Volatility Interrupters

Athens, February 2017

Revision History		
Issue	**Date**	**Description**
0.9	02/08/2007	First Draft
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1.2	16/10/2008	New parameters
1.3	20/02/2009	New Version
1.4	28/07/2009	Updated Version
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Disclaimer

The present document constitutes a short guide for the assistance of ATHEX members. It cannot substitute the standing statutory framework (ATHEX Rulebook, Capital Market Commission decisions, ATHEX Administrative Council decisions etc.) and as a result it cannot prevail over the above mentioned documents.

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1. Volatility Interrupters in Athens Exchange

1.1. Introduction

Volatility Interrupters were first introduced in OASIS, the Trading System of ATHEX, on the 16th of July 2007 for all shares belonging to the Main market.

The purpose of this document is to provide a short description of how Volatility interrupters apply in ATHEX trading model.

Volatility interrupters are used by most international exchanges as a mechanism that protects investors from shares' sharp price movements (market volatility) and ensures the equal dissemination of information to the entire market. In this way, both the security of transactions and investors' protection from sudden changes of shares' prices is ensured.

A volatility interrupter can be defined as a **halt in trading** of a specific security and the automatic activation of an auction for this security when a new order entry into the system may cause a trade price that exceeds specific price thresholds set by each exchange. These specific price thresholds are called the Static and Dynamic Price range for each security.

A definition of the Static and the Dynamic price range as well as a detailed description of the functionality of volatility interrupters is provided in the following paragraphs.

2. Definition of Volatility Interrupters parameters

Thus a Volatility interrupter **during continuous trading** is a halt of trading for a specific security and the automated activation of an auction for this security It is initiated when the potential execution price for a security lies outside a maximum percentage from the last trade price (**Dynamic price range**) or a maximum percentage from the last auction price (**Static price range**).

2.1. Static price range

The Static Price range is calculated individually for each security and defines the maximum percentage deviation of the potential execution price of a security from the Static Reference price where:

The Static reference price is the last price determined in an Auction. In cases, where an auction cannot determine a price then as static reference price, the auction price of the previous auction is used.

Especially for the Opening auction, as static reference price, the start of day price (previous day's closing price of the security including any corporate actions) is used.

At this point it should be noted that the term potential execution is used because the trade that triggered the Volatility interrupter is not executed.

Static Reference price	Activation of Volatility Interrupters
Static Reference price = Last Auction price If there is no price from the last auction, then as reference price is used the price of the previous auction or the start of day price which is equal to the previous day's closing price after any corporate actions.	**Potential execution price > Static Reference price + X%** **Or** **Potential execution price < Static Reference price - X%**

2.2. Dynamic price range

The Dynamic Price range is calculated individually for each security and defines the maximum percentage deviation of the potential execution price of a security from the Dynamic Reference price where:

The Dynamic reference price is the last traded price In case there are no previous trades then the first trade of the order under examination is used.

Dynamic Reference price	Activation of Volatility Interrupters
Dynamic Reference price = Last traded price The last trade before the start of execution of an order is taken into consideration. If there are no previous trades then the first trade of the order under examination is used.	**Potential execution price > Dynamic Reference price + X%** **Or** **Potential execution price < Dynamic Reference price - X%**

2.3. Pre call extension

Volatility interrupters can be initiated **during Auctions** as well as during Continuous trading.

The initiation of a volatility interrupter during an auction results to an extension of the Pre call phase of the auction for a specific security when:

- the potential auction price lies outside the **Price Tolerance Range** (which is defined as a percentage of the Static Price range) or
- the potential auction volume exceeds the buy or sell MKT /ATO order volume participating in the auction **(MKT /ATO order rule)**.

Thus, for the initiation of a Volatility interrupter during an auction two conditions are taken into consideration:

The **Price Tolerance Range** which is defined as a percentage of the Static price range. If the potential auction price exceeds the Price Tolerance Range then an extension of the Pre call phase of the Auction takes place.

The **MKT/ATO order rule** which means that the auction volume is due to the volume of market (MKT) and At The Opening (ATO) orders. If the auction volume exceeds this MKT/ ATO order rule then an extension of the Pre call phase of the Auction takes place.

The Price Tolerance Range as well as MKT/ATO order rule which are taken into consideration for the triggering of volatility interrupters during auctions are described analytically in the following paragraphs.

2.3.1. Price Tolerance Range

The **extension** of the Pre call phase of a scheduled Auction or a volatility interrupter auction is performed when **the potential auction price is outside the Price Tolerance range which is defined as a percentage of the Static price range**.

The reference price for the Price Tolerance range is presented in the table below:

Reference Price for Price Monitoring Range	Checking for the triggering of Volatility interrupter during auctions
Last trade, or Security's start of day price (Opening auction or securities without trades)	**Potential auction price > X% of the last trade or the security's start of day price if there is no last trade**

2.3.2. MKT/ATO Order rule

The **extension** of the Pre call phase of a scheduled Auction or a volatility interrupter auction is performed also when the **potential auction volume of the Auction is smaller or equal to** the total volume of the available unexecuted buy and sell Market and ATO orders.

More specifically the MKT/ATO Order rule is as follows:

Auction Volume ≤ Σ (Volume of Buy MKT + ATO Orders Before Auction)
or
Auction Volume ≤ Σ (Volume of Sell MKT + ATO Orders Before Auction)

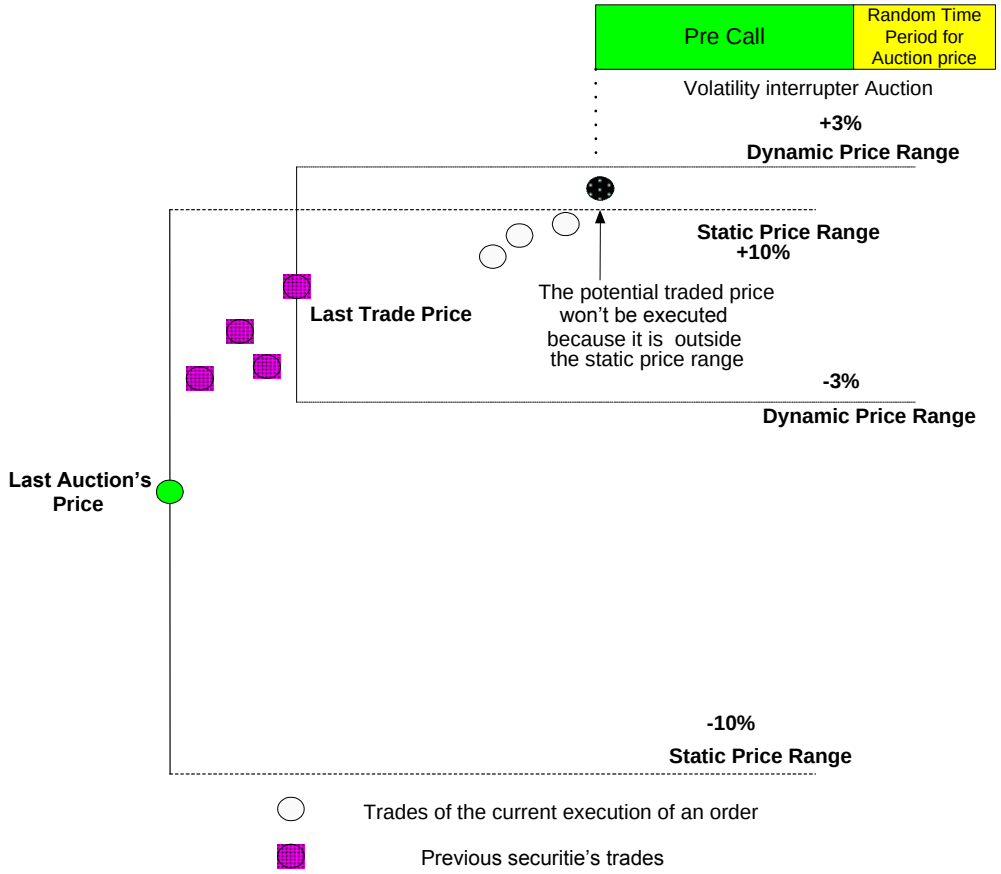
3. Activation of Volatility Interrupters during the continuous trading

For the better understanding of the Volatility interrupters' triggering during continuous trading the following two examples are presented:

3.1. Volatility interrupter due to the breach of the Static Price range

The following figure presents the triggering of a Volatility interrupter during continuous trading due to the breach of the Static Price range. As it can be seen from the figure below:

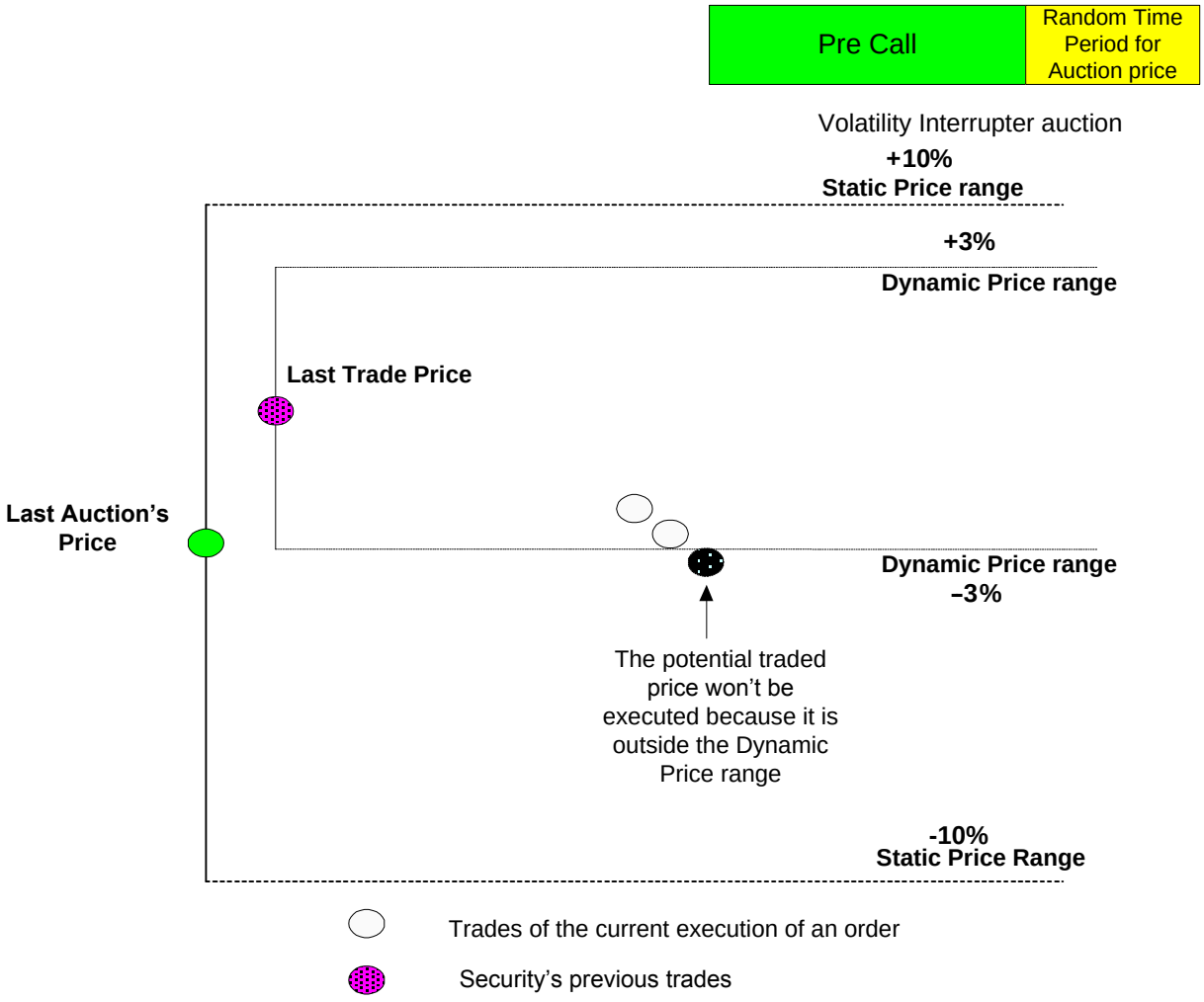
- The Static Price range is calculated based on the last auction's price before the current execution of an order.
- The Dynamic Price range is calculated based on the last traded price before the current execution of an order.
- The trades from the current execution of an order are taking place. Each potential traded price is checked and if it is within the Static and Dynamic price range, is executed.
- The three first trades of the current execution of an order are executed normally since they are within the Static and the Dynamic Price range respectively.
- The fourth trade is not executed because it is outside the security's Static Price range. Immediately a Volatility interrupter auction is initiated.



3.2. Volatility interrupter due to the breach of the Dynamic Price range

The following figure presents the triggering of a Volatility interrupter during continuous trading due to the breach of the Dynamic Price range. As it can be seen from the figure below:

- Each potential traded price is checked and if it is within the Static and the Dynamic Price range then the trade is executed.
- The first two trades are executed since they are within the Static as well as the Dynamic Price range.
- The potential execution price of the third trade is outside the Dynamic Price range, and as a consequence the trade is not executed. Immediately a Volatility interrupter auction is initiated.

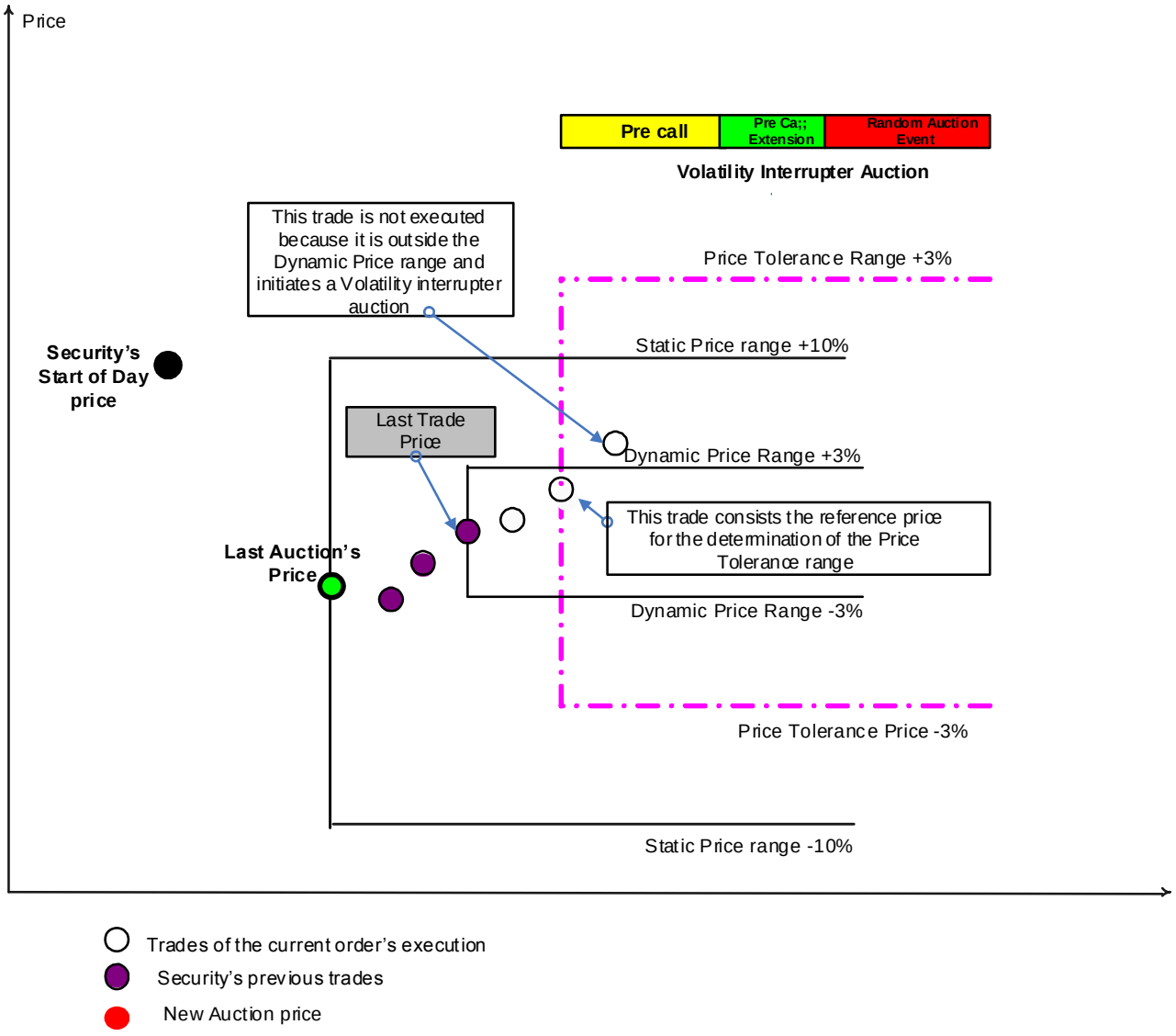


4. Activation of Volatility Interrupters during the pre call phase

4.1. Example of Volatility interrupter due to the breach of the Price Tolerance range

As it can be seen in the figure below:

- The Static Price range is ± 10%
- The Dynamic Price range is ± 3%
- The Price Tolerance range is defined as a percentage of 30% of the Static Price range which means that it is equal to 30% *10% = ± 3%



As it can be seen from the above figure the Static Price range is calculated by the last auction price before the current execution of an order.

The Dynamic Price range is calculated by the last trade price before the current execution of an order respectively.

Each potential traded price is checked and if it is within the Static and the Dynamic Price range is executed. Thus, the two first trades of the current order's execution are executed normally.

The third one is outside the Dynamic Price range and as a result it is not executed and initiates a Volatility Interrupter auction.

Since the potential auction price from the Volatility interrupter auction is outside the Price Tolerance range then the Volatility Interrupter auction will be extended. At the end of the extension will be determined a new auction price. In this point it should be noted that the Price Tolerance range is defined as a percentage of ± 3% from the last trade available before the initiation of the Volatility interrupter auction.

5. Volatility interrupters and Orders' Behaviour

5.1.1. Market orders

If the order that triggers the Volatility interrupter is of type Market (MKT) is partly executed then the unexecuted part of this order participates into the Pre call phase of the Volatility interrupter auction with a limit price equal to the last trade executed before the triggering of Volatitility interrupter. If the Market order that triggers the Volatility interrupter is not executed at all, then it is transferred with the indication "Market" into the Pre call phase of the Volatility interrupter auction in order to participate into the auction.

5.1.2. Fill Or Kill

If the order that triggers the Volatility interrupter is of type Fill or Kill then the entire order is cancelled (because it cannot be partially executed) without activating the Volatility interrupter.

5.1.3. Immediate or Cancel

If the order that triggers the Volatility interrupter is of type Immediate or Cancel then the unexecuted part of the order is cancelled and as a result it doesn't participate into the Pre call phase of the Volatility interrupter auction.

5.1.4. STOP orders

Finally STOP orders can also participate in the Pre call phase of the Volatility interrupter auction if their stop condition is activated based on trades performed before the triggering of the Volatility interrupter auction.

6. Volatility interrupters Parameters

According to Resolution 22 of ATHEX, the Volatility Interrupters mechanism is activated in Main market and Bonds market of ATHEX, with the following parameters:

Market	Market Making	Price	Volatility interrupters Parameters		
			Static limit	Dynamic limit	Price Tolerance Range (30% of Static)
Main market-High Liquidity Class	Yes	≥ 0,05	10%	3%	3,0%
	No				
	Yes	< 0,05	15%	N/A	4,5%
	No				
Main market – Middle Liquidity Class	Yes	≥ 0,05	10%	3%	3,0%
	No				
	Yes	< 0,05	15%	N/A	4,5%
	No				
Main market – Low Liquidity Class	Yes	≥ 0,05	10%	3%	3,0%
	No		N/A	3%	N/A
	Yes	< 0,05	15%	N/A	4,5%
	No		N/A		N/A
Bonds	Yes	-	10%	3%	3,0%

Duration of Volatility interrupters	
Pre call phase	2 min
Pre call Extension	1 min
Random Time Period (RTP)	1 min