

# **Johannesburg Stock Exchange**

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## **Trading and Information Solution Derivatives Market**

### **JSE Guidance Note Statistical Market Data - Derivatives**

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# 1 DOCUMENT CONTROL

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## 1.1 Document Information

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## 1.2 Revision History

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<b>Date</b>	<b>Version</b>	<b>Description</b>
17 October 2018	1.0	Initial Release

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## 1.3 References

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[Volume 00E – Trading and Information Overview](#)  
[Volume 00D – Trading and Information Overview](#)  
[Volume 09D – JSE Reference Data Management](#)  
[Volume 05 - Market Data Feed \(MITCH - UDP\)](#)

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## 1.4 Contact Details

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## 2 INTRODUCTION

This document details the statistical market data that will be computed and published by the Derivative Trading and Information solution.

## 3 MARKET DATA STATISTICS

### 3.1 General Requirements

- 3.1.1 The System will publish the instrument statistics outlined in this section for the current trading day only.
- 3.1.2 All On Book trade types, will update all On Book market data statistics. i.e., AT and UT trades will be included.
- 3.1.3 Off Book trades will update the following statistics:
  - (a) Turnover (Off Book)
  - (b) VWAP (All Trades i.e. On Book and Off Book)
  - (c) Volume (Off Book)
  - (d) Number of Trades (Off Book)
- 3.1.4 For High Price only On Book Trades should be used for calculating statistics (Off Book trades should not be included).
- 3.1.5 For Low Price only On Book Trades should be used for calculating statistics (Off Book trades should not be included).
- 3.1.6 Following are the various statistics published real time in the system.

### 3.2 Opening Price

- 3.2.1 The opening price of an instrument will be determined as per the OpeningPriceConvention field.
- 3.2.2 If the parameter is "Opening Auction" the opening price will be the trade price of the opening auction (uncrossing trade).
- 3.2.3 If no opening auction uncrossing takes place, no opening price will be published for that instrument by the System, i.e.no message will be published.
- 3.2.4 If the parameter is "First Trade" the opening price will be the opening auction uncrossing trade price. However if no opening auction uncrossing takes place, the first automatic trade price will update the opening price.
- 3.2.5 If the parameter is "Mid-Point", the midpoint just after the opening auction will be the opening price for that instrument.
- 3.2.6 The "Mid-Point" will be determined using the Visible Order book.
- 3.2.7 If no trading happens for an instrument there will be no opening price published for that day i.e. no message will be published.

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- 3.2.8** However, if the parameter is “Mid-Point”, opening price will be published by the first ever visible midpoint the moment it gets updated.
- 3.2.9** The OpeningPriceConvention will be published together with the opening price for an instrument.
- 3.2.10** If the parameter is “First Trade” the indicator published with the opening price would be either UT or AT as per the indicator which was used ultimately.
- 3.2.11** If the parameter is “None”, the opening price will not be published for an instrument i.e. no message will be published.

### **3.3 Closing Price**

- 3.3.1** The closing price of an instrument will be determined as per the PrimaryClosingPriceConvention and SecondaryClosingPriceConvention fields. However, for Derivative instruments the closing price will be determined as per the contract specification for that instrument.
- 3.3.2** PrimaryClosingPriceConvention - A mandatory field which defines the preferred method of determining the closing price for an instrument. The following values are supported. The PrimaryClosingPriceConvention will be set to Manual as this is due to the Mark to Market values (MTM) being uploaded to the trading system post the EOD process.
- 3.3.3** The closing price should be computed and published at one of the following events:
1. End of Continuous Trading session
  2. Start of the Post Close session

### **3.4 Last Trade**

- 3.4.1** The price of the last trade will be considered irrespective of the method (Automated trade or Uncrossing trade) under which it was executed.

### **3.5 None**

- 3.5.1** An instrument’s closing price should not be calculated or published. These will be the instruments which will be traded off the exchange.
- 3.5.2** Closing prices for these instruments may be received from their primary markets which could be uploaded to the system (market operations user may update the closing prices via a file upload or individual statistic update). However, closing prices should not be disseminated for these instruments.
- 3.5.3** If the closing price was updated manually, previous close prices should be disseminated on the following day for reference data related calculations. If an option is out of the money the closing price of this option will be set to Zero or the intrinsic value of the option is published, Please refer to the below appendix for the Valuations model used to calculate the end of day prices.
- If an option is out of the money the closing price of this option will be set to Zero or the intrinsic value of the option is published, Please refer to the below appendix for the Valuations model used to calculate the end of day prices.

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## **3.6 General closing price functionality**

- 3.6.1** The closing price of an instrument will be calculated and published real-time to the market data gateways (and MITCH).
- 3.6.2** The method of determining the closing price will be published together with the closing price for an instrument.
- 3.6.3** Similarly, if the market operations team performs the halt and close action for an instrument, then the closing price will automatically be published upon that action.
- 3.6.4** The method of determining the closing price for such suspended or halted and closed instruments will be as defined as per the contract specifications for each instrument.
- 3.6.5** In the event where it is an instrument's first trading day and no trades occur for the entire day, the closing price published will be as per the applicable valuation methodology.
- 3.6.6** When an Instrument is suspended the Closing Price will be not be published, at the suspension. On the day(s) following suspension, if the Instrument remains suspended, a Closing Price will be published at the end of the day.

## **4 STATISTICS**

### **4.1 Last Traded Price (LTP)**

LTP refers to the price of the last trade that took place for the instrument. Applicable only to the Normal Order Book and Off-Book. LTP is not published via market data gateways but can be viewed on the Market View window on the Service Desk. LTP is only available for internal use.

### **4.2 Opening Price**

Opening Price is applicable only to the Normal Order Book.

### **4.3 Closing Price**

Closing Price is applicable only to the Normal Order Book, but when a Normal Order Book is unavailable and the applicable Closing Price Convention is Mid-Point<sup>1</sup>, it is applicable to the Bulletin Board as well.

### **4.4 High Price**

Refers to the highest value that trades took place for the given order book. Even for inverse order books, the high price is the highest traded value (irrespective of whether the instrument is traded on price, on percentage of par, on yield or on discount rate).

Applicable only to the Normal Order Book and Off-Book. Only off-book trades configured to update statistics and are reported on the same day, are eligible to update off book statistics for the high price.

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#### 4.5 Low Price

Low Price refers to the lowest value that trades took place for the given order book. Even for inverse order books, the low price is the lowest traded value (irrespective of whether the instrument is traded on price, on percentage of par, on yield or on discount rate).

Applicable only to the Normal Order Book and Off-Book. Only off-book trades configured to update statistics and are reported on the same day, are eligible to update off book statistics for the low price.

#### 4.6 Best Bid for the day

It is applicable only to the Normal Order Book and Bulletin Board. Refers to the best bid recorded for the entire day for that particular order book. Best bid is considered as the highest value if the order book is configured as a regular order book and the lowest value if the order book is configured as an inverse order book.

#### 4.7 Best Offer for the day

It is applicable only to the Normal Order Book and Bulletin Board. Refers to the best offer recorded for the entire day for that particular order book. Best offer is considered as the lowest value if the order book is configured as a regular order book and the highest value if the order book is configured as an inverse order book.

#### 4.8 Previous Close

Applicable only to the Normal Order Book and Bulletin Board. Previous close is the last closing price (prior to the current trading day) published by the system. It is published on FAST and MITCH Market Data Gateways at the start of the first trading session that is configured to publish statistics.

Previous Close is the only parameter among Market Data that can be adjusted due to a Corporate Action carried out on an instrument.

#### 4.9 Volume

Applicable only to the Normal Order Book and Off-Book. Volume refers to the total quantity traded on the particular order book of the instrument for the day. The quantity is cumulative and is not multiplied by the contract multiplier of the instrument.

#### 4.10 VWAP

VWAP (Volume Weighted Average Price) is calculated as follows:

$$VWAP = \frac{\sum(\textit{Executed Size} \times \textit{Executed Price})}{\sum(\textit{Executed Size})}$$

- a) Summation is performed over all the trades that happened for that order book until that point of time.
- b) Executed Size refers to the traded quantity (volume).

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#### 4.11 Number of Trades

It is applicable only to the Normal Order Book and Off-Book. Number of trades refers to the total trades matched on the Normal order book and total trades reported for the off-book of the instrument for the day.

#### 4.12 Turnover

Applicable only to the Normal Order Book and Off-Book. Turnover for order books of Equity instrument is calculated as follows:

$$\text{Turnover} = \sum \text{Executed Size} * \text{Executed Price}$$

Turnover for Futures, Options and Strategy instruments are calculated as follows:

$$\text{Turnover} = \sum \text{Executed Size} \times \text{Executed Price} \times \text{Contract Multiplier}$$

Turnover for a fixed income instrument (Bonds, Bills, and TIPS) is calculated as follows:

$$\text{Turnover} = \sum \frac{\text{Executed Price} \times \text{Quantity} \times \text{Multiplier}}{\text{Par Value}}$$

#### 4.13 Notional Exposure

Applicable to the Normal Order Book, Bulletin Board and Off-Book of Options instruments. Notional Exposure is calculated as follows:

*Notional Exposure = Underlying Instrument Price x Total Volume x Contract Multiplier*  
The Underlying Instrument Price is always the underlying instrument's last traded price from the normal order book.

#### 4.14 Notional Delta Exposure

Applicable only to the Normal Order Book of Options instruments. Notional Delta Exposure is calculated as follows:

*Notional Delta Exposure = Notional Exposure x Delta of the Option.* (Please refer Theoretical Pricing of Options for the formula to calculate the delta of an option.)

#### 4.15 Open Interest

This indicates the number of contracts (Options and/or Futures) both long and short that are held by market participants on the JSE Trading System at any given time.

The Open Interest of an instrument will be published through the Market Data Gateway at 30min intervals starting from around 07:00 SAST before market trading sessions begin until around 18:30 SAST after the markets have closed. Please refer to Volume PT00 – Post-Trade Services Overview for more information on the calculation of Open Interest Last Trade Type.



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This indicates the movement of the last traded price. Applicable only to the Normal Order Book and Off-Book. At the beginning of the trading day before any trade takes place the field would display the Last Trade Type from the previous day.

- Last Trade Type would be NEUTRAL\_TICK in the following scenarios:
  - For a newly created instrument before any trades take place.
  - If an instrument is traded for the first time during the trading day where no previous close exists.
  - If the traded price is equal to the previous close/previous trade and the Last Trade Type is NEUTRAL\_TICK, for the previous close or the previous trade.
  - If all the trades for a day are cancelled for a particular instrument.
- Last Trade Type would be PLUS\_TICK if the traded price is greater than the previous close or the previous trade.
- Last Trade Type would be ZERO\_PLUS\_TICK if the traded price is equal to the previous close or the previous trade where the Last Trade Type has been PLUS\_TICK.
- Last Trade Type would be MINUS\_TICK if the traded price is lesser than the previous close or the previous trade.
- Last Trade Type would be ZERO\_MINUS\_TICK if the traded price is equal to the previous close or the previous trade where the Last Trade Type has been MINUS\_TICK.

#### **4.16 Indicative Auction Information**

Indicative Auction Information is computed and published if the system is configured to publish this information. It is applicable only to the Normal Order Book.

#### **4.17 Impact on Statistics due to Leg Trades of Multi-legged Instruments**

Leg trades associated with multi-legged instruments do not update any of the statistics of the leg instrument. System only updates statistics of an instrument due to outright trades that take place in that instrument.

#### **4.18 Adjustments to Statistics**

##### **4.18.1 Manual Market Data Update**

Some of the statistics published by the system can be updated manually via Service Desk. Market Operations users have the option of updating the statistic to a different value (causing it to republish or publish for the first time) or to withdraw an already published statistic (causing it to become unset).

##### **4.18.2 Trade Cancellations and Trade Corrections**

Via the Stat Update on Trade Adjust in Trading Parameters, it is possible to configure instruments to automatically re-compute statistics on trade cancellation or correction. The parameter either limits the system to re-compute only a subset of statistics (which are computationally inexpensive to recalculate) or makes the full set of post-execution statistics be recalculated.

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### 4.18.3 Auto Correction of Limited Statistics

If an instrument is configured to automatically re-correct a limited set of statistics on a trade adjustment, then cancelling or correcting of a trade (on book or off book) causes the following statistics to be automatically recomputed and republished for their respective order books:

- VWAP
- Turnover
- Number of Trades
- Volume

### 4.18.4 Auto Correction of All Statistics

If an instrument is configured to automatically re-correct all statistics on a trade adjustment, then cancelling or correcting a trade (on book or off book) causes the following statistics to be automatically recomputed and republished for their respective order books **in addition** to the limited set specified above:

- High Price / Converted High
- Low Price / Converted Low
- Last Traded Price / Converted LTP
- Last Trade Movement
- Last Trade Type
- Last Trade Size
- Last Trade Time
- Opening Price / Converted Opening - Refer Impact of Trade Adjustments on Opening Price for more information
- Closing Price / Converted Closing - Refer Impact of Trade Adjustments on Closing Price for more information
- Change from Previous Close (%)
- Change from Previous Close (Net)

Publication of corrected statistics is also done based on whether the particular session where correction/cancellation is done is configured to publish statistics or not (explained above under Session Level Configuration). Note that a recomputed market data statistic is republished only if the recomputed value is different from the last published value.

E.g. the High Price of an instrument may be recorded at 10. If there are more than one trade at 10, cancelling one of the trades does not change the high price. Therefore although the system internally re-computes the high price, it is not republished.

Also note that the system excludes cancelled trades when calculating closing price, high price and low price for the first time irrespective of whether all statistics or a limited set of statistics are recomputed. For corrected trades too, it considers their last published size and price when calculating them for the first time.