



Xena Exchange

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.ETHUSD_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 .ETHUSD_Premium_IR_Corrected index is used as the premium index of ETHUSD Listed Perpetuals. The index is calculated as the relative difference between the volume-weighted price of bids and asks in the ETHUSD order book and the value of the .ETHUSD 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 .ETHUSD_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 ETHUSD 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 and 1:100 leverage 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

$$= \min(Volume_{Level}, \frac{RemainingMargin * TickSize}{MarginRate * MarginRateMultiplier * ContractValue * TickValue * LotSize * Price_{Level}})$$

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

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

$$Margin_i = roundup(Volume_i * Price_i * \frac{TickValue}{TickSize} * 1\%, \delta)$$

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



- 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:

$$Price_{WA} = round\left(\frac{Value}{TotalVolume * LotSize} * \frac{TickSize}{TickValue}, 8\right); \text{ here, } 8 \text{ is the precision of BTC}$$

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

$$.ETHUSD_MidPrice = round\left(\frac{Price_{WA}^{Bids} + Price_{WA}^{Asks}}{2}, 1\right); \text{ here, } 1 \text{ is the tick of ETHUSD.}$$

- 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: $.ETHUSD_MidPrice = \text{Lower Boundary of the Price Range}$

- 1.3.1.2. No asks: $.ETHUSD_MidPrice = \text{Upper Boundary of the Price Range}$

- 1.3.1.3. No bids and asks: $.ETHUSD_MidPrice = .ETHUSD$

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

$$.ETHUSD_MidPrice_TWAP = round\left(\frac{.ETHUSD_MidPrice_{3_i} + \dots + .ETHUSD_MidPrice_{3_{i-29}}}{30}, 1\right)$$

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

- 1.3.4. The value of the .ETHUSD_Premium_IR index is calculated as follows:

$$.ETHUSD_Premium_IR = roundup\left(\left(\frac{.ETHUSD_MidPrice_TWAP}{.ETHUSD} - 1\right) * \frac{365}{1/24} * 100\%, 2\right); \text{ here, } 365 \text{ is the basis of the interest rate, and } 1/24 \text{ is the period of premium payments in days.}$$

- 1.4. The .ETHUSD_Premium_IR_Corrected index is calculated by introducing the maximal value cap:

- 1.4.1. If $abs(.ETHUSD_Premium_IR) \geq 0.05\% * 365 * 24$, $.ETHUSD_Premium_IR_Corrected = \pm 0.05\% * 365 * 24$

- 1.4.2. Else, $.ETHUSD_Premium_IR_Corrected = .ETHUSD_Premium_IR$