



Xena Exchange

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.XBTUSD\_Premium\_IR\_Corrected Index Specification

Effective since **16 July 2019**

The full list of the documents governing the rules of executing transactions for Xena Listed Perpetuals is located [here](#).

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## Outline

The .XBTUSD\_Premium\_IR\_Corrected index is used as the premium index of XBTUSD Listed Perpetuals. The index is calculated as the relative difference between the volume-weighted price of bids and asks in the XBTUSD order book and the value of the .BTC3 index. The premium rate is limited to 0.05% per hour.

## Specifications

Interest rate basis	365
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In the formulas below,  $round(value, decimal\ places)$  rounds "half up" (e.g.,  $round(1.44, 1) = 1.4$ , and  $round(1.45, 1) = 1.5$ ).  $roundup(value, decimal\ places)$  rounds up (e.g.,  $round(1.41, 1) = 1.5$ ,  $round(1.49, 1) = 1.5$ ).

1. First, the .XBTUSD\_MidPrice index is calculated as follows:
  - 1.1. Every 10 seconds (at 00:00:00 UTC, 00:00:10 UTC, 00:00:20 UTC, and so on), a snapshot of the XBTUSD order book is taken.
  - 1.1. The time for taking the snapshot is defined by the internal clock of the Xena Exchange platform.
  - 1.2. The weighted average price of the execution of a market order with an initial margin of 0.1 BTC is calculated for each side of the book:
    - 1.2.1.  $RemainingMargin = 0.1\ BTC, Value = 0, TotalVolume = 0$
    - 1.2.2. For each price level, starting from the best:

$$Volume_i = \min(Volume_{Level}, \frac{RemainingMargin * Price_{i1}}{1\% * 100000}): \text{ here and below,}$$

1% is the initial margin rate of the XBTUSD Listed Perpetual, and 100,000 is the multiplication of its contract value and lot size

$$Value_i = Value_{i-1} + \frac{Volume_i}{Price_i}$$

$$TotalVolume_i = TotalVolume_{i-1} + Volume_i$$



$Margin_i = roundup(round(\frac{Volume_i * 100000}{Price_i}, 8) * 1\%, 8)$ : here, 8 is the precision of BTC

$$RemainingMargin_i = RemainingMargin_{i-1} - Margin_i$$

- 1.2.3. The iterations continue until RemainingMargin equals 0.
- 1.2.4. If there are no more levels and RemainingMargin is still greater than 0, the price of the last level is used to finish the calculation.
- 1.2.5. The weighted average price is calculated as follows:

$$Price_{WA} = round(\frac{TotalVolume}{Value}, 2)$$
: here, 2 is the precision of USD

- 1.3. When the weighted average prices for bids and asks are calculated, the value of .XBTUSD\_MidPrice is calculated as the average between them:

$$.XBTUSD\_MidPrice = round(\frac{Price_{WA}^{Bids} + Price_{WA}^{Asks}}{2}, 1)$$
: here, 1 is the tick of XBTUSD.

- 1.3.1. If there are no bids and/or asks in the order book at the moment of calculation:

- 1.3.1.1. No bids:  $.XBTUSD\_MidPrice = Lower\ Boundary\ of\ the\ Price\ Range$

- 1.3.1.2. No asks:  $.XBTUSD\_MidPrice = Upper\ Boundary\ of\ the\ Price\ Range$

- 1.3.1.3. No bids and asks:  $.XBTUSD\_MidPrice = .BTC3$

- 1.3.2. All 10-second values in the last five minutes of the mid-price are averaged as follows:

$$.XBTUSD\_MidPrice\_TWAP = round(\frac{.XBTUSD\_MidPrice_{3i} + \dots + .XBTUSD\_MidPrice_{3i-29}}{30}, 1)$$

- 1.3.3. If, due to any reason, some of the last 30 10-second values of .BTC3 are missing, only the existing values are used.

- 1.3.4. The value of the .XBTUSD\_Premium\_IR index is calculated as follows:

$$.XBTUSD\_Premium\_IR = roundup((1 - \frac{.BTC3}{.XBTUSD\_MidPrice\_TWAP}) * \frac{365}{1/24} * 100\%, 2)$$
: here, 365 is the basis of the interest rate, and 1/24 is the period of premium payments in days.

- 1.4. The .XBTUSD\_Premium\_IR\_Corrected index is calculated by introducing the minimum value threshold:

- 1.4.1. If  $abs(.XBTUSD\_Premium\_IR) \geq 0.05\% * 365 * 24$ ,

$$.XBTUSD\_Premium\_IR\_Corrected = \pm 0.05\%$$

- 1.4.2. Else,  $.XBTUSD\_Premium\_IR\_Corrected = .XBTUSD\_Premium\_IR$

