## **Tick Data Processor Reference Manual**

Functions by Category

1. Quotes

1.1 NBBO

Returns latest valid NBBO record for given symbol and timestamp.  
Valid record is a record with both sides of NBBO quote present.

Arguments

|  |  |  |
| --- | --- | --- |
| Argument Name | Data Type | Comments |
| Symbol | [symbol](#DataFormat) |  |
| Timestamp | [timestamp](#DataFormat) | If TAQ data does not contain valid NBBO record with exact time, then previous valid record is returned |
| Markouts | a96 | optional; comma-separated string with one or more markout durations relative to reference time [(see Appendix 2)](#Markouts) |

Result fields

|  |  |  |
| --- | --- | --- |
| Filed Name | Data Type | Comments |
| ID | integer | Input record number in original order, starting from 1 |
| Timestamp | timestamp | Timestamp of NBBO record |
| BestBidPx | double |  |
| BestBidQty | integer |  |
| BestOfferPx | double |  |
| BestOfferQty | integer |  |

Presence of Markouts argument creates N sets of additional result fields, one for each element in markouts array.  
E.g. with value '1t,5t,10t' the result contains 1+5+4x5 fields:  
ID - record ID of the request as its index in the input record set starting with 1  
BestBidPx BestBidQty BestOfferPx BestOfferQty - correspond to NBBO at Timestamp  
BestBidPx\_1 BestBidQty\_1 BestOfferPx\_1 BestOfferQty\_1 - correspond to NBBO at Timestamp + 1 tick  
. . .   
BestBidPx\_4 BestBidQty\_4 BestOfferPx\_4 BestOfferQty\_4 - correspond to NBBO at Timestamp + 10 ticks

1.2 NBBOPrice

Similar function to NBBO.  
Function arguments are the same, however result fields are not. Result fields include only timestamp and prices.

Result fields

|  |  |  |
| --- | --- | --- |
| Filed Name | Data Type | Comments |
| ID | integer | Input record number in original order, starting from 1 |
| Timestamp | timestamp | Timestamp of NBBO record |
| BestBidPx | double |  |
| BestOfferPx | double |  |

1.3 Resting Order Duration (ROD)  
Function returns resting duration calculations for set of orders. Resting order duration measure is expressed by number of shares (LeavesQty) multiplied by duration in seconds.  
Input data for an order can be represented by one or more records. A record may or may not have execution-related fields populated.  
Typical scenarios are:

1. Order was not executed.  
   Expect one record with start and end times populated, with no execution time.
2. Order was filled on arrival.  
   Expect one record with start and end times populated, plus execution time and size , which should be equal to order size.  
   In this scenario execution time overrides end time.
3. Order had multiple executions.  
   Expect more than one record, likely equal to execution count, or execution count + 1.  
   End time correction applies in case when order is fully executed using time of the last fill.

During calculation entire order duration from start to end time is broken into segments, defined by 2 types of events: NBBO changes and order executions. Result of calculation is represented by 7 quantities, each corresponding to a resting band. Resting bands are defined by position of order’s working price relative to both sides of current NBBO.   
Bands are identified by integer values in -3:3 range, where -3 is the least aggressive e.g. for buy order value of -3 corresponds to working price lower than bid, and 3 is higher than offer.

Additional details can be found in Factsheet product specification.

Arguments

|  |  |  |
| --- | --- | --- |
| Argument Name | Data Type | Comments |
| ID | a64 | Unique order identifier Most reliable ID is combination of MPID and OrderID |
| Symbol | symbol |  |
| Date | [date](#DataFormat) |  |
| StartTime | [time](#DataFormat) |  |
| EndTime | time |  |
| Side | [side](#DataFormat) |  |
| OrdQty | integer |  |
| LimitPx | double |  |
| MPA | double | maximum working price aggressiveness as band id |
| ExecTime | time |  |
| ExecQty | integer |  |

Result fields

|  |  |  |
| --- | --- | --- |
| Filed Name | Data Type | Comments |
| ID | a64 | Unique order identifier |
| MinusThree | float | shares\* seconds when working price (WP) is less aggressive than near-touch |
| MinusTwo | float | shares\* seconds WP at near |
| MinusOne | float | shares\* seconds WP between near and mid-point |
| Zero | float | shares\* seconds WP at mid-point |
| PlusOne | float | shares\* seconds WP between mid-point and far-touch |
| PlusTwo | float | shares\* seconds WP at far |
| PlusThree | float | shares\* seconds WP is more aggressive than far |

2. Trades

2.1 VWAP

Returns VWAP for set of orders calculated over duration from start time until end time.  
There are 3 possible to define end time:

1. explicit
2. based on target volume and participation - time required to fill target volume while participating at target rate
3. trade (tick) count

TAQ execution record (print) is eligible for inclusion in VWAP calculation only if it contributes to daily volume.

Arguments

|  |  |  |
| --- | --- | --- |
| Argument Name | Data Type | Comments |
| Symbol | symbol |  |
| Date | date |  |
| StartTime | time | first trade is the latest record with timestamp less than or equal to start time |
| Side | side | optional; if missing VWAP is calculated without price constrain |
| LimitPx | float | optional; if missing VWAP is calculated without price constrain |
| Flavor | integer | optional; specifies which eligible trades are included into VWAP calculation  1 - only normal trades reported by exchanges 2 - only normal trades reported by alternative display facility (off-exchange volume) 3 - normal trades (default)  4 - all eligible trades  5 - block trades (10+K size or $200K notional) |
| EndTime | time | optional; explicit end time |
| TargetVolume | integer | optional; positive integer |
| TargetPOV | float | optional; participation as value in 0-1 range |
| Ticks | integer | optional; negative value will use TAQ records that ends with start time |
| Markouts | a96 | optional |

Result fields

|  |  |  |
| --- | --- | --- |
| Filed Name | Data Type | Comments |
| ID | integer | Input record number in original order, starting from 1 |
| TradeCnt | integer | number of executions included into VWAP calculation |
| TradeVolume | integer | volume included into VWAP calculation |
| VWAP | float | VWAP |

Presence of Markouts argument creates N sets of result fields, one for each element in markouts array.  
E.g. with '1t,5t,10t' the names of fields in result set are: ID, TradeCnt\_1, VWAP\_1, TradeVolume\_1, TradeCnt\_2 .. TradeVolume\_4, VWAP\_4

3. Hybrid

4. Reference

Appendix 1. Data Formats

|  |  |  |
| --- | --- | --- |
| Field Type | Format | Comments |
| symbol | alphanumeric (18) - up to 18 chars | Accepts CTA or UTP symbology |
| timestamp | alphanumeric (36) | ISO format YYYY-mm-dd'T'HH:MM:SS.UUUUUU e.g. "2020-09-01 09:30:00" or "2020-09-01T09:30:00.123456" |
| date | alphanumeric (12) | YYYY-MM-DD or YYYYMMDD |
| time | alphanumeric (20) | Time format: HH:MM:SS.UUUUUU or HH:MM:SS e.g. "09:30:00" or "09:30:00.123456" |
| side | alphanumeric(6) | ‘B’,’S’, ‘SS’, ‘BUY’, ‘SELL’, ‘SHORT’ ; case insensitive Recommended values : ‘B’ or ‘S’ or empty string for None |

Appendix 2. Markouts

|  |  |  |  |
| --- | --- | --- | --- |
| Duration Type | Units | Format | Comments |
| Time | microseconds | us, usec | values can be negative, in which case calculation is performed over period ending with reference time |
| milliseconds | ms, msec |
| seconds | s, sec |
| minutes | m, min |
| hours | h, hr |
| Ticks | ticks | t, ticks |