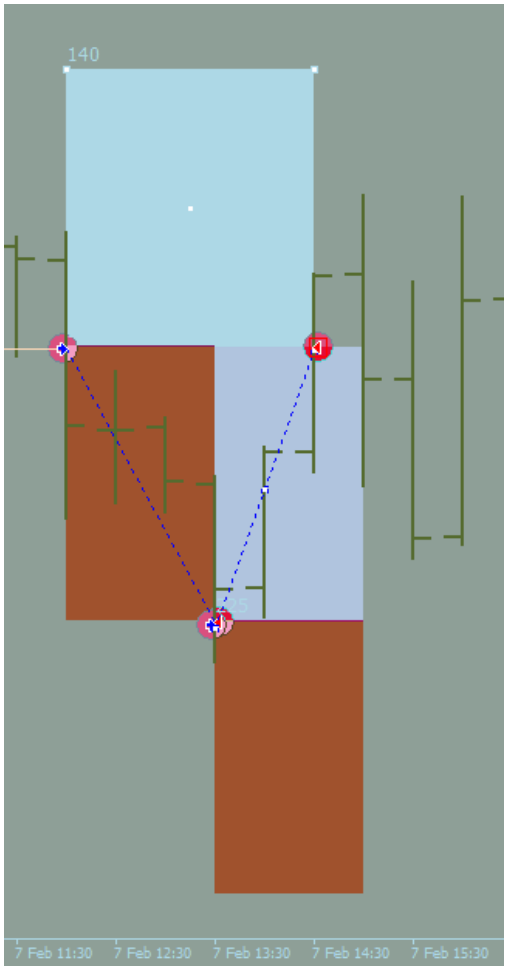
TP: When price crosses the endzone it results in a profitable short trade.

Fig. 6.a



Re-entry: similar to Mode 1

Fig. 6.b



The initial long trade fails. The re-entry is entered immediately after the loss and generates a second stop-loss zone, beneath the first. The original stop-loss zone becomes the endzone, and the trade target is the other side of that zone.

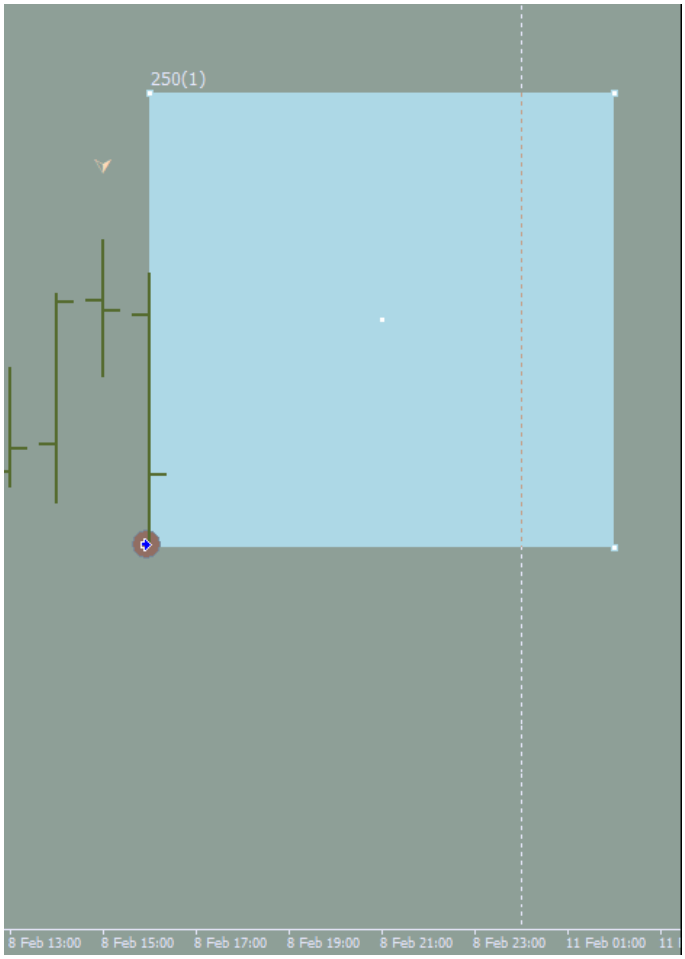
I adjusted the colours of the initial stop-loss zone to show this change, which would be a nice feature, but not critical. The re-entry trade is successful.

Mode 3: No Hitbox; endzone placed at RE

A 3-bar bearish RE forms and so the endzone is aligned with the bottom edge at the low of the bar that breaks the low of bar 2 in the RE. In this case, and the most common result, that is the low of bar 3.

Entry: a long trade example with a target at the top of the endzone rectangle.

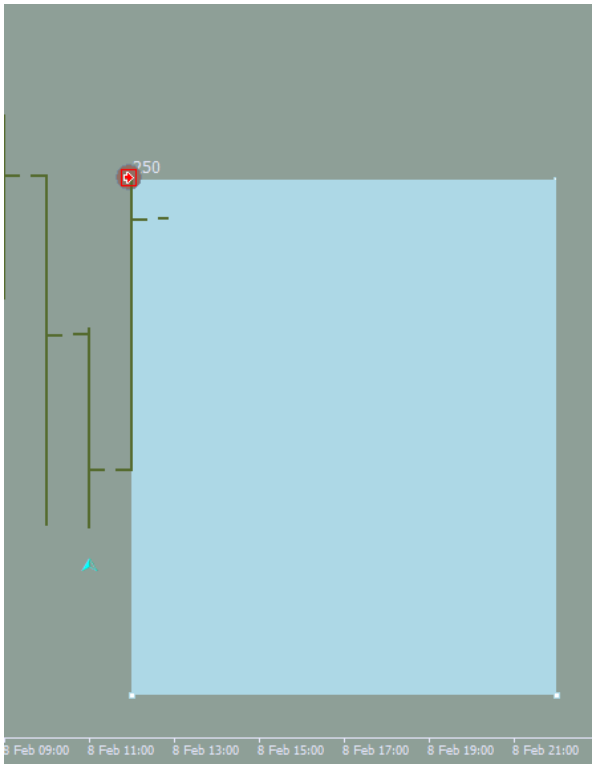
Fig. 7.a



Short trade example

The RE is bullish, so a similar but opposite setup is formed.

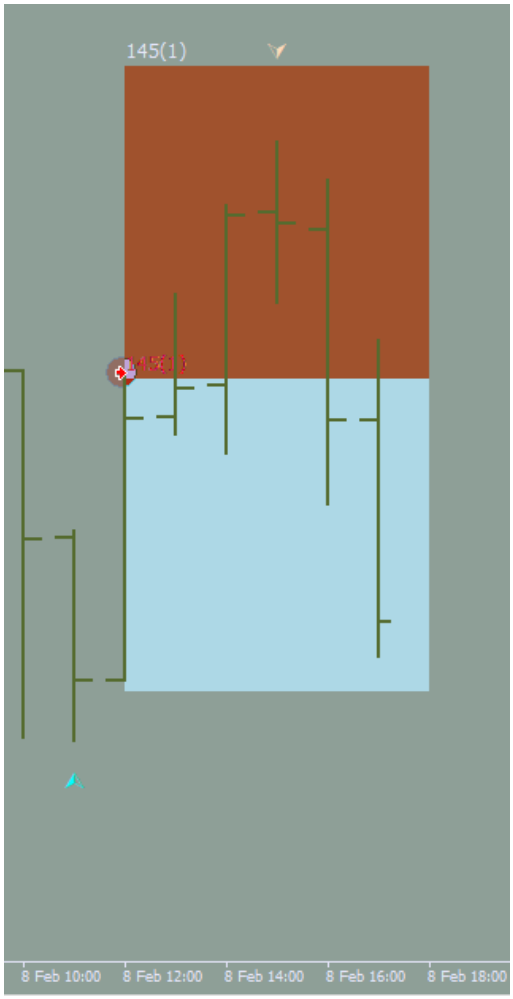
Fig. 7.b



The RE is bullish and the endzone is placed with its top edge at the high of bar 3 which broke the high of bar 2 in the three bar pattern. Note that bar 1 and 2 have the same low price but bar 3 has a higher low so the pattern is valid.
This sets up a short trade with the profit target at the bottom of the endzone.

SL: If price declines below the endzone a stop-loss zone will be created below the endzone to handle the stop loss.

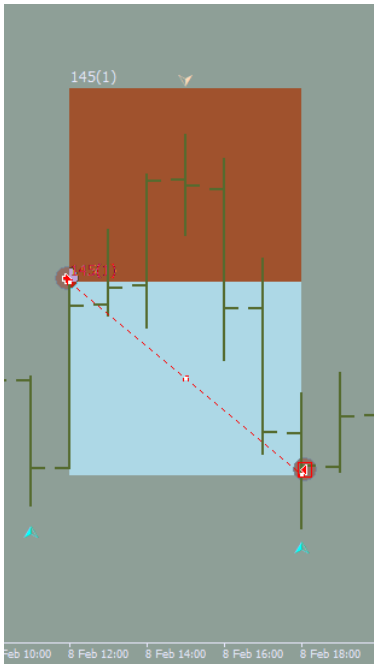
Fig. 7.b



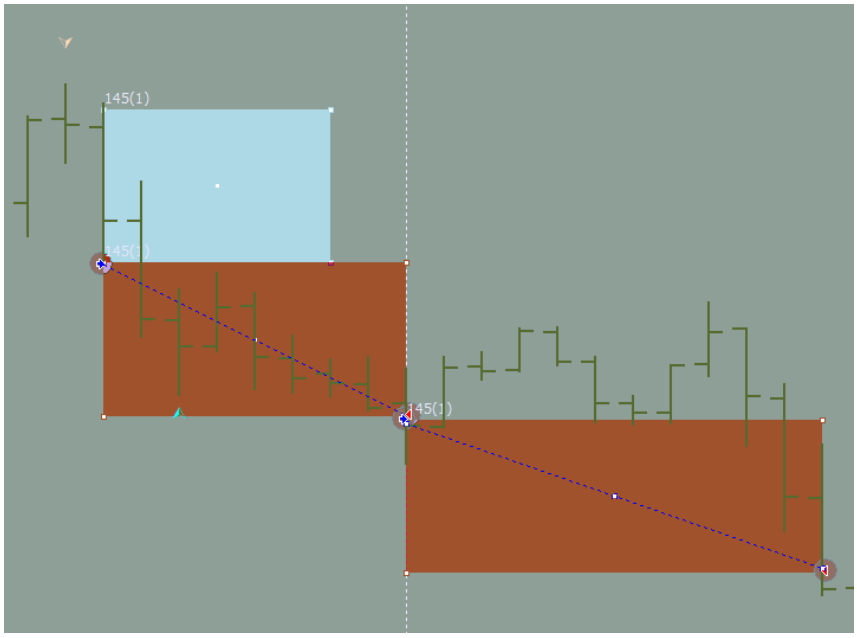
In this case it looks like the stop loss won't be hit, but it's not guaranteed yet.

TP: Close the trade at a profit when it reaches the other side of the endzone.

Fig. 7.c



Re-entry: Nearly identical to the Mode 2 example.
Fig. 7.d



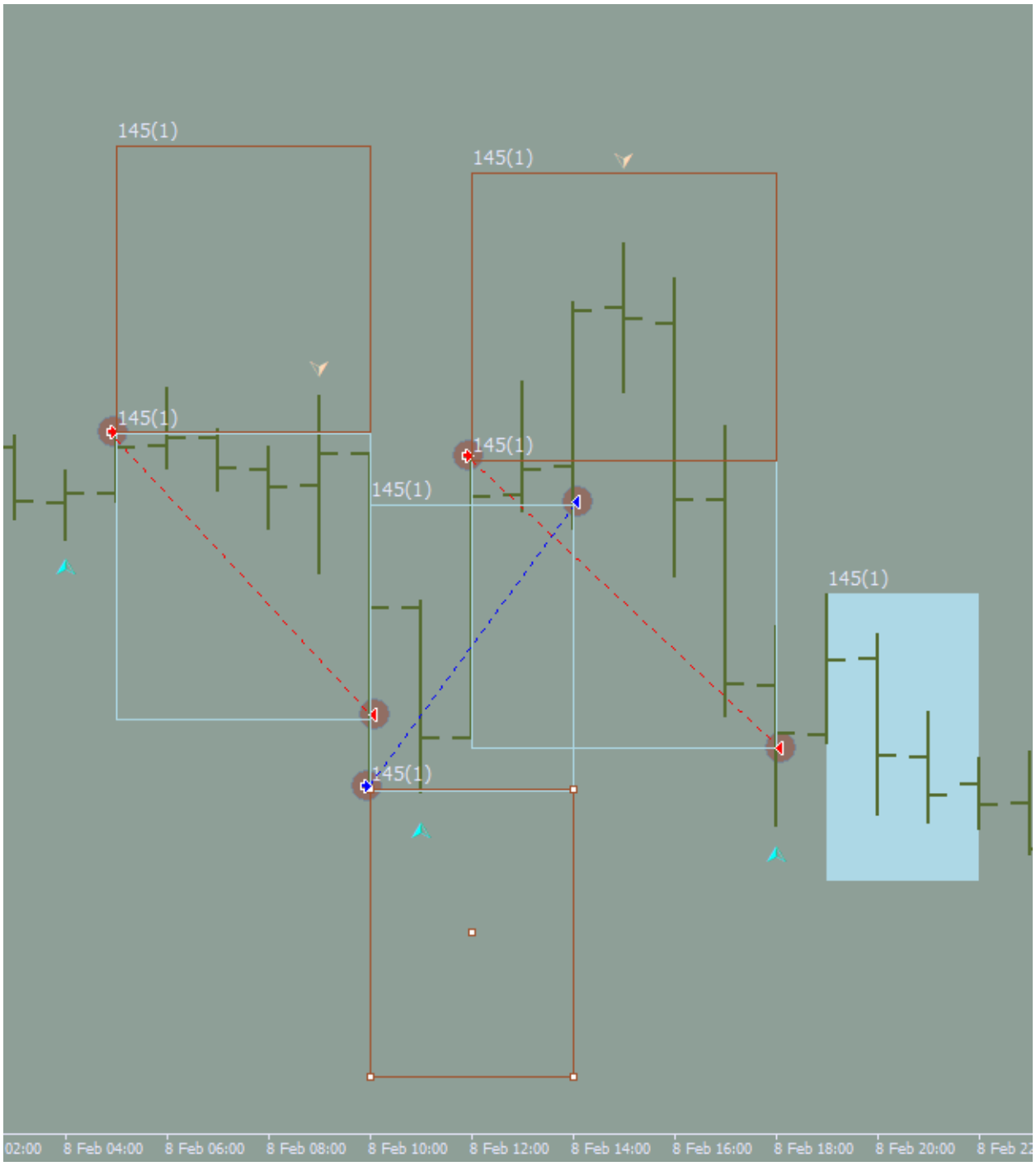
The initial long trade fails and sadly the re-entry trade fails as well with a second stop-loss zone.

Overlapping:true; Example

The examples shown for these three methods have so far all used non-overlapping settings, but if overlapping was allowed there would simply be more active trades and more rectangles. As

this can get visually crowded and overwhelming quickly, only the active trade should have filled rectangles. As trades close, their rectangles should become non-background objects (un-filled).

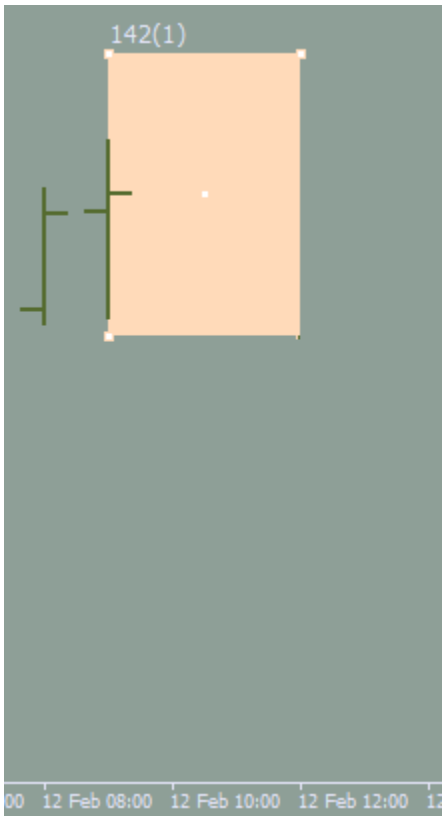
Fig. 8.a



3 successful and closed trades are represented with only the current active trade having a filled rectangle.

Mode 4: hitbox placed at MRC

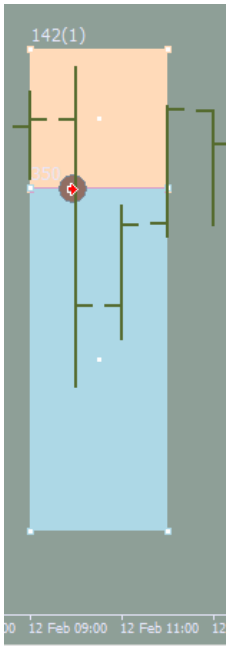
Now let’s look at examples where the hitbox is used.
Fig. 9.a



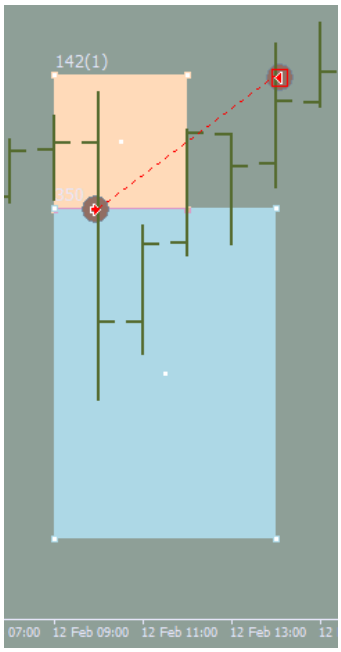
In this example the hitbox (pink rectangle) is placed at the most recently closed bar, centred on the closing price.

Entry: when price touches the hitbox edge.

Price drops through the hitbox, an endzone is added below.
Fig. 9.b

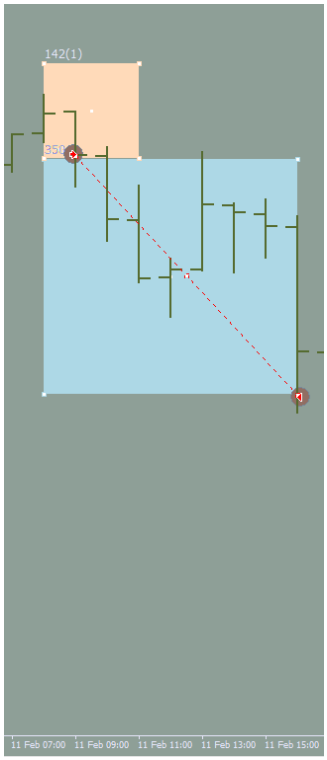


SL: the other side of the hitbox becomes the stop loss level
Fig. 9.c



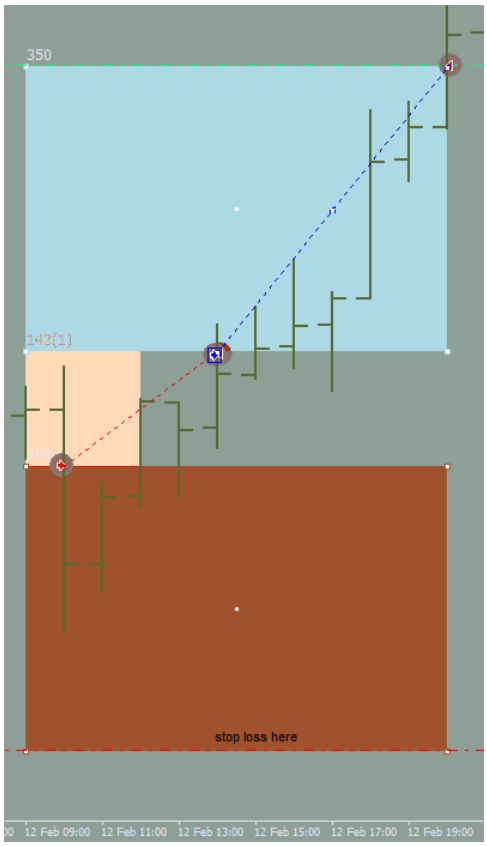
Price moves up and crosses the hitbox, resulting in a loss.

TP: when price touches the other side of the endzone
Fig. 9.d



Re-entry: enter immediately after a loss using the second endzone that is created when price touches the other side of the hitbox. TP when price crosses the far side of the new endzone, and use the far side of the old endzone as the SL. Note that where the ‘no hitbox’ modes simply repeated the trade type for the re-entry, when using a hitbox, the trade type reverses to go with the presumed trend change. So in this example the initial trade was short, but the re-entry is long.

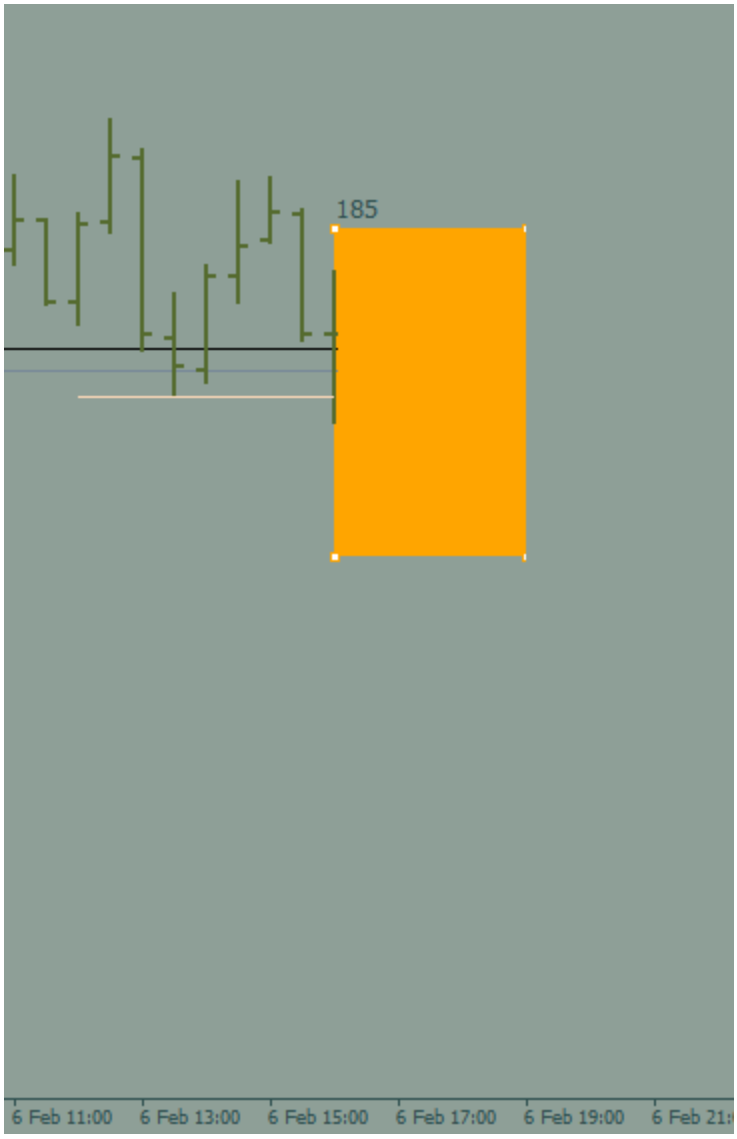
Fig. 9.e



The initial short trade (from fig. 9.b) fails, but the re-entry long trade succeeds. Note that re-entries can have a different SL level than the initial trade. This mode uses the old (first) endzone like a stop loss zone. It should change colour to show its new role.

Mode5: hitbox placed at Level Break

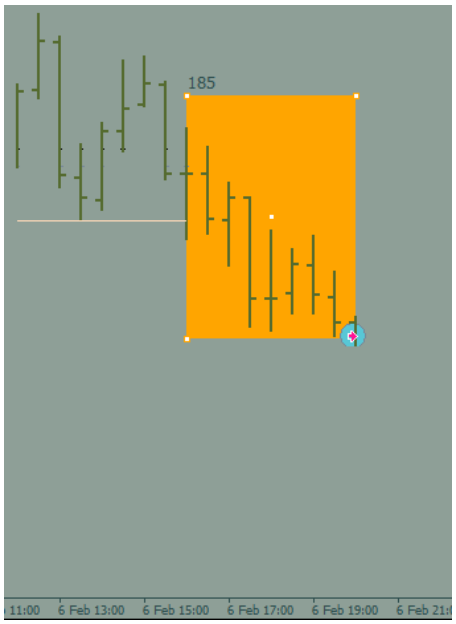
Fig. 10.a



The initial setup uses a hitbox that is centered vertically at the level break at the moment it occurs. Whichever edge (top or bottom) of the hitbox is hit first will determine the trade entry direction.

Entry: when price touches top or bottom edge of the hitbox

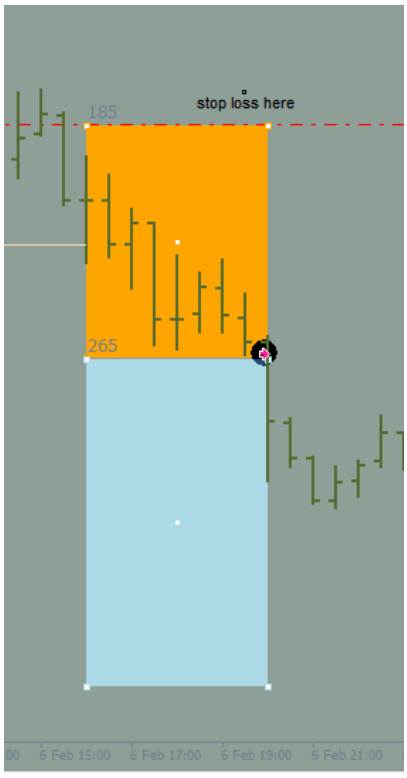
Fig. 10.b



Price drops down to the bottom edge of the hitbox and initiates a short trade

SL: for the initial trade SL is placed at the side of the hitbox opposite to the side entered.

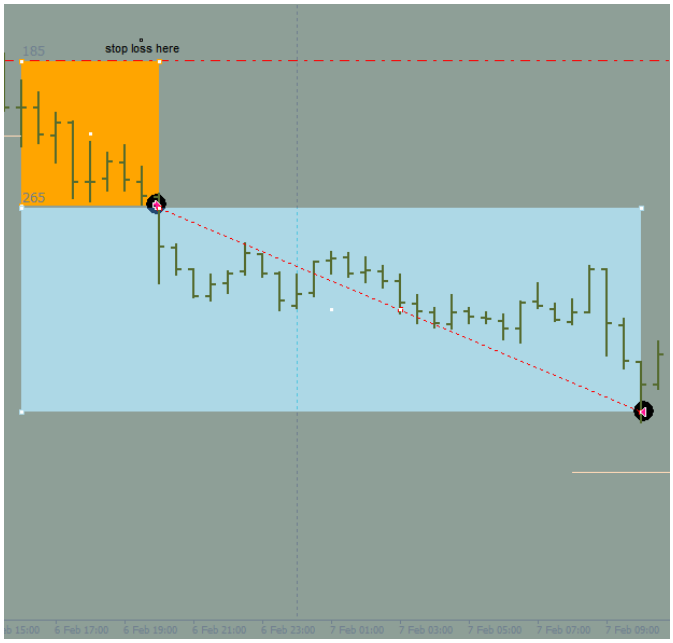
Fig 10.c



In this example the SL is the top edge of the hitbox.

TP: for the initial trade is the far side of the endzone.

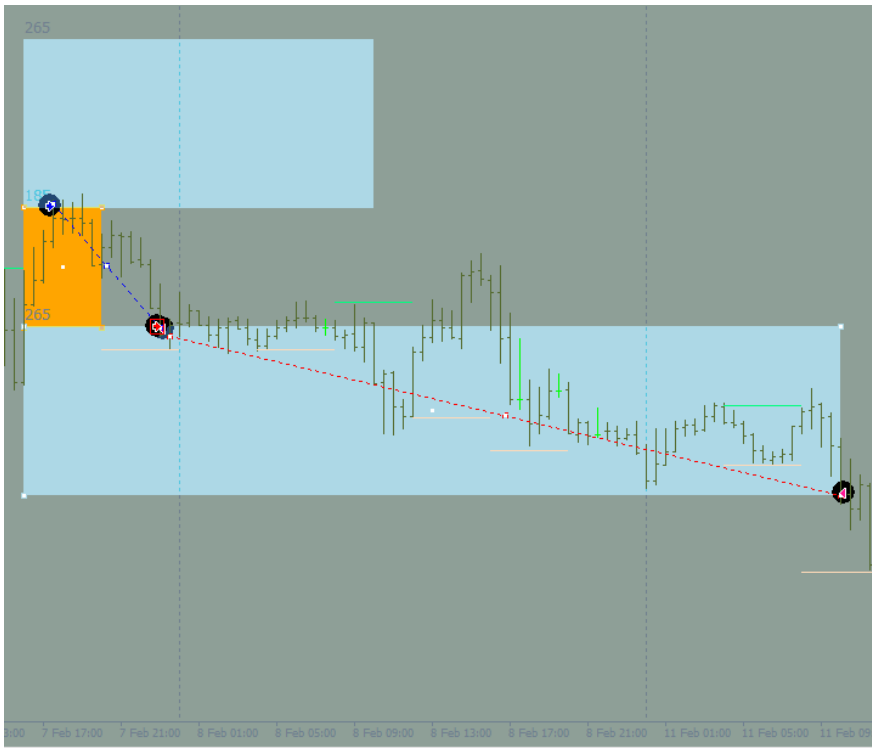
Fig 10.d



In this example the short trade closes at a profit when price touches the bottom edge of the endzone.

Re-entry: immediately after a loss, reversing the trade direction

Fig. 10.e



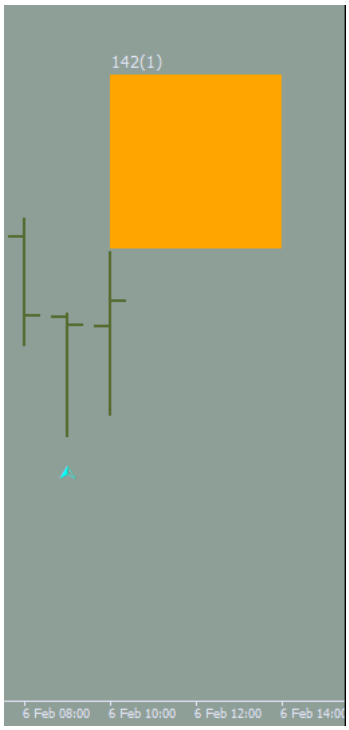
The initial long trade fails when it reaches the stop loss at the other side of the hitbox, and the re-entry is immediately entered short. It is successful when it reaches the other side of the endzone. The stop loss for the re-entry trade was the top edge of the upper endzone.
Note the level breaks that are shown but not entered, either because overlapping is disabled or because a maximum of one active short trade is enabled.

Mode 6: hitbox placed at RE

Compared to mode 3 we are placing the hitbox in the opposite way. If the RE is bullish, then we want the lower edge of the hitbox to align with the low of the bar that breaks the high of the middle bar in the RE pattern. The example uses a 3 bar pattern.

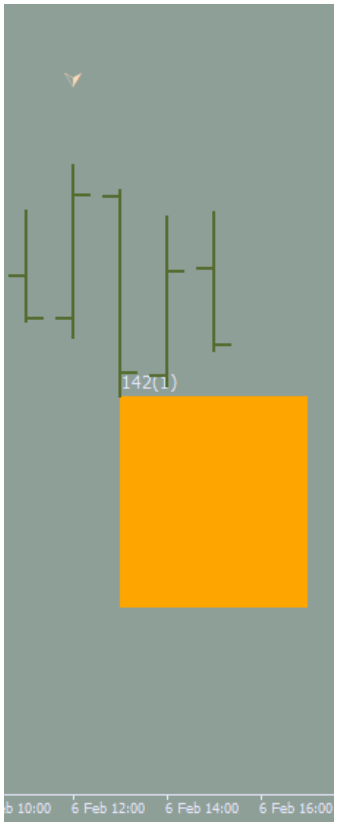
Entry: align hitbox with final candle of the RE pattern

Fig. 11.a



The RE is bullish. The hitbox bottom edge aligns with the high of the bar that breaks the middle bar high. A trade will be entered long if price can break the top edge of the rectangle.

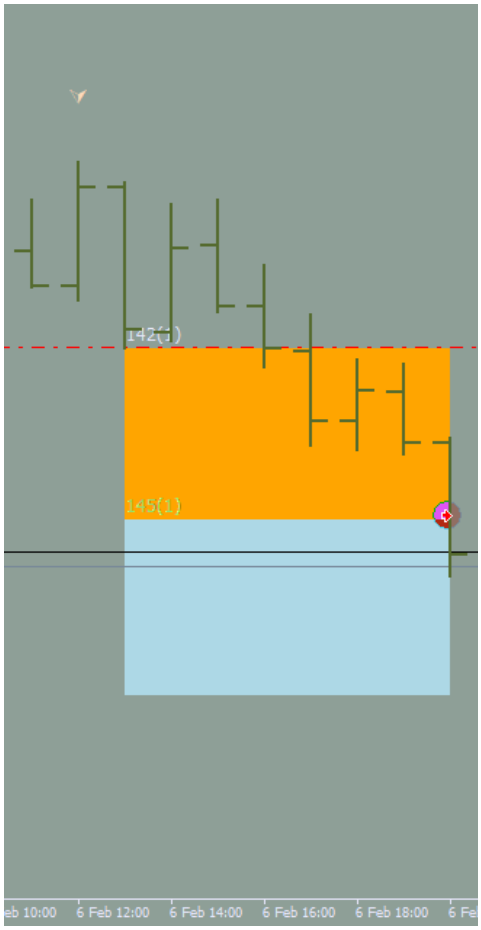
Fig. 11.b



And this is a bearish example. The RE is bearish. The hitbox bottom edge goes on the low of the third bar which broke the middle bar low of this three bar pattern. If price can cross to the other side of the hitbox it will trigger a short trade.

SL:close at a loss if price retraces and touches the side of the hitbox opposite to the side entered

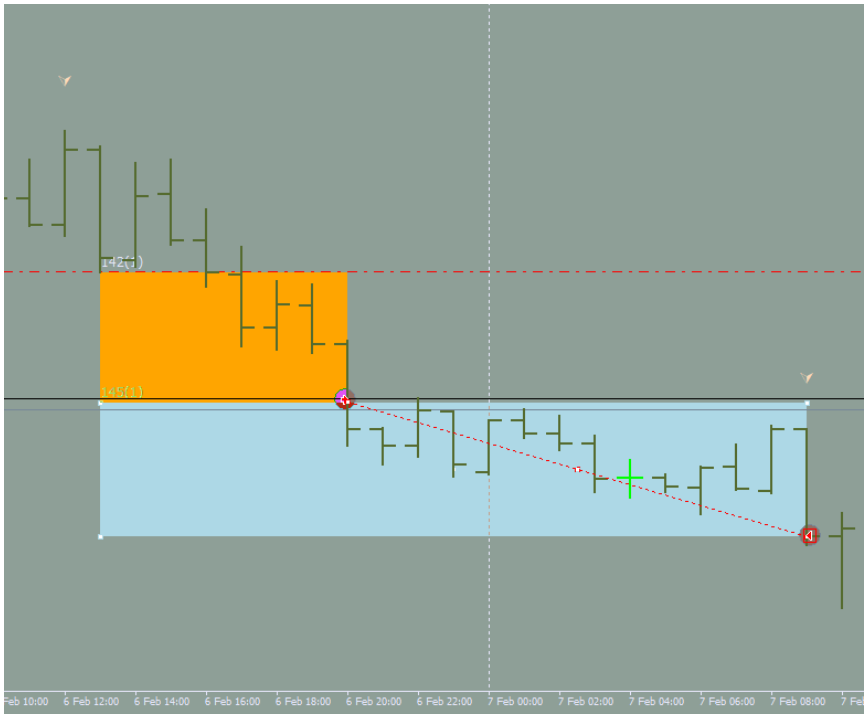
Fig. 11.c



A short trade is initiated as price crosses down and touches the bottom edge of the hitbox. An endzone forms giving us a profit target, and the stop-loss level is now the top edge of the hitbox.

TP: close the trade at a profit if it touches the far side of the endzone.

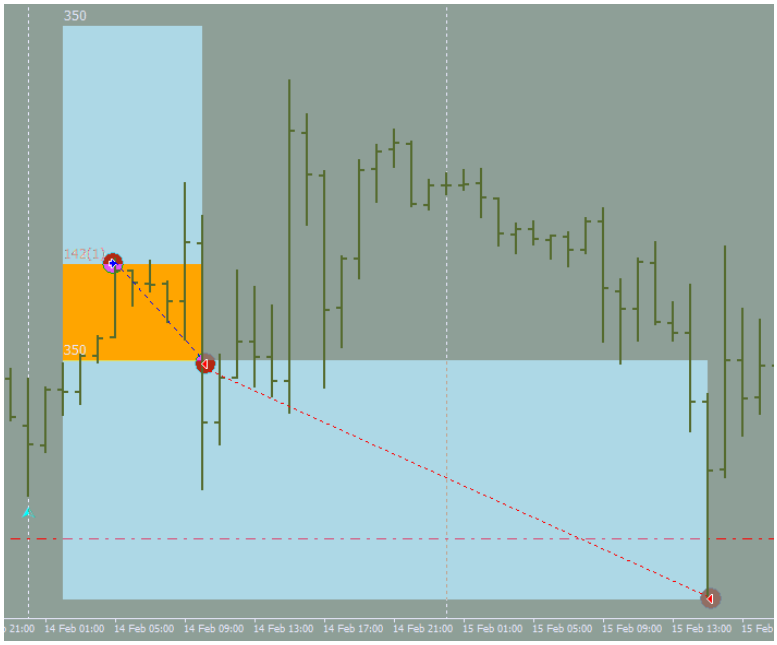
Fig. 11.d



A successful short trade.

Re-entry:immediately after a loss, using the second endzone as the TP target, and the first endzone as the SL.

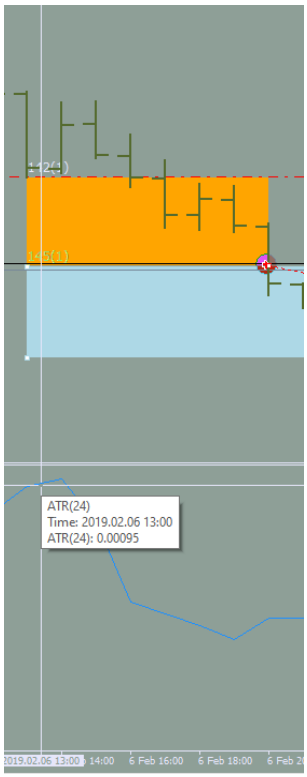
Fig. 11.e



The initial long trade fails and so a short trade is initiated. The initial trade is stopped out at the hitbox bottom edge, but the re-entry trade uses the top endzone top edge as the SL. It nearly reaches it, but the larger space allows the trend to reassert itself and the second trade wins.

Getting the hitbox value from an indicator

I don't know if it's possible to add different indicators from which to get a range/hitbox height value, but if a specific one must be specified, let it be the ATR. Note that MQ4 has two different ATR indicators. It should be the one that has 3 digits of precision. It is likely that the value given by the ATR will need to be scaled up to make sense. For example this reading:



The value is 0.00095 when a valid multiple would be something like 95 points.

Trailing and Break-even

Trailing

UseTrailing: false;

- When set to **true** all trading modes will **ignore the endzone take-profit level** and simply hold the trade until **an opposite signal** is received.
- When an opposite signal is received, **close all active trades**
- Note that this doesn't affect the endzone for other purposes, for example when it's used as a stop-loss zone.

The opposite signals depend on the mode and placement.

- Mode1
    - if the active trade(s) were triggered on the upside (broke the top edge of the endzone) then an opposite signal is one that breaks to the downside (breaks the bottom edge of the endzone)
    - If the active trade(s) were triggered on the downside, an opposite signal is one that breaks up through the endzone
- Mode 2
    - An opposite signal is the formation of a level break that is of the opposite type from the active trade(s).
- Mode 3
    - An opposite signal is the formation of an RE type that is of the opposite type from the active trade(s)
- Mode 4
    - Much like mode 1 - use the endzones to judge
    - An opposite signal is a break through an opposite endzone.
    - So if the current active trade(s) broke through the bottom endzone(s), an opposite signal is a break through a top endzone.
    - If the current active trade(s) broke through the top endzone(s), an opposite signal is a break through the bottom endzone
- Mode 5
    - Like mode 2
    - An opposite signal is the formation of a level break that is of the opposite type from the active trade(s).
- Mode 6
    - Like mode 3
    - An opposite signal is the formation of an RE type that is of the opposite type from the active trade(s)

BreakEven

UseBreakeven: false;
BreakevenArmedPercent: 50;
If set to true, then once a trade is active and winning, and the distance to the target is <= BreakevenArmedPercent set the SL to breakeven + BreakevenBufferPercent when price reaches this percentage of the total profit target distance
BreakevenBufferPercent: 3: (the amount of padding to add to the breakeven point measured as a percentage of the total distance to the profit target)

List of input settings and default values:

Note: if you dislike any of these variable names feel free to change them. Also this list might not be complete. If you realize other settings are needed, please add as required.

- HitboxClr: orange; (default hitbox rectangle colour)

- HitboxHeight: 185 points; (default height in points) when defined explicitly by the user
- HitboxHeightFromIndi: false; (if true - use ATR and override the above setting)
- HitboxWidth: 3; (default hitbox rectangle width in bars at object creation)
- HitboxPlace: centre, levelbreak or extrema; (default is centre which means centre on bar close price)
- HitboxOverlap: false; (if true allow hitbox rectangle overlapping)
- EndzoneClr: light blue (endzone colour at creation)
- EndzoneWidth: 3 bars (endzone width at creation)
- EndzoneHeight: 225 points; (default endzone height at creation)
- UseHBMultipleForEndzone: false; (if true, take the value from the following setting)
- EndzoneHeightMultiple: 1.5 (use the hitboxHeight value and multiply by this value to get the endzone height)
- LevClrBullish; pale green; (default bullish level break line colour)
- LevClrBearish; light pink; (default bearish level break line colour)
- LevLineStyle: solid 1 point (default level break line style)
- LevTimeframe; H4 (default level break timeframe)
- LevLifetime; 1; (default number of bars to count when checking for a level break)
- LevPadding; 5; (default distance in points that a level break must exceed the high or low of a previous level in order to be a valid signal)
- BullArrowClr: lime green; (default bullish RE arrow colour)
- BearArrowClr: red; (default bear RE arrow colour)
- REArrowType: 217; (default RE arrow type)
- ArrowDist: 5; (default distance of the arrow from the middle bar for both bear and bull signals in points.)
- PatternBars: 3; (the default number of bars to check for an RE pattern)
- MaxTrades: 2; (default max active trades. if set to zero there is no maximum)
- MaxLongTrades: 1; (restrict the number of simultaneous long trades to this number)
- MaxShortTrades: 1; (restrict the number of simultaneous short trades to this number)
- ReEnterVolMult: 2x; (volume multiplier for re-entry)
- PlyLevel: 1; (the number of times to immediately re-enter after a loss)
- StopLossZoneHeight: 128; (default stop loss zone height; this value is overridden if the stop loss zone gets its height from the endzone)
- StopLossZoneClr: sienna; (default stop loss zone colour)
- UseTrailing: false; (when true disable the profit target on endzones and hold trades until an opposite signal is detected)
- UseBreakeven: false; (when true, the below settings will take effect)
- BreakevenArmedPercent: 50; (the percentage of the take profit distance that must be reached before the breakeven level is moved)
- BreakevenBufferPercent: 3: (the amount of padding to add to the breakeven level measured as a percentage of the total distance to the profit target)