Document title

# EURONEXT DERIVATIVES: HOW THE MARKET WORKS

Sub-title

Euronext Derivatives on Optiq

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## CONTENTS

# 1. OVERVIEW

## 1.1 INTRODUCTION

The purpose of this document is to provide a description of the main functionalities and services offered by Optiq for Euronext Derivatives markets.

This document strives to provide for each identified functionality or service the following elements:

1. Why it is present in our Market
2. Description of the service and its principles
3. Examples, where possible, of its use
4. Advantages & benefits of the services as well as recommendation of use

The aim of the document is to provide a practical overview of the functionalities and approaches to Derivatives trading in Optiq. At the end of the document technical and architectural topics are also covered to provide a general overview.

This document is the view of the expected implementation of Optiq for Derivatives markets. This document will be updated with further information providing additional details[1]. In case of any functional changes they will be highlighted and communicated to clients in due course.

*A number of functionalities described in this document are subject to regulatory approval, and confirmation of implementation will be provided in due time.*

## 1.2 GLOSSARY

This section provides some high-level definitions of commonly used terms in this document. Please note that some of definitions and descriptions are also provided elsewhere within this document.

- **Actual Quality Spread (AQS):** Expressed as a decimalized multiple of the MQS, this spread is the operational reference in terms of liquidity, which takes into account market conditions. In determination of DCRP AQS is used to identify which price type to use in case Contract is setup with "*mid-BBO or Fair Value*" Dynamic Collar Logic. Without application of any multiplier, AQS and MQS are equal.
- **Aggregate:** Aggregate order or quote represents a summary of all the volume held at a price level, with each order or quote included in it being a constituent of said Aggregate.
  - **Explicit Aggregate:** contains summary of volume of submitted explicit orders at a price level
  - **Implied Aggregate:** contains summary of volume at a price level generated by the Matching Engine based on the SIM and EDIM models through Implieds.
- **Authorized Price Fluctuation (APF):** APF defines the traded price variation authorized for an instrument above and below its reference price (DCRP).

[1] Further details may be additional information due to implementation, or clarification following feedback from clients

- **Blue Month:** The most active Expiry month in Options available for trading based upon volume and open interest which is determined by the Exchange officials. Due to changes in volume and open interest between expiries, most calculations in this document for Options use in its place the Front month.
- **Book:** For an Exchange it represents a list of orders on an instrument waiting for counterparts.
- **Collar:** Safeguard mechanism, i.e. a limit, constraining the instantaneous order price fluctuation, to protect the market from aberrant order prices & trades. On order entry and upon matching, prices are checked against the Collars.
- **Component Implied:** A contingent order in an individual Outright order book derived from the combination of existing orders in a Strategy order book and existing orders in the other components of the strategy.
- **Double Sided Quote (DSQ):** A Double Sided Quote (DSQ) represents submission of price and volume for the two sides for an Outright. Technical submission is done via "Quotes" messages.
- **Dynamic Collar Logic:** Logic that identifies the rules to obtain the DCRP, and the Dynamic Collars, with the reference price to use identified as the *Reference Price Origin*.
- **Dynamic Collar Reference Price (DCRP):** DCRP of a derivative's instrument is the price used as base for Dynamic Collar calculation, and is determined based on the rules in the Dynamic Collar Logic setup for the Contract.
- **Euronext Customer Technical Support Group (CTSG):** Exchange team responsible for management of Exchange's External User Acceptance (EUA) test environments, providing technical and functional assistance to clients for testing in the test environments. Euronext currently offers two separate EUA test environments: EUA Current mirroring the production environment, EUA Next for future developments.
- **Euronext Market Services (EMS):** Exchange team responsible for surveillance and operation of the market in Production, ensuring in real-time fair and orderly markets, and provide functional assistance to clients in Production environment.
- **Euronext Membership & Customer Connectivity (MCC):** Exchange team responsible for creation and modification of client's membership on Euronext markets, as well as the setup and management of client's connectivity to private Order Entry gateways.
- **Event Driven Implied Model (EDIM):** An Implied matching model under which strategy Implieds are calculated in cases of submission of (i) an order that improves BBO price, or (ii) an RFIE messages.
- **Exchange Defined Strategy (EDS):** A real-time strategy created by the trader via a dedicated message during the trading day based on the list of standard strategies as well as delta-neutral supported by Optiq.
- **Expiry:** Expiry date indicating the specific day of expiry (year, month & day).
- **Explicit:** Order or quote that has been explicitly entered into the book by a market participant (and is not Implied).
- **Fair Value:** a neutral and balanced estimate of the market price of an instrument that takes into account a pre-defined set of actual and intangible factors.
- **Firm:** A firm is an investment firm or financial institution that deals, advises, and/or acts on behalf of its clients and possibly itself on the Euronext markets.
- **Front month:** The Expiry nearest to the current date. Normally this term is used for Futures, however for purposes of calculations explained in this document the same term and definition would be applied to Options, which normally do not use this terminology.
- **Future Spike Protection (FSP):** A trading safeguard mechanism setup by Euronext Derivatives markets to provide protection to the Futures markets from extreme price movements within a short timeframe (e.g. in case of a Flash crash) while still allowing clients to continue trading safely in such volatile conditions within reasonable price limits.

- **Indicative Matching Price (IMP):** Price at which the maximum volume of orders can be executed at the time of Uncrossing, with minimal imbalance quantity. It is disseminated on a regular basis by MDG and facilitates price discovery.
- **Logical Access:** An OEG (Order Entry Gateway) entry point, setup for clients to connect to a single Optiq Segment, containing the technical configuration for the client's connectivity. Multiple logical accesses can share the same SFTI® line.
- **Market Data Gateway (MDG):** Software that provides high-speed, real-time market data (public messages) for the Euronext markets.
- **Market Maker Protection (MMP):** Facility that offers registered Market Makers a degree of protection against being traded out, (i) on multiple quotes instantaneously [delta protection] or, (ii) above a cumulative traded volume resulting from multiple trades [volume protection]. Limits and manner of responding to the breach of these limits, are set by the Market Maker.
- **Market On Close (MOC):** Trading service that aims to enable participants to trade Futures during the day against the index close, in index points, with an agreed spread. The final price of the Futures contract is being calculated at the end of the day.
- **Market Quality Spread (MQS):** A reference Spread value identifying the Exchange standard for liquidity for individual books. It is independent of market conditions. Using MQS clients are able to determine in real time the collars applied by the system for each individual order book.
- **Matching Engine:** Software that manages the trading services for the Euronext markets.
- **Optiq Segment:** Grouping that defines a universe of instruments habitually sharing common trading properties. An Optiq Segment can contain one or several asset classes. An Optiq Segment access is setup through a Logical Access.
- **Optiq:** Euronext's multi-market full trading chain technology platform.
- **Order Entry Gateway (OEG):** Software that manages the access for Exchanges' clients, and acts as the private interface between the clients and the Optiq Matching Engine.
- **Outright**: Represents a unitary component of a Contract. For Futures Contract, an Outright is an Expiry. For Options, an Outright is a Put or Call on the underlying product, at a given strike price with a given Expiry. Each Outright has its own order book; both are identified indistinctively by a Symbol Index.
- **Partition:** Technical subdivision of an Optiq Segment. An Optiq Segment may be comprised of at least one or several partitions, physically independent one from one another, but connected to each other within the context of the Optiq Segment. Instruments may move from one partition to another within an Optiq segment.
- **Price Explicit Time (PET) Priority:** Matching policy that uses Price-Time logic, also referred to First-In First-Out (FIFO), to prioritize orders for matching.
- **Price Pro Rata (PPR):** Matching policy in which if there are several orders at the last price level reached by the incoming order, equal priority is given to every order at this price and incoming volume is divided among these orders in proportion to their resting volume. Otherwise priority is given to orders at the best price (highest for a bid, lowest for an offer).
- **Product / Contract Code:** Code assigned to identify a Euronext Derivatives Contract.
- **Quotes:** Feature, and a technical message, provided by Optiq to Market Makers, enabling bulk submission of orders in a single message. Each individual "Quotes" message allows to submit a set number of Double Sided Quotes (DSQs).
- **Reference Price Origin:** defines the type of reference price used for the identification of the Dynamic Collar Reference Price (DCRP).
- **Request for Cross (RFC):** Trading facility used by a participant to submit a committed cross trade against a client via a multilateral auction.

- **Request for Implied Execution (RFIE):** Facility that allows clients to send a private message to trigger recalculation of Implieds, and possible matching, for a strategy book in a Contract using EDIM model.
- **Request for Quote (RFQ):** A private message mechanism giving the market and Market Makers the opportunity to:
  - Submit or update Quotes prior to the execution of the RFC submissions.
  - Respond to the system's request to the market in case of the instrument's reservation.
- **Request for Price (RFP):** A private message mechanism that requests market participants for submission of order and quotes.
- **Self-Trade Prevention (STP):** Service provided by Euronext on its trading platform, to allow trading clients to avoid unintentional trading with themselves, that results from the matching of two opposite orders of the same client. This service is made available to clients performing specific types of activities (e.g. Market Makers) setup depending on the rules defined per Optiq Segment.
- **Spontaneous Implied Model (SIM):** An Implied matching model under which strategy and component Implieds are continuously calculated
- **Spread Class:** The structure that defines the setup of Time to Expiry (TTE) and spread values of Market Makers obligations for individual contracts. For each TTE the spread values are defined for the price spread, to manage spreads in general trading conditions, as well as for cases when trading conditions bring instruments to overly low (cheap) or high pricing. Market Making schemes define spread obligations through several Spread Classes. Multiple contracts may refer to the same spread class, while only one spread class can be associated to a contract.
- **Standard Uncrossing Sequence:** A type of uncrossing sequence on a Contract consisting of executions of Book Uncrossing on all the order books belonging to the Contract when uncrossing is done on Contracts without Implied.
- **Standing Data:** Set of data that provides referential characteristics of all trading instruments available on Euronext markets. The data is provided via files and messages.
  - Standing data files contain referential data characteristics of the trading instruments and strategies that may be required, or provided as value-added information. These files are provided on a daily basis and can be obtained from a separate HTTPS service.
  - Standing data messages contain the basic information of each instrument and strategy, and are disseminated via MDG at the start of each trading session and intraday on creation of Derivatives instruments.

    Clients should refer to the MDG documentation for the full details about these services.
- **Strategy Implied:** A contingent order in a Strategy order book derived from the combination of existing orders in individual legs of the Strategy (individual legs being Outrights). For a Strategy only one Strategy Implied can be defined at a given price level.
- **Strategy:** Represents a structured product built over a linear combination of Outrights, and has its own order book. Trading a strategy allows to simultaneously execute all trades on all legs at the same time under the exact same market conditions.
- **Symbol Index:** A unique system-wide identifier (in private and public messages) assigned to a trading instrument in Optiq. Note that an instrument here represents either a single tradeable instrument, an index or a strategy. It represents the combination of the following instrument characteristics: ISIN, MIC, Currency and when required the MIC of the Market of Reference, Symbol Index will not change over the lifetime of the instrument, but can take a different value for the same instrument, depending on the environment (Production or Test).

- **Time To Expiry (TTE):** The specific amount of time that remains prior to the time that an instrument will be due to expire and after which the instrument is no longer traded. In the Spread Classes TTE is defined as a faction of a month.
- **Total Return Future (TRF):** A listed Contract that replicates the economics of a total return swap within the infrastructure of a centralized Exchange. The Buyer party in a TRF receives the total return of any income generated by the asset (i.e. increase in value, as well as dividends) and in exchange pays the asset owner, the Seller, a set rate over the life of the Expiry. Transactions are executed in basis and index points with final price calculated at the end of the day.
- **Trade Price Validation (TPV):** A trading safeguard mechanism for trade validation at execution, to ensure that all earlier entered orders participating in a trade are within the price limits, and reduces the risk of aberrant trades.
- **Trading At Index Close (TAIC):** Type of trading that allows trading to occur intraday against index closing levels. Trades intraday are done in points (basis or index), and final prices are determined end of day based on the value of the points against the identified closing levels of the index.
- **Trading At Market (TAM):** Type of trading that allows trading to occur intraday using index levels as a reference, with final Futures price known at the time of trading. TAM is available via wholesale facility and is done in index points.
- **Trading Pattern:** A sequence in which a defined set of trading phases are triggered throughout the trading day. Each trading phase in a Pattern is assigned a specific time of triggering.
- **Trading Phase:** A time period within the trading day that is defined by specific order entry and matching conditions, and during which specific trading mechanisms apply. Main trading phases in Optiq for Derivatives are Call, Uncrossing, Continuous.
- **Uncrossing Price (UP):** price at which trades, if any, are performed at the Instrument's uncrossing time.
- **Uncrossing Sequence(s):** Sequence that defines the order in which individual book uncrossing steps are done. Optiq uses three Uncrossing sequences that are applied depending on whether Implied are setup to be calculated, and if so, which Implied mechanism is to be used. These sequences are defined in the applicable sections further in this document.

## 1.3 RELATED DOCUMENTS

The following list identifies the documents, which either should be read in conjunction with this document, or which provide other relevant information for the user:

1. Euronext Optiq Phase 3 Derivatives: Member Consultation
2. Euronext Derivatives Markets - Optiq Kinematics Specifications
3. Euronext Markets – Optiq OEG Connectivity Specifications
4. Euronext Markets – Optiq File Specifications
5. Euronext Markets – Optiq MDG Client Specifications
6. Euronext Markets – Optiq OEG Client Specifications - SBE Binary Interface
7. Euronext Markets – Optiq OEG Client Specifications - FIX 5.0 Interface

Clients are advised to also refer to the Euronext Rules and Regulations documents for more details.

For the latest version of documentation please visit https://connect2.euronext.com/en/membership/resources/it-documentation.

## 1.4 DOCUMENT HISTORY

The following lists only the most recent modification made to this revision/version. Please see the Appendix for the document revision history.

| DOCUMENT VERSION | CHANGE DESCRIPTION |
|---|---|
| 5.0.0 | Introduction of COB interaction with Request For Cross Functionality |

# 2. REFERENTIAL MANAGEMENT

Referential data provides characteristics of all tradeable instruments and their underlying, as well as other information required for trading, including trading schedule, tick sizes that remains comparatively static throughout a trading session.

Referential data for Optiq is provided via daily files, and market data messages.

## 2.1 TRADING INSTRUMENT & EXPIRY MANAGEMENT

Standing Data File, provided on a daily basis, contains characteristics of all tradable instruments for the coming trading session. For most efficient use of the system, clients must use, and update on a daily basis, their referential data by downloading the Standing Data files (via EFS) and/or using the Standing Data market data messages (via MDG).

The primary key to identify a Contract and individual tradeable instruments is the **Symbol Index**.

In parallel of Symbol Index the **AMR code is provided in the standing data** and can be used to map the instrument Symbol Index used for trading to the AMR code. *More details on modifications of AMR code are provided later in this document*.

With Optiq, Derivatives Contracts with the same underlying and the same set of main trading characteristics (listed below) are managed as a single structure identified by a unique Product Code and the associated Symbol Index. Standing data will contain a field to identify the Daily, Weekly and Monthly expiries within the same Contract. *More details on this field in standing data will be made available in Optiq MDG Client specifications & Files specifications documents.*

The identifiers of the remaining Contract will be kept and used for all expiries.

### Daily, monthly and weekly expiries

Three level of expiries are introduced by the Exchange (Cf. Listing schedule of AEX as an example):

- Monthly expiries are defined through the year *for* calendar months and their maturity date is often set as the third Friday of the month (with calendar exception management indicated in the policy).
- Weekly expiries are defined between two consecutive monthly expiries (across two calendar months). They are created by the Exchange prior start of a new calendar month for up to the next 5 calendar weeks.
- Daily expiries allow creation of instrument for clients to hold a daily position.

Different expiries will be managed as much as possible in a single Contract: weekly and monthly expiries for one single product can either be:

- All under the same Contract (general rule) or
- Separated across several Contracts (exceptional setup)

depending on the number of instruments belonging to it.

### Trading characteristics

Trading characteristics that are the same between Contracts being combined are:

- Contract Type
- Exchange Code
- Lot Size / Unit of Trading
- Trading Currency
- Exercise Style
- Settlement Method
- Optiq Segment

***Example 1: Futures Contracts with different length of expiries: dailies/weeklies/monthlies***

*In this example Futures Contracts managed via single Contract, vs. multiple Contracts that are defined based on underlying and main trading characteristics will be based on "AEX-Index" as the underlying.*
*Standard (monthly) Contracts will incorporate into itself the expiries of the shorter expiries (weekly / daily).*

- *Standard Contract: FTI Future AEX Index*
- *Weekly Contracts that would potentially merge into FTI:*

| | |
|---|---|
| *1FT* | *AEX Index Weekly Future – Week 1* |
| *2FT* | *AEX Index Weekly Future – Week 2* |
| *4FT* | *AEX Index Weekly Future – Week 4* |
| *5FT* | *AEX Index Weekly Future – Week 5* |

*The combination will take weekly Contracts and combine their constituent expiries to be managed in the single standard (monthly) Contract, with the identifiers of all expiries following the change being:*

| | |
|---|---|
| *Contract Exchange:* | *K* |
| *Contract code:* | *FTI* |
| *Contract Name:* | *Future AEX Index* |

***Example 2: Spreads over different expiries represented by different Contracts***

*In this example an ICS setup for Future on AEX Index that will be removed is:*

| | |
|---|---|
| *Contract Exchange:* | *K* |
| *Contract code:* | *T12* |
| *Contract Name:* | *AEX Index Weekly Future - Wk1-2 ICS* |

*Instead clients can use existing strategies between different expiries that are combined under FTI (Future AEX Index) Contract.*
*In this example to clients can create a standard calendar spread between expiries for week 1 and week 2 of FTI Contract.*

*For a detailed description of referential data files and messages clients should refer to the Optiq file specifications and Market Data Gateway client specifications documents.*

For similar Outrights this:

1. Allows clients to define inter-expiry spreads on their own,
2. Gives Market Makers flexibility to set their MM protection on the full range of such series,
3. Permits for all Expiry roll changes, whether on short and longer term Expiries, to be managed in a single Contract. This makes short term maturities (daily, weekly) fungible with the standard monthly expiries.

**IN SUMMARY: TRADING INSTRUMENTS & EXPIRY MANAGEMENT**

- **Symbol Index becomes the primary key identifier of a Contract and an instrument:**
  - ✓ **Clients will need to use Symbol Index as the Contract and trading instrument identifier.**
  - ✓ **AMR code will remain in the standing data, with format modifications and increase in length to 18, to allow mapping to Symbol Index for post-trade and back-office reconciliation purposes.**
- **Contracts with the same trading characteristics, and different expiries are grouped. Standing data will contain a new field to identify the Daily, Weekly and Monthly expiries within the same Contract. Clients need to:**
  - ✓ **Use Optiq standing data, on a daily basis, to obtain all the expiries that are identified as a population linked to a single Contract.**
  - ✓ **Migrate Contracts being combined, into a single Contract / set of expiries.**
  - ✓ **Follow forthcoming instructions for migration of referential.**
- **Expiry roll between different terms of expiries managed within a single Contract.**
  - ✓ **Operations performed for the roll of short and long term expiries can be done in the same manner, within a single Contract, whether they are daily, weekly or monthly.**
- **Client can define spread between expiries and no longer need to rely on ICS structures predefined by the Exchange (increased flexibility).**
  - ✓ **All expiries were linked by the ICS structures in the legacy system, because of the non-fungibility of the contracts. In Optiq, ICS are decommissioned, as all expiries of identical trading characteristics are part of a single Contract. Clients have the flexibility to use existing Exchange Defined strategies on Optiq to create spreads between different Expiry durations.**
- **Market Makers can extend MM protection to the full range of similar series.**
  - ✓ **Client should adjust their MM protection thresholds associated to individual Contracts, and include the full range of available expiries in a single Contract.**

# 3. TRADING PATTERNS & TIMETABLES

## 3.1 MAIN TRADING PHASES

Throughout the trading session the Matching Engine uses a pre-defined schedule to trigger the use of trading rules & mechanisms. The rules and mechanisms are referred to as the trading phases, and the schedule is referred to as the trading pattern. The chapter below explains the trading phases, patterns and some of the associated rules that are supported by Optiq.

### 3.1.1 Price Discovery Mechanism

This part of the trading cycle consists of two trading phases, that is (1) Call followed by (2) Uncrossing. These two phases may exist in a pattern or event independently from each other, however typically a Call phase precedes an Uncrossing.

Call phase: Order & quote accumulation period, during which the system records all orders and quotes entered and matching does not occur.

The same applies when the instrument is in the state of Reservation or Suspension with order entry enabled.

Uncrossing phase: A (very short) scheduled period during which Optiq attempts to match orders and quotes that are present in a book at the time of Uncrossing.

Different **Uncrossing Sequences** are defined in Optiq and used depending on the Derivatives Contract parametrization. Parameters allowing to determine the set of rules applied are provided in the Contract Standing Data. *The different rules are explained in the **Trading on Optiq** dedicated section of this document.*

During Uncrossing no orders and/or quotes may be modified, cancelled or entered.

At the end of Uncrossing, matched orders are disseminated as trades to clients in private messages, and as public messages via market data.

### 3.1.2 Continuous Trading Mechanism

This part of the trading cycle consists of the phases managed during continuous trading.

Continuous phase: Trading phase during which orders and quotes are submitted and typically matched continuously.

Different Matching Algorithms are defined for trading on Optiq. They are applied depending on the setup indicated in the Contract Specifications. Matching algorithm rules are explained in the ***Trading on Optiq*** dedicated section of this document.

### 3.1.3 Trading Interruptions

In Optiq, in case of interruption of trading, instruments may be in three book states: Reservation, Suspension and Halt. For all trading interruptions, and their resumption, a market data message is sent to inform the market.

Reservation: An automated temporary interruption of trading (matching) of an Instrument triggered by potential matching outside of prevailing prices.

For Strategies, the state of Reservation may be triggered by the Leg pricing algorithm (*Cf. section "Leg pricing algorithm"*).

Reservation applies only to the instruments in the Central Order Book. In case of Reservation all orders remain in the book.

Suspension: An automated or manual interruption of trading (matching) of a Contract and/or an Instrument triggered in one of the following cases:

- Interruption in the associated underlying
- New contract listing
- On request of regulator or issuer
- To ensure fair & orderly trading

When triggered on instrument level, the other instrument within the same contract may not be affected by the Suspension.

Suspension may apply to both the Central Order Book and Wholesale facilities. The Market data message sent for the change in status identifies the Market Mechanism to which it applies. In case of Suspension all orders remain in the book.

Halt: An interruption of trading (matching) of a Contract due to a technical issue and takes priority over any other contract state or trading phase.

Halt applies exactly at the same moment to both the Central Order Book and Wholesale facilities. In case of a Halt all orders remain in the book.

> **Note:** The status of Contracts and Instruments in the different cases of trading interruption, including the setting of the Order Entry, is communicated via the public Market Status Change message.

## 3.2 THE OPTIQ TRADING PATTERNS: PREDEFINED SEQUENCE OF TRADING PHASES

A trading phase defines the order entry and matching rules that are applied by Optiq.

Each trading phase in a **Pattern** is defined by its starting time, its type and several associated phase qualifiers & characteristics. As such the pattern provides the standard timetable for trading. A trading pattern is set at the Contract level and the supported exchange market mechanisms (i.e. COB, Wholesales, RFC), and applies to all instruments within the Contract.

Throughout the trading session, the Matching Engine uses the pattern to follow the timed succession of the defined phases, and trigger the use of the associated rules & mechanisms. Each pattern provides clients with a configuration applicable for the day.

All trading patterns are provided to the market on a daily basis, through a single dedicated referential file. In this file each trading pattern is identified by an ID. In the Standing Data, each contract refers to the ID of a trading pattern that applies to it. The same pattern may be associated to several contracts.

Applying Patterns to Strategies: with the exception of Reservation cases *(Cf. section "Trading on Optiq")* strategies follow the same pattern as defined for the whole Contract, following the rule described below with regards to its multiple outright legs.

Note that this setup goes with the assumption that all strategies are defined within a Contract. Inter-Contract Strategies are currently not supported by Optiq.

> **Note:** Strategies are placed in most restrictive instrument state and set with the most restrictive Order Entry qualifier of any of its legs.

The order of severity of instrument state and order entry qualifier are as following:

| | LEG STATE SEVERITY ← Lower | | | | Higher → |
|---|---|---|---|---|---|
| **Instrument State** | Continuous | Call | Reserved | Suspended | Halted |
| **Order Entry Qualifier** | Yes | Cancel and Modify | | Cancel Only | No |

### 3.2.1 Trading Phases Characteristics

As mentioned above, each trading phase has a starting time, type, as well as qualifiers. The main ones are described below:

Trading Phases: The trading phases, or types of phases, define the main order entry and matching rules. The trading phases used by Optiq are:

- Inaccessible: Trading engine not accessible
- Closed: Trading engine accessible COB accessible for order cancellation only
- Call: Market open, COB accessible, orders usually accepted, no matching
- Uncrossing: Market open, COB auction
- Continuous: Market open, orders accepted, automatic continuous matching

Scheduled Event: Expiry Management

Timetables are linked to Derivatives Contracts. The time of Expiry is provided as a value assigned to a Contract, in the field "Scheduled Event" of the Timetable. The value is always provided as one of the settings, irrespective of whether the specific instrument belonging to this Contract will expire or not.

Actual triggering of an Expiry is communicated via a real time market data message. Clients should identify the instruments concerned by the effective Expiry using the maturity date provided in referential at Outright level.

Collars Management: Indicates whether a trading phase, or a scheduled event, is accompanied by change in the Collar Management used for order entry and matching rules in case a specific widening is applied.

### 3.2.2 Intraday Changes for Patterns

While typically Optiq follows the predefined trading pattern to change between phases and rules, the patterns can change intraday depending on events on the underlying market, or Derivatives market conditions. The changes are indicated to the market through dedicated Market Data messages.

Advantages of the approach:

Trading Patterns in combination with Scheduled events:

- Allow for typical pre-defined trading sequences to be provided in a uniform manner
- Ensure that Matching Engine and clients are able to consistently follow a sequence of trading phases
- Provide expected time of phase occurrence before start of the trading day
- Allow for variation of phases per Contract, if required, while maintaining the overall communication of trading pattern details
- Permit patterns to also be applied for strategies, to enable same level of consistency and predictability
- Offer flexibility to react to intraday events with clear & consistent process
- Provide a harmonized approach for applying trading pattern & timetable mechanism across markets running Optiq

## IN SUMMARY: TRADING PATTERNS & TIMETABLES

### Trading Patterns & Timetables:

- **Optiq uses Patterns to provide trading timetables.**
- **Two fields added to the existing Cash pattern file to provide information on "Scheduled Event" & "Collar Management" (to indicate when collars are widened).**
- **Price Limits added in timetables in addition to real-time event messages, with price limit changes being applied for specific trading phases in the trading pattern / phase.**
- **Naming convention used for identification of trading phases follows what was already defined and described in MDG specifications in Phase 1 and Phase 2, and Change Highlights document.**

  **The main differences to note are:**

  - **Pre Open** — **renamed as Call / Opening**
  - **Open** — **renamed to Continuous / Standard**
  - **Pre Close** — **renamed to Continuous / Closing**
  - **Auction** — **renamed to Uncrossing**
  - **Terminate** — **renamed to Suspend**
  - **Pre Expiry** — **managed in Continuous**
  - **Expiry Expiring** — **managed in Continuous or Scheduled, as scheduled event for instruments**

### Clients should:

- ✓ **Incorporate the daily pattern timetable file & associated rules in their system.**
- ✓ **Adapt their systems to be able to handle flexibility of patterns as well as different schedules and timetables for different Contracts.**
- ✓ **Use the new fields (Scheduled Event & Collar management) provided in the timetable file, to have the information on which phases of the day are expected to have changes in price limits.**
- ✓ **Use the MDG real-time messages that identify intraday changes in price limits that may occur.**

# 4. TRADING ON OPTIQ

In order to provide the full overview of how to trade on Optiq, the next short definitions are provided as an introduction.

## 4.1 ORDER MANAGEMENT FUNCTIONALITIES

Optiq supports the following basic functionalities for Derivatives segments:

- Order Types: Limit, Market
- Validity Types: Day, GTC*, GTD*, IOC, FOK
- Volume Qualifiers: Minimum Quantity
- Account Types: House, Client, Market Maker

Combination of order and validity types for Derivatives markets are as follows:

| | Order Types | | | | | | Validity Types | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Phase** | **Market** | **Limit** | **MTL** | **Stop** | **Peg** | **Iceberg** | **Day** | **GTD*** | **GTC*** | **IOC** | **FOK** | **VFU** | **VFC** |
| **Call** | X | ✓ | X | X | X | X | ✓ | ✓ | ✓ | X | X | X | X |
| **Continuous** | ✓ | ✓ | X | X | X | X | ✓ | ✓ | ✓ | ✓ | ✓ | X | X |

**Note:** On Derivatives segments in Optiq, Market orders do not rest in the order book.

For day 1 of migration – while available in Optiq – Stop, Peg and Iceberg orders are deactivated on the Derivatives segments. These order types may be activated by Euronext in the future, as part of dedicated initiatives, if client need is identified.

** Maximum validity of GTC / GTD orders is one year minus one day. At the end of the year, if not cancelled by the member, system automatically cancels such orders.*

## 4.2 MARKET MECHANISMS & POLICIES

### 4.2.1 Market Mechanisms

Central Order Book trading on Optiq follows the rules of two main **Market Mechanisms**:

- Price discovery
- Continuous trading

- The Price discovery consists of two trading phases / states, that are (1) Call [or one of the functional trading interruptions: Suspension or Reservation] followed by (2) Uncrossing.

- *The Call/Reservation phase is an order and quote accumulation period, during which system records all orders and quotes entered and matching does not occur.*

  *The difference between Call and Reservation is that a Call phase is a scheduled trading phase, while Reservation is triggered by an intraday event.*

- *The Uncrossing is a phase during which matching is attempted after a Call phase. Uncrossing consists of several steps performed in sequence. During Uncrossing orders and/or quotes cannot be modified, cancelled or entered. At the end of uncrossing, matched orders are disseminated as trades to clients in private messages, and via market data.*

*Optiq employs the following concepts:*

- Uncrossing phase: phase during which matching is attempted after a Call phase. During Uncrossing phase Implieds can be generated.

- Uncrossing of a Contract: an attempt to execute an Uncrossing sequence within a single Contract.

- Uncrossing sequence: defines the order in which individual book Uncrossing steps are done. Optiq uses three Uncrossing sequences that are applied depending on whether Implied are set to be calculated, and if so, which Implied mechanism is to be used. These sequences are defined in the applicable sections further in this document.

- Book Uncrossing: attempt of execution of the Uncrossing algorithm within a single order book.

- The Continuous trading is applied during the Continuous phase. It follows the rules of the trading algorithms, logic and characteristics setup for this phase with the goal of continuous matching of submitted orders and quotes.

### 4.2.2 Matching Policies

In Continuous trading Optiq uses two **matching policies** that define the matching algorithm used i.e.:

- Price Explicit Time (PET)
- Price Pro Rata (PPR)

Each Contract is assigned a single policy. A policy provides priority and volume allocation rules, for the existing orders, in case of a trade. These policies are in interaction with the notions of aggregated orders.

*The policies are described in detail in the Continuous Trading Without Strategies section of this document.*

### 4.2.3 Implied Matching Models

In addition to explicit orders submitted by clients, Optiq uses two **Implied matching models** to imply liquidity from one book to another through Strategies. This is achieved by generating Implied prices based on existing

explicit orders. For each Contract, if applied, this generation of implied prices is governed by one of two models:

- Event Driven Implied Matching (EDIM)
- Spontaneous Implied Matching (SIM)

The sections below describe the different matching mechanisms and policies based on the Implied model set for a Contract. It also distinguishes between Outrights and Strategies (based on Implied model set).

## 4.3 PRICE DISCOVERY FOR OUTRIGHTS WITHOUT IMPLIEDS

*During the Call phase or Reservation*, orders and quotes are accumulated within all the **Instruments (Outright and Strategies)** individual order books of the Contract; the resulting Indicative Matching Price (IMP) is calculated and disseminated upon change in the order book that trigger recalculation.

For each outright order book an IMP is calculated using the following method:

A snapshot of the order book is taken

Volumes are aggregated per price level, *on each side*

A crossed quantity is identified, as well as the imbalance quantity

An **Tradable Price Range** of potential matching prices is defined as the range at which the largest volume can be executed. It is determined using the principles described below:

If more than one execution price would result in the same largest executable volume, (i.e. the maximized executable volume identified in the first step), then Tradable Price range is the price, or set of prices, which minimize the imbalance quantity at the execution price.

- If there is no imbalance quantity, Tradable Price range contains a single price
- If there is an imbalance quantity:
  - When a single price covers the imbalance quantity - the Tradable Price range contains this as the single price.
  - When multiple prices result in the same imbalance quantity - the Tradable Price range is defined as the interval that contains the summary of all the prices that minimizes that imbalance

From the Tradable Price range, an IMP is then determined **as the mid-point** of the limits of this Tradable Price range.

A unique IMP is disseminated

*Transition to Uncrossing* is what happens at the instance when the Contract scheduled status switches to Uncrossing phase. At that moment:

- At individual book level, the IMP is re-calculated and becomes the effective Uncrossing price (UP). It is disseminated by each order book as the “Uncrossing Price” in market data, triggering the effective uncrossing.
- The Standard Uncrossing Sequence immediately starts.

The **Standard Uncrossing Sequence** of a Contract consists of executions of Book Uncrossing on all order books belonging to the Contract.

*Uncrossing* at individual book level consists in the following:

- The effective uncrossing price is first checked against the collars. In case of breaches of trading safeguards. *(Cf. section "Trade Price Validation")*, the book is Reserved and no trade is executed.
- If Uncrossing Price is within the collars, then Optiq matches orders based on their price then time. Resulting trades are not aggregated. Unmatched or partially matched orders remain in the book.

**IN SUMMARY: PRICE DISCOVERY WITHOUT IMPLIEDS**

- **Optiq uses a simple Uncrossing Algorithm either on a single instrument, or as an Uncrossing on the whole Contract.**
- **Dissemination of the Indicative Matching Price and Uncrossing Price allows client to be informed of the value determined by the market for the Outright instruments.**

**Clients should:**

✓ **Compared to the current implementation, no specific changes are required to be performed by clients to accommodate Price Discovery without Implieds.**

## 4.4 CONTINUOUS TRADING FOR OUTRIGHTS WITHOUT IMPLIEDS

The Continuous Trading processing applies to any instruments with a status 'Scheduled' during a Continuous phase.

In Continuous Trading orders are matched and executed on a continuous basis against the orders already in the book using a given Matching Policy. The Matching Policy is configured at Contract level.

A Matching Policy is a mean of allocating a given incoming volume to orders. Different Matching Policies are suitable for various levels of liquidity and type of product.

The Optiq platform supports two Matching Policies:

- Price Explicit Time (PET)
- Price Pro Rata (PPR)

All matching policies always allocate to better priced orders first, then continue price level after price level. Allocation in Uncrossing is always done in Price-Time priority, even if the Matching Policy set for the Contract is not PET.

A single incoming order may trade in depth i.e. at several different, subsequent price levels.

### 4.4.1 Price Explicit Time (PET)

In order to choose the orders to be allocated, the Price Explicit Time (PET) Matching Policy uses first the best price then within this price level, the time ordered by priority (oldest first, newest last). This policy is also named Price-time or First In First Out (FIFO).

### 4.4.2 Price Pro Rata (PPR)

In Price Pro Rata (PPR), priority is always given to orders at the best price (highest for a bid, lowest for an offer). However, if there are several orders at the last price level reached by the incoming order, equal priority is given to every order at this price and incoming volume allocation is distributed among these orders in proportion to their resting volume. This is called the "pro-rated volume" of the resting order.

The pro-rata algorithm is only applied to resting orders. For aggressive orders, priority is still given on the basis of time.

The calculated pro-rated volume is evaluated against the "minimal pro-rata threshold" and is handled as follows:

- If the calculated pro-rated volume is greater than the minimal pro-rata threshold, the quantity is rounded up and is allocated.
- If the calculated pro-rated volume is less than the minimal pro-rata threshold, the quantity is not allocated.

The minimal pro-rata threshold is set for each Contract, and is provided in the Contract Standing Data.

In case the incoming order has not been fully executed due to rounding effects of the pro-rated volume, the residual incoming order quantity is distributed over the remaining resting orders by recalculating the pro-rated volume per resting order.

In this second step the original ratio of the first step is applied and the same priority rules are applied (resting orders with the highest pro-rated volume are executed first; when there are resting orders with equal pro-rated volume, resting orders are executed based on time of order entry).

> **Note:** For contracts setup with Price Pro Rata (PPR) as the matching policy, only STP Type "Cancel Resting" is accepted. Submission with STP Type set to "Cancel Incoming" will result in rejection of the messages.
>
> STP Type "Cancel Resting" is not allowed for FOK and Minimum Quantity orders. This means that for FOK and Minimum Quantity orders on contracts setup with Price Pro Rata (PPR) as the matching policy, STP is not available.

***Example for PET***

*Assume that the following Explicit bids and offers exist in an Outright market:*

**Tick = 1 / Collars = (96; 101)**

| | Bid | | Offer | | |
|---|---|---|---|---|---|
| Time | Qty | Price | Price | Qty | Time |
| T1 | 100 | 99 | | | |
| T2 | 100 | 99 | | | |
| T3 | 200 | 99 | | | |

*A sell aggressing order is entered at 99 for 140 lots*

*The total volume of the incoming order is less than or equal to the cumulative remaining volume of selected orders (140≤400):*

- *The incoming order is fully executed for its total volume*
- *The Bid side has only one aggregate of 400 lots at 99*

***Matching of Aggregates***

*The sole aggregate on the Bid side cannot be fully matched*

***Matching of Individual Orders (via PET)***

*Constituent T1, T2, T3 are sorted in time priority and are matched*

- *T1 is fully executed for 100*
- *T2 is partially executed for 40*

***Example for PPR***

*Assume that the following Explicit bids and offers exist in an Outright market:*

**Tick = 1 / Collars = (96; 101)**

| | Bid | | Offer | | |
|---|---|---|---|---|---|
| Time | Qty | Price | Price | Qty | Time |
| T1 | 100 | 99 | | | |
| T2 | 100 | 99 | | | |
| T3 | 200 | 99 | | | |

*A sell aggressing order is entered at 99 for 140 lots*

*The total volume of the incoming order is less than or equal to the cumulative remaining volume of selected orders (140≤400):*

- *The incoming order is fully executed for its total volume*
- *The Bid side has only one aggregate of 400 lots at 99*

***Matching of Aggregates***

*The sole aggregate on the Bid side cannot be fully matched*

***Matching of Individual Orders (via PPR)***

*Constituent T1, T2, T3 are sorted in proportion to their resting volume*

- *T3 represents 50% of the aggregate volume*
- *T1 represents 25% of the aggregate volume*
- *T2 represents 25% of the aggregate volume*

*The list is never re-sorted again*

- *50% of the volume of the incoming order are allocated to T3*
  - *T3 is partially executed for 70 lots*
- *25% of the volume of the incoming order are allocated to T1*
  - *T1 is partially executed for 35 lots*
- *25% of the volume of the incoming order are allocated to T2*
  - *T2 is partially executed for 35 lots*

**IN SUMMARY: CONTINUOUS TRADING ALGORITHM WITHOUT IMPLIEDS**

- **Optiq supports two Matching Policies to define priority of traded volume allocation:**
  - ✓ **Price Explicit Time: Price / Time priority.**
  - ✓ **Pro Rata: Price Priority and distribution of volume allocated based on relative sizes of orders at the same (last) price hit.**
- **The policy is defined in the Contract specification.**
- **Relevant parameters (e.g. Pro-Rata threshold) of the policy are provided in referential data when applied.**

**Clients should:**

✓ **Take into account which policy is used for the Contract they trade to adapt their own trading logic. Detailed specifications of Optiq Matching Engine provide the exact rules and processing of each policy.**

## 4.5 TRADING ON STRATEGIES WITHOUT IMPLIEDS

Optiq defines two types of **tradable instruments**:

- Outright**:** Represents a unitary component of a Contract. For Futures Contract, an Outright is an Expiry. For Options, an Outright is a Put or Call on the underlying product, at a given strike price with a given Expiry. Each Outright has its own order book, and is uniquely identified by a Symbol Index.
- Strategy**:** Represents a structured product built over a linear combination of Outrights. A strategy is defined by its formula, which indicates its structure:
  - Identification of each of the component Outrights by its Symbol Index, referred to as the Strategy legs
  - **A leg ratio** (that is, a multiplier which is necessarily a positive integer) for each Outright leg
  - A side for each leg
  - A side for the whole strategy

***Example***

*A Calendar Spread on a Future Contract is a strategy defined as a product allowing to buy a single Expiry (ratio is 1, the second Expiry is Outright with Symbol Index 1) and sell simultaneously a second single expiry (ratio is 1, the second Expiry is the Outright with Symbol Index 2).*

*Formula of the Strategy is (Leg1[Symbol Index 1;B,1];Leg2[Symbol Index 2;S;1];) Leg 1 being the "near month" and leg 2 being the far month.*

For the complete list of exchange recognized strategies, and their expected structure, please refer to the "*Annex Two – Recognized Strategies*" of the Euronext Derivatives Markets Trading Procedures.

A strategy has its own order book. Trading a strategy allows to simultaneously trades both legs at the same time under the exact same market conditions.

Trading mechanisms of strategies without Implieds uses the same principles as those defined for the Outrights.

### Market Mechanisms:

- Price Discovery: Applicable exactly the same as for outrights when the strategy is in Call, Reserved or Suspended state with Order entry allowed. Orders are collected, matching is not executed, until the book is uncrossed.
- Continuous trading: Rules applied are identical to those defined for the Outrights, and are applied at the Contract level[2].

### Matching Policies:

- Strategies follow the same matching policies that are set on the associated Contract.

[2] The Dynamic collars applied to strategies are covered in a dedicated section

**Practical Note: State of a Strategy depending on its leg**

Unless it is individually reserved, any strategy inherits the most constraining state of its leg, with the following logic, from the most constraining state to the less constraining one (*cf. Section " The Optiq Trading Patterns: predefined sequence of trading phases"*)

### 4.5.1 Intraday creation of strategies

Optiq allows clients to create **strategies intraday via dedicated specific private message**.

Types of strategies that are available are provided at the **Contract level in the Standing Data**. Each strategy type is referred by a **dedicated code**, and defines a **unique applicable formula**.

To create a **standard Exchange Defined Strategy** (EDS), a trader submits a "create strategy" request to the system. It consists of the list of legs that make up the strategy plus the relevant Strategy Code.

A trader must always create an Optiq strategy in the long position (from the buy perspective). For example, a Futures Calendar Spread must be created in terms of buying the near month and sell the far month. If a trader attempts to specify the legs in a different order the request will be rejected by Optiq.

$$Strategy = n_1 \times Leg_1 + n_2 \times Leg_2 + \cdots + n_N \times Leg_N$$

With $n_i > 0$ if on the sell side, $n_i < 0$ if on the buy side.

Upon acknowledged creation of a strategy, system confirms it by replying the Symbol Index of the strategy.

A trader wishing to define a new strategy with an intention to sell would create the strategy from the buyer's perspective and enter an offer.

A EDS is visible to all end users on the day of its creation, but will not be visible the next day unless a GTC or a GTD order will still be present in this strategy book for the following trading day.[3]

When submitting a complex transaction using a strategy (e.g. LIS strategy for wholesales) the provided list of Symbol Index must match the strategy structure exactly, in symbol indexes and their order, to the strategy indicated by the strategy code submitted. Optiq uses the same rules for such validation as the one done for intra-day strategy creation.

At the end of the Trading Day, if there are no more GTC and GTD orders on a strategy, it is deactivated and no longer visible to traders in the following trading days' standing data, however is not deleted from the Optiq system. In case a trader wants to trade again in the future a previously de-activated EDS, then upon the new creation request, the Matching Engine will return the same EDS Symbol Index as the one originally used.

GTC / GTD orders are not allowed to be entered in delta-neutral / volatility trades.

[3] GTC / GTD orders on the delta-neutral strategies are cancelled at the end of the day, as such delta-neutral strategies are not visible the day after they are created

### 4.5.2 Leg pricing algorithm

Matching rules and price formation for Strategies follow the same general rules as Outrights: "matching price is the resting price". For example, a limit Sell order for €9 on Strategy ABC arriving into an order book with a best Buy limit of €10 (resting price) on ABC will trade at €10.

While Optiq matches strategies at a single price, the resulting positions are always maintained in the corresponding Outright series and maturities.

Therefore, once a strategy trade has been identified, each leg must be allocated a price which is consistent both with the strategy traded and with the current Strategy in the Outright market.

The goal of the algorithm is to find prices for each leg such that:

$$Strategy\ price = n_1 \times Leg_1 price + n_2 \times Leg_2 price + \cdots + n_N \times Leg_N price$$

With $n_i > 0$ if on the sell side, $n_i < 0$ if on the buy side.

The algorithm used by Optiq to determine the price of each Outright leg proceeds using the following steps:

1. Determination of authorized Leg Price ranges
2. Assignment of Initial Leg Price
3. Calculation of the Strategy Price
4. Adjustment of Leg Prices in order to match the trade price.

The pricing algorithm is processed twice. The first pass tries to keep leg prices within the BBO; if it is not possible a second attempt is run extending the Leg Price authorized range to Dynamic Collars.

If the system cannot match the trade price neither within the component leg BBOs nor using their respective Dynamic Collars as authorized price ranges, the incoming orders that triggered the trade causes Reservation of the Strategy instrument, and follows the procedure for TPV.

**IN SUMMARY: TRADING ON STRATEGIES WITHOUT IMPLIEDS**

- **Optiq supports trading on multiple Strategy Types as individual instruments with their own order book.**
- **All strategies instruments are managed as User Defined Strategies by Optiq and can be created intraday.**
- **When trading occurs on a strategy Optiq computes a price for trades on individual legs. They are provided to both the market and Euronext Clearing Partner for reconciliation purposes.**
- **Processing of leg pricing is harmonized between Futures and Options, with all prices being systematically attempted to be found within the individual Outright BBO.**
  - ✓ **This change should be transparent to clients.**
- **Rounding rules for identification of Collars are adjusted as follows: Values are always rounded to the next applicable tick (from the tick table), with the lower limit rounded to the tick below, and higher limit to the next identified tick above.**
  - ✓ **This change should be transparent to clients.**

## 4.6 IMPLIED MECHANISMS

Optiq is built to provide clients access to the most available liquidity.

Strategy Order Books and Outright Order Books are separated, however the two may benefit each other. Strategy trading allows to ensure that all legs of the order are executed the same transaction as single product, without having to ensure that a single counterpart is present for all legs to ensure the transaction.

Outright trading consisting of trading a single component, without having to ensure whether it is trading against a single leg of a strategy or an explicit order.

The liquidity found on Strategy and Outright markets may benefit one another if a mechanism allows a strategy order to match directly against explicit Outright orders (potentially with multiple counterpart) or vice versa.

### 4.6.1 Strategy and Component Implied prices

The transfers of liquidity between various books are made possible by Optiq using Implied prices that follow the rules of two matching models:

- A **Strategy Implied** is a contingent order in a Strategy order book derived from the combination of existing orders in individual legs of the Strategy (individual legs being Outrights).

  For a Strategy only one Strategy Implied can be defined at a given price level.

- A **Component Implied** is a contingent order in an individual Outright order book derived from the combination of existing orders in a Strategy order book and existing orders in the other components of the strategy.

> **Note:** An Implied is built solely on the combination of explicit orders.

As they are defined, each Component Implied or Strategy Implied is an Aggregate, as it represents a combination of potentially multiple orders at the same price from the different books it is built on.

An Implied – whether Component or Strategy – is always in relation with an identified strategy and its related formula. The formula is used to build the Implied itself (the combination of orders).

As an Implied can also be seen as an Aggregate itself, it is also associated with the newest timestamp of its constituent.

> **Note:** Implied prices are not generated if the implied prices are outside of the collars, and Implied prices are thus not tradable if they are outside of Collars.

In a nutshell, an Implied has three properties on which trading will rely on:

1. The implied price timestamp:

- From each book, the oldest timestamp of all contributing explicit orders at the same price (the explicit aggregate used to generate the implied price) is taken, resulting in an intermediary timestamp for each book
- The implied price timestamp is the newest (youngest) timestamp across contributing explicit aggregates

2. A ratio, which is the greater ratio of legs of the related strategy
3. The creation time of the related strategy

### 4.6.2 SIM & EDIM Implied Matching Models

Dynamic behaviour of the Implieds is defined in the following Implied matching models:

- Event Driven Implied Matching (EDIM)
- Spontaneous Implied Matching (SIM)

The Implied matching model applies at the **Contract level.** The type of Implied matching model is indicated in the daily standing data files as:

- Event Driven Implied Matching (EDIM),
- Spontaneous Implied Matching (SIM), or
- No Implied.

At the strategy level standing data will indicate if Implied prices are active for that specific instrument. If Implied prices are deactivated, the strategy book will not generate strategy Implied prices and will not accept component Implied.

These market mechanisms govern how Implied prices are:

- Generated
- Included into the external order book if applicable

With both models, when activated, Implied prices are never generated in the Call phase. They are generated only during the Uncrossing phase of the Price Discovery mechanism and during the Continuous phase in the Continuous trading mechanism. Implied prices are not generated and can't be traded if they are outside of Collars.

Therefore, three (3) Uncrossing sequences are defined:

- Standard Uncrossing sequence,
- EDIM Uncrossing Sequence,
- SIM Uncrossing Sequence.

> **Note:** Implied prices will not be generated and won't be traded if they are outside of the Collars.

### 4.6.3 Implied Trading Policy

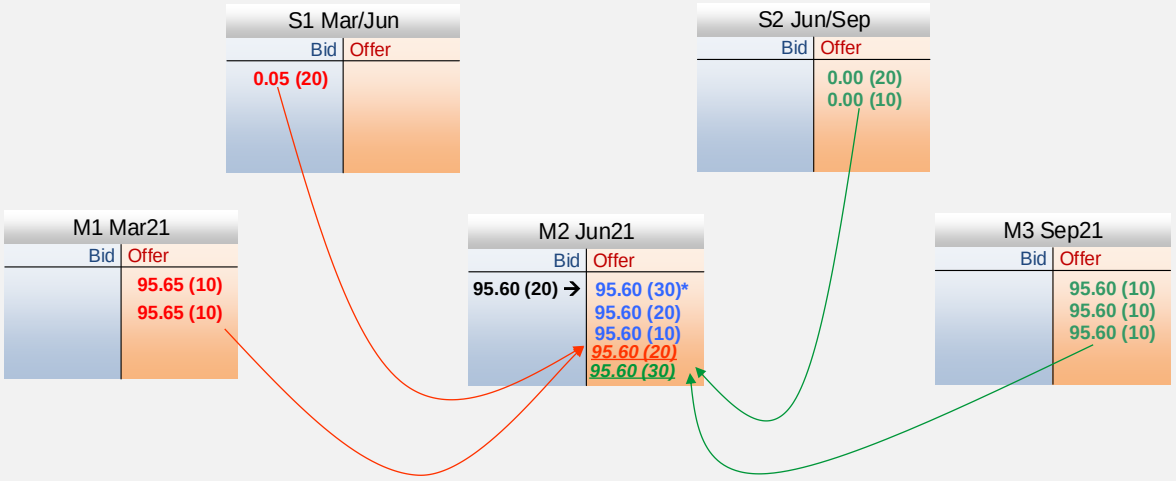
EDIM and SIM models define rules of the generation of the Implied prices and their dynamic behaviour in interaction with the market and the order books. When a matching situation occurs:

A. First matching occurs at the aggregated price level, then
B. For each aggregate at individual constituent level.

An **Aggregate** represents a grouping of all the volume available in the book at a single price level. Aggregates represent a summary of the volume held at a price level.

There are two (2) types of aggregates, Explicit Aggregate, which contain volume at a price level for submitted explicit orders and Implied Aggregates, which contain volume generated by the Matching Engine based on the SIM and EDIM models through Implieds. At a given price level both types of aggregates may be present.

***Example Implied Orders' Aggregate***




- *Underlined records are Aggregates*
- *Not underlined records are Individual Explicit orders*
- *Blue records represent an Explicit Aggregate in M2 Jun 21*
- *Black record is an incoming Individual Explicit order*
- *Red and Green records represent two (2) Implied aggregates generated in the M2 Jun 21 book*

Constituents of an Explicit Aggregate are individual explicit orders *(Cf. section "Trading without Implieds")*. Implied Aggregates correspond to an actual Implied order through a single strategy.

As an instrument may contribute to multiple strategies, multiple Implied Aggregates may co-exist at the same price level.

- For an Outright, if there are N strategies having this Outright as a leg, a price level in this Outright order book may be made up of up to N Component Implieds
- For a strategy, only one Implied Aggregate can exist at a given price level

The **Implied Trading policy** applies first at Aggregate level at the last price level reached by an incoming order. It then applies at Constituent level to individual Explicit orders constituting the aggregates.

A. *Allocation* at Aggregate level:

- Each price level is filled in price priority, until the remaining quantity of the incoming order does not allow to fully match the last price level. At the last price level, Explicit and Implied Aggregates are allocated depending on the Implied Trading Policy (Explicit Aggregate having always priority over Implied Aggregates).

B. Allocation at Constituent level:

- Once the incoming volume has been allocated amongst the Aggregates, Explicit orders constituting Implied Aggregates are allocated depending on the Implied Trading Policy.

The timestamp of an Explicit Aggregate is always equal to the timestamp of the **oldest** order at the aggregate price level in the market and doesn't depend on the Aggregate Trade Policy configured.

An Implied Aggregate is generated from two or more aggregate explicit orders (parents). The Implied Aggregate retains the timestamp of the oldest order from each Aggregate Explicit Order (parent).

The timestamp of the Implied Aggregate is always the **newest (youngest)** of the parent's Aggregate Explicit Orders.

> **Note:** In Optiq all explicit and Implied volume is aggregated for the BBO. Clients have to process the last value for BBO (Best bid and Offer) from Market Update message (1001).
>
> Implied Bid and Offer will no longer be provided, and values Implied Bid and Offer from Market Update message (1001) will be decommissioned.

## 4.7 EVENT DRIVEN IMPLIED MATCHING (EDIM) MODEL

### 4.7.1 Main Principles of EDIM

The **Event Driven Implied Matching (EDIM)** model gives the control to the market participants on the generation of Implied prices – meaning, traders **request** Optiq to generate Implied prices.

This model gives clients another means to request liquidity outside of the Central Order Book, when it is needed, and which they control.

> **Note: Only strategy Implied prices are allowed**. As a result:
>
> - Interaction between the client and the system are handled by the strategy order book,
> - Once requested to the strategy, strategy order book combines the prices of the orders on the single strategy legs to build its own Strategy Implied aggregate with the corresponding volume.

Once generated, the Strategy order book executes an Uncrossing algorithm, and allocates volumes accordingly and generates trades, if any. Remaining volumes in Implied prices do not rest in the book, and are not published in MDG.

The "Event" in EDIM model is the clients' submission of a new better priced order (i.e. priority order), or a request to uncross the strategy and its legs.

The EDIM model is built on the interaction between two actors: **clients** and the **strategy order books**.

EDIM specific rules are outlined below. They build on top of the rules of the market mechanisms presented previously.

### 4.7.2 Price Discovery with EDIM

*During the Call phase or Reservation*, all instruments (both outright and strategies) collect orders and implied are never generated.

*The Transition to Uncrossing* defines the parameters to uncross the Contract. It is what happens at the instance when the Contract scheduled status switches to Uncrossing phase and the EDIM Uncrossing Sequence immediately starts.

*Uncrossing* at individual book remains unchanged (dissemination of an Uncrossing Price being the last Indicative Matching Price of the Call phase), and the potential crossed quantity is processed the same way.

**EDIM Uncrossing Sequence** consists of the following two (2) steps:

- **Step 1:** parallel executions of Book Uncrossing on all the Instruments belonging to the Contract (i.e. using Standard Uncrossing Sequence on both strategies and outrights)
- **Step 2:** to ensure that Strategy and Outright markets are also uncrossed at the end of the sequence, each Strategy order book will sequentially, automatically trigger generation of the best implied from its leg, match relevant strategy explicit order against it, and re-generate the next best implied until it is not fully matched.
- **Step 3 :** Implied prices are not kept in the order book and are cleared immediately following the uncrossing.

Since an individual Outright may contribute to several strategies as a leg component, the following sequence is used to prioritize the strategies:

1. Time to Expiry of the nearest leg
2. Strategy types (strategies with the greater leg ratio executed first)
3. Strategy creation time

The second step of the EDIM Uncrossing sequence deals with the individual EDIM **Strategy Book Uncrossing** (SBU). When it is triggered, the strategy book itself is not uncrossed as each book in itself would have already been uncrossed in the Standard Uncrossing Sequence.

Strategy Book Uncrossing (SBU) for EDIM:

With EDIM, the Strategy order book iteratively evaluates the individual order books of its leg components to identify the best Implied that can match against its own price levels.

Outright leg order books being uncrossed in the previous step, Strategy Implied prices generated during SBU always uncross one single side of the Strategy instrument (Buy or Sell) and match against Strategy Explicit orders only.

Strategy Implied orders generated are processed as follows:

- If matching of the Implied quantity is not possible (no crossed quantity) – uncrossing ends for this Strategy order book.
- If matching is possible ,*e*xecution is done against explicit orders on the opposite side using the Price-Time priority.
- If the Strategy Implied order is fully matched, the next best Implied limit is evaluated by Optiq until it can no longer fully match.
- When Uncrossing completes, no Implied volume remains in the order book. Only Explicit quantities rest in the strategy order book.

Without Implied, the Contract uncrossing is an auction - all trades of the uncrossing are executed at single price for each order book (the Uncrossing price).

In EDIM, the Contract uncrossing is not an auction. Only the first step of the uncrossing sequence follows the auction rules: single uncrossing price per order book, and resulting trades.

The second step is not an auction as the trades are executed at different prices depending on implied prices generated and the Strategy order book depth.

Before being disseminated, any generated trades at any level, Strategy or Outright, are evaluated by Optiq for breaches of trading safeguards *(Cf. section "Trade Price Validation")*.

### 4.7.3 Continuous Trading with EDIM

In EDIM, during Continuous, there are two client initiated events that can trigger generation of Implieds by the system to see if there is a potential match. Implieds are considered by the system only when those events occur. In between occurrences Strategy order books and their Outright books do not interact with each other. As a consequence of this they can be crossed.

The two events are:

- **Request for Implied Execution (RFIE)**

  When a client observes trading opportunity identified by a Strategy order book that is crossed with its Outright legs, client has the possibility to request an uncrossing of the strategy order book versus its outright leg's order books. If the request is accepted, Optiq performs a Strategy Book Uncrossing for EDIM.

  The only condition to submit a request is to be owner of an existing order in the strategy book at BBO or at depth. In other words, client cannot request generation of the Implied in the strategy order book without participating in it, but they can be if they are at any price level within it.

  Each Request for Implied Execution can be submitted only individually, through a dedicated technical message.

  In case of an invalid attempt the request is rejected by Optiq.

> **Note:** Uncrossing will attempt to use the best possible price for matching, even if the client who issued the RFIE had an order that was not at the best limit.

Allocation rules in case of an RFIE follow the rules defined in the contract.

- **Submission of a Priority Order on a strategy book**

  A **Priority Order** is an order that creates a new price level, which improves the best bid or the best offer when it is submitted for a given instrument, Outright or Strategy. This is true whether it is a new order, or a modification of an existing one. As soon as the Priority Order is processed and enters the book, it stops being a Priority Order.

  **For triggering an EDIM uncrossing in a strategy book, the priority order must enter the Strategy book.** EDIM does not trigger generation of implied upon reception of a Priority order on any outright order book.

  EDIM prioritizes the allocation of the newly entered liquidity to the Outright markets over Strategies. If the BBO of a Strategy order book and the combined prices of its Outright legs are crossed, it means that the Strategy order book provides the market with more competitive prices than the Outrights.

  EDIM achieves its prioritization by attempting to match any Priority Order on a Strategy book first against the Outright legs.

  Optiq generates Strategy Implied (at multiple price levels) to attempt matching against the Priority Order. Outright leg order books being uncrossed, each side of Strategy Implied prices cannot be crossed.

  > **Note:** Entry of any order, whether it meets Priority price criteria or not, will result in attempts to matching against the Strategy and the Outright book, even if it does not trigger calculation of Implieds.

Priority Order received on a strategy in EDIM always checks first against the implied price available on the opposite side. If the implied price is better or at the same price than the available best price on the opposite side in the strategy market, the Priority Order matches against the implied price. Only if the strategy available price is better than the implied one, the strategy Priority Order would match in against the resting strategy price.

When Priority Order enters the Strategy book, it stops being a Priority Order, and trading on Strategies without Implied prices applies.

***Example***

*Assume that the following order books exist in Strategy and Outright markets:*

**Strategy A- B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| Y | 20 | 250 | 350 | 10 | C |
| X | 15 | 210 | 370 | 5 | D |

**Outright A**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| M | 5 | 450 | 470 | 10 | E |
| W | 10 | 430 | 480 | 10 | G |
| L | 10 | 400 | | | |

**Outright B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| U | 10 | 120 | 160 | 10 | F |
| T | 10 | 100 | 170 | 10 | H |

***Event 1: New Strategy Priority Order (rule 1 and 2) Bid at 5@285***

*New Order on A-B on Offer side at 285.*

*The order improves the BBO in A-B*

*Related Outright prices are snapped from the Outright markets: Best Implied Bid is 290*

*The incoming order trades against the Outright order book with two Explicit trades:*

- *Strategy Trade at 290*
- *A Trade at 450*
- *B trade at 160*

***Event 2: New Outright Priority Offer Order 10@440 on Outright A: Outright order book shifts, nothing happens***

**Nothing is triggered by any new Outright orders in the strategy order book.**

*Let's assume we now have the following order book:*

**Strategy A- B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| Y | 20 | 330 | 350 | 10 | C |
| X | 15 | 210 | 370 | 5 | D |

**Outright A**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| W | 10 | 430 | **440** | **10** | **P** |
| L | 10 | 400 | 450 | 10 | E |
| | | | 480 | 10 | G |

**Outright B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| U | 10 | 120 | 160 | **5** | F |
| T | 10 | 100 | 170 | 10 | H |

*Theoretical Implieds in Strategy A-B offer could be calculated at 10@320, and Bid calculated at 5@270*

***Event 3: Requests for Execution***

*Client X submits a Request for Implied Execution (RFIE) as this client has an individual order in the Strategy book.*

*Best Implied Bid limit is retrieved from the Outright books by the Strategy book: 5@270 (not tradeable)*

*The Offer limit orders of the Strategy book 10@320 are filled up to the maximum quantity and the following executions are generated:*

- *Strategy Trade for 10@320*
- *Explicit Outright A trade for 10@440*
- *Explicit Outright B trade for 10@120*

*Resulting book:*

**Strategy A- B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| Y | **10** | 330 | 350 | 10 | C |
| X | 15 | 210 | 370 | 5 | D |

**Outright A**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| W | 10 | 430 | ~~**440**~~ | ~~**10**~~ | ~~**P**~~ |
| L | 10 | 400 | 450 | 10 | E |
| | | | 480 | 10 | G |

**Outright B**

| | | Bid | Offer | | |
|---|---|---|---|---|---|
| Client | Qty | Price | Price | Qty | Client |
| ~~U~~ | ~~10~~ | ~~120~~ | 160 | **5** | F |
| T | 10 | 100 | 170 | 10 | H |

*Recalculate the next implied offer 10@350, and bid 5@270*

*The strategy book is uncrossed against its leg, calculated Implied can no longer match, sequence stops here.*

### 4.7.4 Throttling Considerations for RFIE in EDIM

RFIE is one of the two client initiated events that triggers generation of Implied prices to assess the presence of potential match. As each RFIE can only be submitted individually, through a dedicated technical message, clients should consider the most effective use of this message vs. their available throughput and the expected outcomes. **RFIE messages are counted in throttling.** In order not to negatively impact their message throughput unnecessarily, clients should consider sending RFIE messages only when conditions of the book are favourable to obtaining liquidity.

## 4.8 SPONTANEOUS IMPLIED MATCHING (SIM) MODEL

### 4.8.1 Main Principles of SIM

Spontaneous Implied Matching (SIM) model computes Implied prices on a continuous basis, to be taken into account as matching possibilities.

This model gives clients exhaustive liquidity available on any central order book of the Contract. This is achieved by combining all potential prices from all order books. Both Strategy and Outright Implied prices are generated.

SIM is not event driven, and does not depend on the market conditions or any available actors. It systematically generates all possible Implied prices, using a step-by-step, in-depth approach.

In low liquidity environment this exhaustiveness is needed to display all possible trading opportunities.

### 4.8.2 Price Discovery with SIM

In SIM, the exhaustive approach is also applicable to the Price Discovery mechanism. Nevertheless, the common rule defined in Optiq of the Price Discovery for both models still apply.

*During the Call phase or Reservation*, all instruments (both outright and strategies) collect orders and implied are never generated.

*The Transition to Uncrossing* defines the parameters to uncross the Contract. It is what happens at the instance when the Contract's scheduled status switches to Uncrossing phase and the SIM Uncrossing Sequence immediately starts.

*Book Uncrossing* differs in comparison with EDIM and trading without Implied prices.

**SIM Uncrossing Sequence** consists of the following three (3) steps:

- **Step 1:** parallel executions of Book Uncrossing on all the Instruments (Outright and Strategies) belonging to the Contract (i.e. using Standard Uncrossing Sequence)
- **Step 2:** Sequentially, each of the Strategies belonging to the Contract generates the Strategy Implied prices from its legs price level not matched in Step 1, include them in its own order book and executes the Book Uncrossing a second time. The Sequence to prioritize the strategies is the following:
    1) Time to Expiry of the nearest leg
    2) Distance to the money (delta) (Options only)

3) Option Type: Call first

- **Step 3:** Sequentially, each of the Outrights belonging to the Contract generates the Component Implied prices from all strategies and associated legs price level not matched in Step 2 and Step 1, include them in its own order book and executes a second time the Book. The Sequence to prioritize the Outrights is the following:

  1) Time to Expiry
  2) Strategy types (strategies with the greater leg ratio executed first)
  3) Strategy creation time

### 4.8.3 Continuous Trading with SIM

In SIM, Implied prices are always calculated by the system. When this model is applied on a given Contract, each individual Strategy order book evaluates its Component Leg order books, combines the available prices and created the related Strategy Implied prices.

Each Outright order book also combines, for each Strategy where it acts as a Component Leg, the prices available at Strategy level and the other legs to generate its own Component Implied prices.

At a given time, an order book in SIM is built upon Implied and Explicit Aggregates and associated prices and volumes.

At each price level of the order book, one to multiple Aggregates may be defined:

- None to One Explicit Aggregate (made up of individual explicit orders)
- None to Multiple Implied Aggregate (for each individual Implied)
  - Only one for strategies (the implied price computed through combination of the leg prices)
  - Multiple for outright (one implied price per strategy relying on the bespoke outright order book).

**IN SUMMARY: IMPLIED MECHANISMS (EDIM & SIM)**

**EDIM & SIM:**

- **New references for Implied prices as follows:**
  - ✓ **Strategy Implied and Component Implied concepts represent a new naming convention in Optiq.**
  - ✓ **Implied-In and Implied-Out do not map exactly to these concepts and clients should review carefully the descriptions of the new Implied prices concepts and mechanisms.**
- **SIM is exhaustive in identifying all possible Implied matching opportunities – "brute force" algorithmic logic. SIM mechanism is critical when:**
  - ✓ **Order book doesn't have enough explicit prices**

  **OR**
  - ✓ **There is significant strategy trading.**

**In practice:**

- ✓ **Commodity contracts rely heavily on implied prices displayed on screen.**
- ✓ **Substantial strategy trading is observed on main Index Futures during the expiry roll (spread trading).**

- **SIM mechanism, however, is heavy in use of resources and artificially slows down matching.**
- **To provide balance between the Implied and real liquidity, EDIM model is more suited for most products as it:**
  - ✓ **Guarantees that the market sets explicitly the opening prices of the Outrights.**
  - ✓ **Ensures that prices remain consistent in open trading, between legs and strategies, by allowing clients to trigger implied matching at any time.**
  - ✓ **Allows for instantaneous identification of trading opportunities for strategies.**
- **In Optiq all explicit and implied volume is aggregated for the BBO. BBO is provided via the Market Update message (1001) and is always the last value for BBO (Best bid and Offer).**

  **Implied Bid and Offer will no longer be provided, and values Implied Bid and Offer from Market Update message (1001) will be decommissioned.**

## 4.9 OPTIQ TICK TABLE MECHANISM

Optiq uses the **tick able** to provide the rules applied on a given instrument for the order entry.

Each tick table contains:

- A pre-defined set of price ranges, and the tick size mapped to it.
- A **Front Month ratio** to be used for front month, and expiries with a time to maturity smaller than the front month, i.e. daily and weekly. The ratio applies on the tick size and allows, if required, to apply a finer tick to these expiries. The same applies for Options and Futures.

The tick table is the sole definition of ticks used by Optiq. A tick table is assigned at Contract level, and with exception of specific rules that may be set for the front month, applies to all instruments within the Contract.

The same tick tables that are used by Optiq are provided to the market participants on a daily basis.

All tick tables are provided to the clients through a single dedicated daily referential file, within which each tick table is identified by an ID. In the Standing Data each instrument refers to the ID of a tick table that applies to it.

A single tick table may be used / shared by multiple Contracts and the supported exchange market mechanisms (i.e. COB, Wholesales, RFC), as such the price ranges and tick sizes provided are chosen to cover needed granularity for various Contracts and covered functionalities.

Client should be aware that the ticks defined are used by Optiq for the order entry checks only. Matching and trade prices are allowed at different granularity of ticks, which occur for the strategy leg trades. More information on this is provided below.

*For full details of the Tick Table file clients should refer to the Optiq File specifications.*

***Example:***
*Contract A and B are associated with the tick table n°12. Contract C is associated with tick table n°8. Trading Currency is indicated for each one at Contract level. Ticks are expressed as units of the currency.*

- ***Tick table n°12 is defined as follows:***
  - *Front month ratio: 10*
  - *Price > 0 : tick = 0.01*
  - *Price > 10 : tick = 0.05*
  - *Price > 100 : tick = 0.1*
  - *Price > 1000 : tick = 1*

- ***Tick table n°8 is defined as follow:***
  - *Front month ratio: 5*
  - *Price > 0 : tick = 0.005*
  - *Price > 25 : tick = 0.05*
  - *Price > 75 : tick = 0.1*
  - *Price > 100 : tick = 1*

### Strategy Leg Trades:

Trades that occur on strategies, whether with implieds or without, may result in trades on the legs of the strategy (outrights) with different granularity than the one of the strategy or the outright. These strategy leg

trades will still have the same number of decimals that are assigned to the tick value, but would not be equivalent to the tick value for the price range.

The cases where this occurs are:

1. Pricing of an Outright, following a trade of a strategy vs. strategy without implied pricing
2. Pricing of an Outright, following a trade in a strategy, with implied pricing

In both of these cases Optiq first checks that trade on the strategy is within the Collars of the strategy, and when calculating the prices of the resulting trade on the Outrights to fit within the Collars or BBO of the Outright book. The goal of the approach is to maximise the number of trades that occur within the limits of the Outrights. To achieve the calculation, the price of the Outright trade attempts to meet the conditions identified in the strategy, and fit it within the best suited price between the Collars or BBO in the Outright book at the moment of the trade.

For the outright, these trades are communicated in Market Data with trade type "Strategy Leg Conventional Trade". If desired, such trades could be filtered out of the market data feed.

This calculation does not apply to trades of an Outright vs. Outright.

***Example***

*Example of trades on a Commodity Future in a Strategy trade that led to 2 strategy leg (outright) trades*

*For this example a Calendar Spread strategy is used. It results in 2 strategy legs for a strategy trade, i.e. trades built by Optiq on an instrument (outright) following a match on a strategy.*
*For 1 strategy leg trade:*
- *The two original orders that matched were in a strategy book*
- *The two orders had a price of 4.5 (at tick of 50 cent)*

*Outright book data was:*
- *BBO of leg 1 is 388 and 388.75*
- *BBO of leg 2 is 383.75 and 384*

*To match the strategy price of 4.5, the trades are created to match the spread of 4.5 and be within the Collars and BBO of the outrights.*
- *388.38 on leg (outright) 1 within BBO*
- *383.88 on leg (outright) 2 within BBO*

*388.38 - 383.88 = 4.5*

**Advantages of this approach:**

- Offers a more consistent and fair handling of order entry checks and matching rules across different Contracts and strikes,
- Ensures that the required ticks sizes are consistently used for various strikes, e.g. with larger ticks applied for deep in the money strikes,
- Provides harmonized approach for applying tick table mechanism across markets running Optiq.

**IN SUMMARY: OPTIQ TICK TABLE MECHANISM**

**Ticks and Tick table:**

- **Tick sizes used for order entry are provided in a daily tick table file.**
- **Two legacy ticks are replaced by the tick table, and more granular ticks may apply.**
- **Premium Based Tick Size (PBTS) is replaced by the tick table mechanism.**

**Clients should:**

- ✓ **Incorporate the daily tick table file.**
- ✓ **Integrate logic of determining the tick size to apply, based on the price range within which the order / quote price falls.**
- ✓ **Use ratios and rules defined for management of tick sizes for Front month, for both Futures and Options.**

## 4.10 PROCESSING OF DATA FOR PRODUCTS IN OPTIQ

### 4.10.1 Public Data (MDG) Feed

For Derivative markets, updates of Market Data are provided by price level only, not by individual orders. Each update for a price leads to an update of the corresponding price level in Market Data. Each such message provides the number of explicit orders at that price.

Implied price volumes are included in the message communicated for the associated price level, but implied prices are not considered as orders. When an implied price contributes to a limit, the volume available on the market at that price increases without incrementing the number of orders. This logic allows client to distinguish volumes of implied prices vs those of explicit orders.

> **Note:** Implied prices are displayed on the market only if they contribute to the Best Limit. As such it is possible to have a Best Limit displayed with price and volume but with a number of orders equal to zero (when relying exclusively on implied prices).

On the Derivatives markets, the market data always follows the sequence below:

1. In case of a matching event: Market Update with total quantity and last matched price of the event[4]
2. Update of the Order Book
3. Update of the Best Limits
4. In case of a matching event: Dissemination of all individual trades according to the following pattern:
   - Strategy Trade (if any)
   - Strategy Leg Trade: when the trade is occurring on an instrument without involving explicit orders on that instrument (e.g. trades disseminated at leg level in case of matching of two explicit strategy orders, or matching of two implied prices on a given outright order book).
   - Individual Outright Explicit Trades

More details about this sequence are available to the clients in the latest *Euronext Derivatives Markets – Optiq Kinematics Specification* document.

### 4.10.2 Private Data (OEG) Feed Instruction Processing

On the Cash Markets (including on the Warrants & Certificates segment), the notion of a listed Product represents an individual instrument, identified by a Symbol Index. On the Derivatives Markets, the notion of a listed Product represents the Derivatives Contract (e.g. FCE – CAC40 Future).

On both Cash and Derivatives Markets, some client instructions can be submitted by trading members using either the exchange assigned order identifier (*OrderId*) or the client assigned one (*ClientOrderId*).

[4] This first event is currently covered by Total Traded Volume (TTV) in UTP-D. In Optiq TTV will be replaced by an explicit flag representing this event

An action submitted by a trading member on Optiq can either be unitary or a complex one.

Unitary actions are:

1. Submitted at the level of a single listed Product,
2. Submitted using the Exchange assigned order identifier (i.e. based on Exchange assigned OrderId and not client assigned ClientOrderId).

Any action that does not respect one of those two criteria is considered as a complex one and needs additional treatment before entering the processing queue for a listed Product.

If a client uses a complex action, there is a risk that a unitary action submitted after it by another trading member reaches the central order book before the first complex one.

The Following table identifies the unitary actions on Derivatives (and Cash) markets that guarantee to reach the Central Order Book without going through any additional processing.

| **Action** | **Mass Cancel For a Firm** | | | | **Mass Cancel For a Market Maker (Firm + ExecutingWithinFirm Shortcode)** | |
|---|---|---|---|---|---|---|
| **Instrument Granularity** | Cash Instrument | Derivative Instrument | Cash Trading Group | Derivatives Contract | Cash or Derivatives Instrument | Derivatives Contract |
| **Unitary** | **No** | **Yes** | **No** | **Yes** | **Der : Yes**<br>**C. : NA** | **Der : Yes**<br>**C. : NA** |

*ClientOrderId is used in Mass Cancel only as identifier of the submitted message. This instruction can't rely on the ClientOrderId as the identifier of the orders.*

| **Action** | **Single Cancel and Cancel / Replace** | |
|---|---|---|
| **Instrument Granularity** | Cash or Derivatives Instrument | |
| **Order Identifier** | OrderId | ClientOrderId |
| **Unitary** | **Yes** | **No** |

| **Action** | **Quotes** | |
|---|---|---|
| **Instrument Granularity** | Cash (Warrants) Partition | Derivatives Contract |
| **Unitary** | **No** | **Yes** |

*ClientOrderId is used in Quotes only as identifier of the submitted message. This instruction can't rely on the ClientOrderId as the identifier of the orders.*

# 5. TRADING SAFEGUARDS

## 5.1 DEFINITIONS AND MAIN PRINCIPLES

To protect market participants from temporary disorderly price fluctuations, all orders and quotes upon entry are checked by the Exchange to ensure that their price is within acceptable limits, or **Collars**.

Collars are a trading safeguard mechanism. Collar serves as a limit, constraining the instantaneous order price fluctuation, to protect the market from aberrant order prices & trades. On order entry and in upon matching, prices of orders and potential trades are checked against the Collars. For Derivatives markets prices are checks only against one of the Collars, using the side that is relevant to the side of the order. This means that bid orders are checked against the upper collar, and sell orders are checked against the lower collar.

Optiq uses **Dynamic Collars**. They apply around a reference price defined for each book: the **Dynamic Collars Reference Price** (DCRP). The DCRP is subject to changes all along the trading day depending on both the Derivatives and the underlying markets. Rules to determine DCRP are described below.

Depending on the product type on the one hand and the conditions of the market on the other hand, Optiq will use different methodologies to determine the Dynamic Collar Reference Price. The **Reference Price Origin** is used to define how the DCRP of a product is determined. The reference price origin is not always the same depending on the trading mechanism (Price Discovery, Continuous trading or trading interruption) for the same contract. This information is indicated to clients through referential data.

Optiq uses concept of **Market Quality Spread** (MQS) to define dynamic collars, which are tightly coupled with Market Maker obligations. While MQS is dynamically calculated, it remains unaffected by market conditions.

**Actual Quality Spread** (AQS) is used by the system in case of particular market conditions that may have an impact on quoting obligations. In such a case MQS remains unchanged, and Exchange provides adjustments through AQS. AQS does not directly impact dynamic collars, however it is used as a parameter for the rules of determining DCRP.

While independent from each other, in general, when AQS is enlarged, dynamic Collars are also enlarged.

Most multipliers used in these calculations are made available in a referential data file called **Reference Spread (APF)**.

The close relationship between the Collars and Market Maker presence is achieved by defining MM obligation spread on the basis of the MQS value.

## 5.2 DYNAMIC COLLARS REFERENCE PRICE ORIGIN

Based on the Reference Price Origin and applicable DCRP Rule, Optiq determines the ***Dynamic Collar Reference Price*** as follows:

### 5.2.1 Opening Call Price

If the **Reference Price Origin** is set to **Opening Close Price** methodology, the **DCRP** is set to:

- The 'Official Market Close price' if trading occurred in the previous trading session.
- The 'Last Settlement Price' if no Official Market Close price exists.

In case the value must be adjusted, a dedicated MDG real-time message is sent.

### 5.2.2 Fair Value

If the **Reference Price Origin** is set to **Fair Value** methodology, the **DCRP** is set to the 'Fair Value' received from the Pricer

Optiq is built with the integration of a Pricing subsystem. This Pricer allows the Exchange to determine a theoretical price of any given instrument. Such a theoretical value obtained through the pricing system defines the **Fair Value**.

### 5.2.3 Mid BBO or Fair Value

The **Reference Price** Origin is set to **Mid-BBO or Fair Value** methodology, the **DCRP** is set to either 'Mid-BBO' or 'Fair Value'. If the BBO is within AQS, the policy uses Mid-BBO as the reference price, if not a Fair Value is used.

While the setup of this Reference Price Origin on a per product basis is static (provided through daily referential, detailed table provided in this section), the DCRP will change depending on market conditions:

- If the market is considered liquid enough the DCRP is using Mid-BBO of the order book.
- If the market is not considered liquid enough, the DCRP is using Fair Value.

Determination of the quality of the order book is made by comparison of BBO spread to the Actual Quality Spread. If BBO is tighter than AQS, then the Exchange considers the price provided by the market participants as good enough to be used as reference, hence Mid-BBO is used. If BBO is larger than the AQS, the Exchange will then rely on its own pricing system to determine a DCRP.

### 5.2.4 Future Market Price

**Future Market Price** methodology applies only in Continuous phase, and:

- For the most liquid maturity (the Blue month), it uses Future Market Price (FMP) to determine the Dynamic Collars Reference Price (DCRP), which takes into account Last Traded Price, Best Bid and Offer.
- For all other maturities, it uses FMP of the most liquid maturity combined with the value of applicable Inter-Month Spread.

Upon entry into Continuous phase, the Blue Month DCRP is determined upon each market event as follows:

- **For a Blue Month Instrument**

The Future Month Price for the most liquid maturity (blue month) takes into account Last Traded Price, Best Bid and Offer to determine the DCRP for this maturity.

- Following a Trade, DCRP is set either to the Trade price, or to the price of the residual volume of the aggressive order if some remains following the trade.
  - Last traded price is communicated via Price Update (1003) message where the *Market Data Price Type* is set to '27' = Last Traded Price.
  - If there is some residual volume, the incoming order enters the order book on the aggressive side, improving the Best Limit of that side. The DCRP is set-up to that new improved Best limit communicated via Market Update (1001) message.

> **Practical Note:** When the BBO is updated following a trade:
>
> 1. The resting side sees its Best limit remaining unchanged or the next level becomes the Best limit.
> 2. The aggressive side sees its Best limit remaining unchanged or a new Best limit is created based on the aggressive order price and residual volume.

- On entry of a new order, modification or a cancellation of an existing order which modifies the best Bid or Offer:
  - If there is a last traded price, communicated via Price Update (1003) message, then:
    - if the best Bid is greater than previous DCRP then new DCRP is set to the Bid Price,
    - otherwise the Best Offer price is checked to be lower than previous DCRP, then the new DCRP is set to the Offer price.
    - if neither is true, the DCRP doesn't change
  - If there is no last traded price:
    - if there is no BBO, then DCRP doesn't change
    - if the BBO is within collars then the new DCRP is the mid-Price limited to collars
- If the instrument state changes to Reserved, DCRP is set to the Indicative Matching Price, which is communicated to the market via a Price Update (1003) messages, where the Market Data Price Type is set to '14' = Indicative Matching Price.

- **For an instrument that is not Blue Month**

For an instrument that is not Blue Month reference price is based on the DCRP established for the Blue Month of its Contract and the applicable Inter-Months Spread (IMS).

The DCRP is calculated for each maturity of the contract as:

$$\text{DCRP}_{\text{Non-Blue Month Maturity}} = \text{DCRP}_{\text{Blue Month}} + \text{Inter-Month Spread}_{\text{of the applicable maturity}}$$

Each time the DCRP is updated for a Blue Month Instrument all others instrument in the Contract are updated using the same method identified above.

Inter-Months spreads are calculated for each instrument, i.e. maturity, and the updated IMS values are communicated via a public Market Update (1001) messages, where *Market Data Update Type* is set to '95' = DCRP Inter-Month Spread .

As per previously defined, the type of Reference Price Origin that applies to an instrument in Call and/or Continuous is provided in dedicated fields of the Contract Standing Data file. The applicable logic would not change intraday, however clients should incorporate standing data on a daily basis to apply the correct logic set for the trading session.

The table below provides the general target set-up of Reference Price Origin for the instruments and phases.

Please Note: The table below is the target setup. To obtain the actual setup for each individual Contract clients should use the value provided in the daily Standing Data.

| | **Call Phase** | **Continuous Phase** | **Trade Interruption** *(reservation, suspension, halt)* |
|---|---|---|---|
| **Equity Derivatives (EQD)** | | | |
| Individual Equity Options | Fair Value | Mid-BBO or Fair Value | Fair Value |
| Single Stock Futures | Fair Value | Fair Value | Fair Value |
| Single Stock Dividend Futures | Opening Call Price | Fair Value | Fair Value |
| **Index Derivatives (IDD)** | | | |
| Index Futures | Opening Call Price | Future Market Price (FMP) | Last known FMP or Blue month IMP[5] |
| Index Dividend Futures | Opening Call Price | Fair Value | Fair Value |
| Index Options | Fair Value | Mid-BBO or Fair Value | Fair Value |
| Total Return Futures | Opening Call Price | Future Market Price | Last known FMP or Blue month IMP |
| **Financial Derivatives (FID)** | | | |
| Currency Futures | Fair Value | Fair Value | Fair Value |
| Currency Options | Fair Value | Mid-BBO or Fair Value | Fair Value |
| **Commodities (COM)** | | | |
| Commodities Futures | Opening Call Price | Future Market Price | Last known FMP or Blue month IMP |
| Commodities Options | Fair Value | Fair Value | Fair Value |

If a trade interruption occurs during Call phase, the DCRP Rule applied doesn't change.

[5] If reservation occurs on the Blue month, the Indicative Matching Price (IMP) of the Blue month is used as the DCRP, in all other cases DCRP is the Last known Future Market Price (FMP) identified before the occurrence of interruption.

If a trade interruption occurs during Continuous phase, the DRCP Rule will change to the one assigned for use in Call phase, except if the DCRP Rule for the Call phase is the Opening Call Price (OCP). In this case the system uses the last known DCRP before the interruption.

## 5.3 TRADING SAFEGUARD MANAGEMENT MODEL

With Optiq, Euronext introduces a model for trading safeguards management that allows market participants to be able to predict their behaviour without disseminating them explicitly. This approach allows to provide the market with a predictable model without overloading the real-time Market Data flow.

**The model is built on the following principle:**

1) Euronext defines for each instrument of a Contract (or group of Contracts) a spread of reference, identifying Exchange's standard for liquidity: the **Market Quality Spread** (MQS). It is used as a reference value regardless of any specific market conditions. Depending on the market conditions a multiplier is applied to the MQS to obtain the actual value that can be used.

2) Using MQS, and associated multipliers, clients are able to determine in real time the collars applied by the system for each individual order book. Collars are expressed as a multiple of MQS and therefore are necessarily symmetric, and apply around the DCRP.

3) Euronext also defines for each instrument a spread valid for the day against which all actual comparisons will be made: the **Actual Quality Spread** (AQS)**.** The AQS is expressed as a decimalized multiple of the MQS. Without any multiplier applied, AQS and MQS are equal.

   AQS is used to determine which Reference Price Origin to apply for Contracts set with Reference Price Origin of "Mid-BBO or Fair Value".

4) Through daily referential, Euronext will provide the parameters needed to compute intraday DCRP and MQS, as well as AQS and Collars expressed as decimalized multiples of the MQS. Multiplier parameters are provided as dedicated referential data in the **Authorized Price Fluctuation** file.

5) In case of exceptional market conditions these parameters may be adjusted. When adjusted an update on this is provided through real-time Market Data messages.

All spread parameters defined above are provided by Optiq through a referential file, including an **Authorized Price Fluctuation (APF)** table, to allow client to compute all associated derived values dynamically.

The Reference Spread (APF) tables are provided to clients through a single dedicated daily referential file. Structure of the file will be available in the Optiq client file specifications.

Each Reference Spread (APF) table is identified by an ID. In the standing data each Contract refers to the ID of the Reference Spread (APF) table that applies to it.

Each Reference Spread (APF) table is built on a '**Time to Expiry'** basis defining multiple configuration of each Time to Expiry (TTE). For each record in the table, it provides at minimum the following:

| Time to Expiry (TTE) | Bid price range | Market Quality Spread (MQS) | Unit of Spread | Actual Quality Spread (AQS) multiplier | Collars Multiplier |
|---|---|---|---|---|---|
| Different spreads are defined for the same Contract depending on maturities. As such the table provides several records referring to different maturities range. | Range of prices to which the spread applies. | Spread used as reference for DCRP and market making when applicable. When Market making schemes are defined, this spread is inherited from the MM spread class. *(Cf. section "Market Making")*. | Identifies if the Spread provided is in absolute value or percent. | Allows to determine the AQS by applying this multiplier to the MQS. | Allows to determine the effective Collars by applying this multiplier to the MQS. |

**Note: Intraday changes of values**

In case of intraday changes of one of the multipliers provided in referential due to an operational change done by Euronext Market Services (EMS), or full de-activation of the collars (therefore termination of checks at order entry level) the changes will be communicated through real-time Market Data messages.

Example: the Collar multiplier provided in Reference Spread (APF) table may be overwritten by the Collar multiplier communicated intraday via MDG messages. This applies also to AQS multiplier.

## 5.4 STEP FOR DYNAMIC COLLAR DETERMINATION

1) To obtain the **DCRP Rule** retrieve the value set in Reference Price Origin that is assigned to the Contract from the Standing Data.

2) Identify the **trading phase** (based on the real-time market data) in order to identify which of the assigned logic applies during the current phase

3) Determine the **Dynamic Collar Reference Price** (DCRP) that applies for set DCRP logic:

   - Opening Call Price

| | If Official Market Close price is Known | Official Market Close price is NOT Known |
|---|---|---|
| *DCRP =* | *Official Market Close price* | *Last Settlement Price* |

   - Future Market Price

| | Most liquid maturity | Other maturities |
|---|---|---|
| *DCRP =* | *Future Market Price* | *Future Market Price + IMS* |

- Fair Value

*DCRP =* *Fair Value*

- Mid BBO or Fair Value

a. Obtain the MQS and AQS Multiplier from the Reference Spread (APF) table

b. Calculate Actual Quality Spread (AQS) using the formula:

$$AQS = AQS\ Multiplier \times MQS$$

c. Calculate the BBO Spread as (Best Offer price – Best Bid price)

d. Determine the DCRP

| | If BBO Spread <= AQS | If the BBO Spread > AQS |
|---|---|---|
| *DCRP =* | *mid BBO* | *Fair Value* |

4) Calculate the **Limits based** on the information from previous steps using the following formulas:

$$Lower\ Collar = DCRP - Collars\ Multiplier \times (\frac{1}{2} \times MQS)$$

$$Upper\ Collar = DCRP + Collars\ Multiplier \times (\frac{1}{2} \times MQS)$$

***Example***

*The following table provides the data client will retrieve either from static referential or real time market data. The table focuses on the information related to Collars computation.*

***Static values from Contract Standing Data & Outright Standing Data***

| Contract Standing Data Field | Contract Symbol Index | Reference Spread ID | Ticktable ID | Reference Price Origin in Continuous | Reference Price Origin in Opening Call |
|---|---|---|---|---|---|
| Values | 4876500000 | 10 | 34 | Mid BBO or Fair Value | Opening Call Price |

| Outright Standing Data Field | Symbol Index | Maturity Date |
|---|---|---|
| Values | 4876500032 | 17122019 |

*In this example the data provided should be processed as described below:*

- *Retrieve the Static / referential data based on the*
  - *Contract Symbol Index (Contract Symbol Index) 4876500000 having*
  - *Reference Spread (APF) ID of 10,*
  - *Ticktable ID of 34 and the*
  - *Outright Symbol Index 4876500032 maturity date of 17122019*
  - *Current date is 01022019*

*The system then loads the following values:*

- *From Reference Spread (APF) table 10, and the Time to Expiry record applicable to this maturity retrieve*

| Reference Spread Table Fields | TTE | Bid Price Range | Market Quality Spread (MQS) | Units of Spread | AQS Multiplier | Collars Multiplier |
|---|---|---|---|---|---|---|
| Values | 9 | 0 | 0.25 | Absolute Value | 1.2 | 3.5 |
| | 9 | 8.33 | 3 | Percent | 1.1 | 4 |
| | 9 | 50 | 1.5 | Absolute Value | 1 | 4.5 |
| | 18 | 0 | 0.5 | Absolute Value | 1.6 | 4 |
| | 18 | 8.33 | 6 | Percent | 1.4 | 4.5 |
| | 18 | 50 | 3 | Absolute Value | 1.2 | 5 |

*The Bid Price Range is taken from the value indicated in the row, and up to, but not including, the value indicated in the next row. If the value is the last one for the TTE or in the table, the range applied is from that value to Infinity.*

*In the table above,*

- *the row with Bid Price Range of 0, indicates the range of bids from 0 to 8.32;*
- *the row with Bid Price Range of 8.33, indicate the range of bids from 8.33 to 49.9, and*
- *last row with Bid Price Range of 50, indicates the range of bids from 50 to infinite.*

*From Tick table 34*

| Ticktable Fields | Front Month Ratio | 0 =< price < 10 | 10 =< price < 100 |
|---|---|---|---|
| Values | 10 | 10 cents* | 50 cents* |

** The unit is indicated here to simplify readability of the example. Effective values in the file may be formatted differently.*

- *Obtain dynamic data and Calculate the Dynamic Collar Reference Price by determining:*
  - *Real-time Market data:*
    - *Book State (phase): Continuous*
    - *Best Bid price: 57.5*
    - *Best Offer price: 60.5*

- *Identify the DCRP Rule applied:*
  - *As Book State is Continuous, policy applied is: Mid-BBO or Fair Value* (Contract Standing Data)

- *Based on TTE of 18, and the Bid price from real-time data (57.5), identify values from the Reference Spread (APF) table:*
  - *MQS = 3*
  - *AQS multiplier = 1.2*
  - *Collars Multiplier = 5*

- *Calculate the BBO & AQS spreads as:*
  - *BBO spread is 60.5 - 57.5 = 3*
  - *AQS Spread:*

$$AQS\ Spread = AQS_{\ multiplier} \times MQS$$

*AQS Spread = 1.2 x 3 = 3.6*

- *Determine the Dynamic Collar Reference Price*
  - *As BBO spread (3) is within the AQS spread (3.6), the reference price used is mid-BBO: 59*

- *Determine the effective Collars levels:*
  - $Lower\ Collar\ (LC) = DCRP - Collar\ Multiplier \times (\frac{1}{2} \times MQS)$

*Lower Collar = 59 - 5 x (.5 x 3) = 51.5*

  - $Upper\ Collar\ (UC) = DCRP + Collar\ Multiplier \times (\frac{1}{2} \times MQS)$

*Upper Collar = 59 + 5 x (.5 x 3) = 66.5*

## 5.5 DYNAMIC COLLARS FOR STRATEGIES

The Dynamic Collar Reference Price of a Strategy is computed based on the strategy formula and the individual DCRPs of the Component Legs as follows

If the strategy is defined as follows:

$$Strategy = n_1 \times Leg_1 + n_2 \times Leg_2 + \cdots + n_N \times Leg_N$$

with $n_i > 0$ if on the buy side, $n_i<0$ if on the sell side, then

$$Strategy\ DCRP = n_1 \times Leg_1 DCRP + n_2 \times Leg_2 DCRP + \cdots + n_N \times Leg_N DCRP$$

Then the Strategy uses – as the outrights order book – the Reference Spread (APF) table to determine the Collars.

**The Strategy will always use the Reference Spread (APF) record corresponding to its leg with the longest Time to Maturity.**

**IN SUMMARY: TRADING SAFEGUARDS**

**Dynamic Collars advantages of the approach:**

- **Collar mechanism protects investors from the impact of erroneous orders, by**
  - ✓ **Reducing possibility of fat finger errors.**
  - ✓ **Keeping fair and orderly market by preventing temporary disorderly price fluctuations.**
  - ✓ **Decreasing number of trading halts.**
- **Reduced number of units and multipliers, and harmonization of values used in most calculations.**
- **Provides harmonized approach & naming convention for Price limits, and management of orders outside of such limits, across markets running Optiq.**

**Clients Should:**

- ✓ **Incorporate the new Reference Price Origin & associated rules into their system.**
- ✓ **Clients are strongly encouraged to retrieve referential data provided for these purposes.**

# 6. AUTOMATED TRADE CONFIRMATION

## 6.1 TRADE PRICE VALIDATION (TPV)

**Trade Price Validation (TPV)** mechanisms use Collars as trading safeguard for trade validation before execution, to limit the risk of aberrant trades, and provide a fair and orderly market.

The main steps in processing of TPV are:

1. Instrument enters a Reserved state;
2. An RFP is sent;
3. A re-opening is automatically scheduled with a pre-defined unhalt parameter and a notification is published via real-time market data messages;
4. While instruments is Reserved, order entry, modification and cancellation in the Reserved Outright instrument are permitted;
5. Price limits are active in the subsequent Reservation state;
6. If the situation persists when re-opening (second Uncrossing), the mechanism is triggered again. Re-opening and Uncrossing is attempted a defined maximum number of time;
7. After the maximum number of re-opening is exhausted, if the situation persists, the orders participating in the uncrossing and breaching the collars are automatically pulled by the Matching Engine in order to allow opening of the Contract.

> **Note:** As identified in the section "Definitions And Main Principles" for the Derivatives markets prices are checked only against one collar, from the side that is relevant to the side of the order. As such, when TPV is triggered only the orders that are part of the potential match and are in breach of the collars are in scope of cancellation.

### 6.1.1 Triggering of Trade Price Validation

In call phase, whether or not the Trade Price Validation is activated, dynamic collars cannot be violated as no trade can occur.

At the Uncrossing and during Continuous phases TPV may be triggered because potential trades could occur outside of the collars.

At the Uncrossing, TPV may occur when the Uncrossing Price calculated is outside of the collars.

During Continuous phase this may occur when previously accepted orders are no longer within the latest collars calculated by the Optiq Matching Engine, but end up in a potential trade (therefore a trade would be outside of collars) as a result of a new price reference following price movements of the underlying.

Optiq TPV mechanism guarantees that all trades, whether at Uncrossing or during Continuous, are checked against the same, most current collars, and only the trades within collars are accepted and executed.

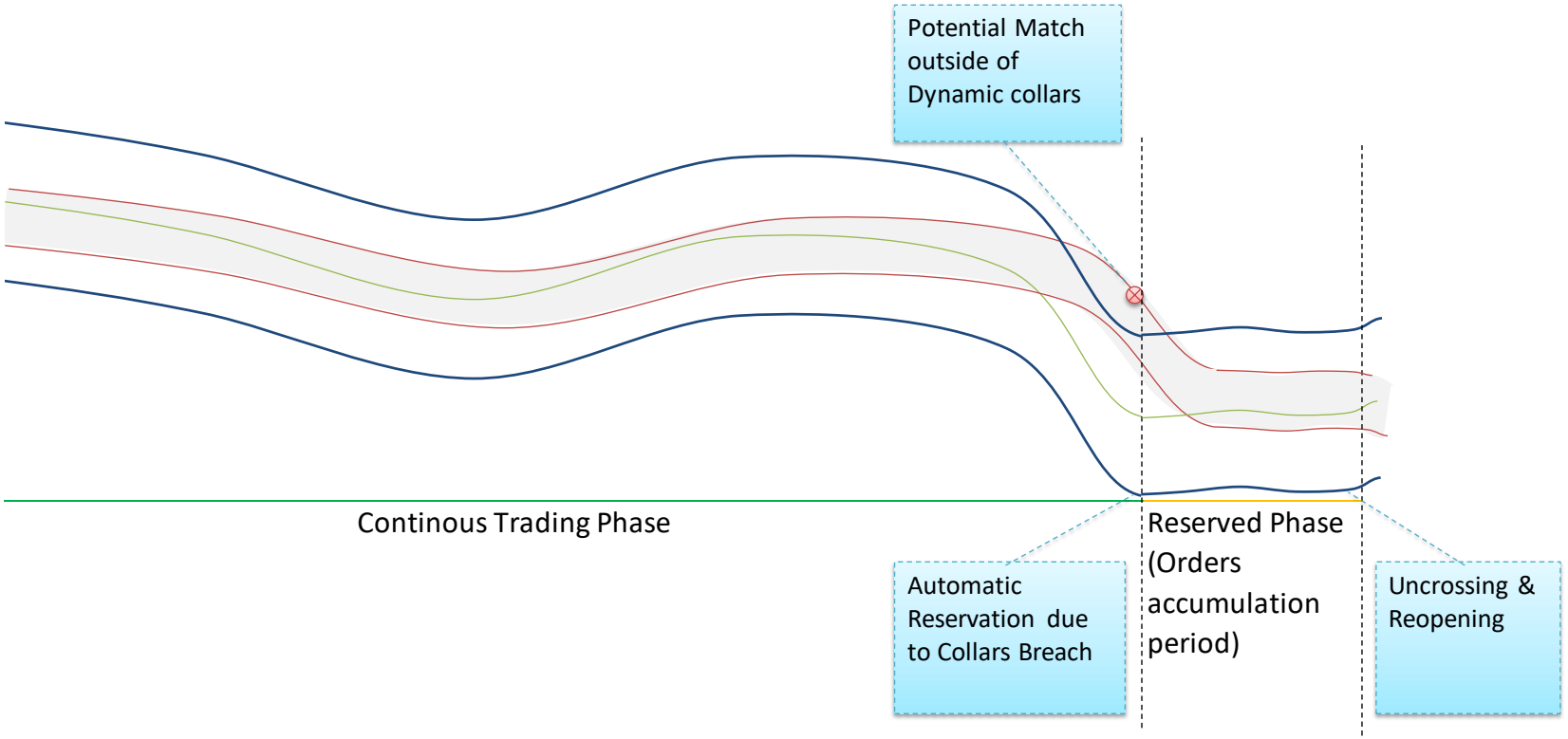
### 6.1.2 Trade Price Validation for Strategies

As soon as one of the component legs of a strategy (Outright) is in Reserved state, the strategy book automatically moves into Reserved state. The strategy book will stay Reserved until all component legs are in Continuous state.

Three scenarios apply in case strategies are Reserved intraday due to the collar validation and not as the result of at least one component leg of the strategy being reserved.

1. When calculating leg prices, if the system cannot match the trade price neither within the component leg BBOs nor using their respective Dynamic Collars, the incoming orders that triggered the trade causes Reservation of the strategy instrument and follows the procedure for TPV.
2. If after being generated (within the collars) an Implied gets out of the collars of the strategy, it still remains in the book. In this case, if it matches against another explicit order/Implied, no trade is generated and the strategy book in which it has been created is reserved (TPV).
3. If at least one of the parent orders used to generate an Implied is outside of the collars (the Implied being within the collars of the strategy), and the Implied matches, the strategy book is reserved (TPV).

***Example***




**LEGEND**

Dynamic Collar Reference Price DCRP

Dynamic collars > change with every DCRP update > orders are checked against these collars

BBO spread

## 6.2 FUTURE SPIKE PROTECTION (FSP)

Management of price limits is a key element of any electronic trading environment where sudden fast market conditions could bring a significant risk of extreme and erroneous price volatility.

Future contracts using the Future Market Price (FMP) style (Reference Price Origin), can cause a significant price drop. Only incoming orders are validated against collars and as long as the trade is within the collar range the last trade will become the new reference price that is used to set the Collars. This can create a domino effect which becomes an issue when the price moves too far and fast.

Future Spike Protection (FSP) provides protection to the Futures Markets from extreme price movements within a short timeframe (e.g. in case of a Flash crash). While protecting market from an extreme price slide it still allows clients to continue trading safely in such volatile conditions within reasonable price limits, that are adjusted in response to the market conditions, and are based on Front month prices. FSP can be enabled / disabled at Contract level.

The FSP functionality uses the following notions:

- FSP Reference Price: reference value snapped by the Matching Engine
- FSP Spread: spread applied based on the reference value snapped
- FSP Period: time range between two snapshots of the FSP Reference Price

Whenever the expected trade price of a Futures is out of the FSP Spread within the pre-determined FSP Period, an FSP event is triggered, resulting in an FSP Cool Down period defined as follows.

- FSP Cool Down Period: pre-determined time period, during which the price of the Front month is not permitted to trade outside the FSP Spread.

During the FSP Cool Down Period:

At the start of the FSP Cool Down Period Collars are Widened. The collar level is capped to the value of the FSP Spread. The upper or lower limit of the FSP Spread that is breached by the potential trade will be the side that is capped to the FSP Spread limit. (In the example below the trade breaches the lower FSP Spread limit, and collars are capped to that lower limit).

1. Trading continues for the related Contract(s),
2. Euronext only allows trade prices within/on this value range,
3. No new FSP Limit Value will be generated,
4. The FSP Spread will stay as it was at time of the breach.

The FSP Limit Value is calculated from the Front month, based on the snapshot of the last traded price at the end of the time interval.

The FSP Spread corresponds to the maximum number of ticks (or other variables) that a Front month is allowed to move up or down during the FSP Period.

Real time market data messages are disseminated to inform market of an FSP event and it characteristics:

- At the moment an FSP Event is triggered message will include: event start time, event duration, the static FSP Reference Price and the corresponding FSP Spread (Lower and Upper limit).
- At the end of the FSP Cool Down Period message will indicate the end of the FSP period, and the new FSP Reference Price (that will be equal to the last reference price in the Front month)

Private order entry messages are sent for any orders rejected or cancelled in the event that the residual volume would cause a potential trade outside the boundaries of the FSP Spread.

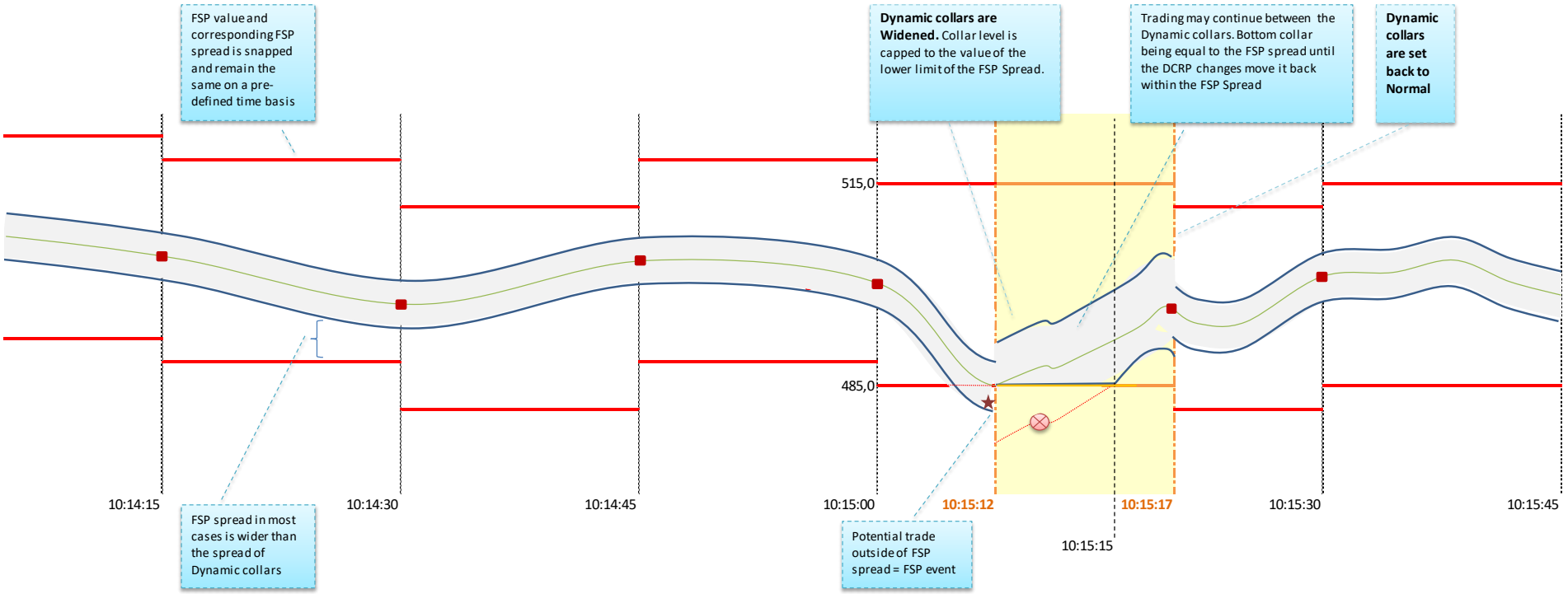
At the end of the FSP Cool Down Period Collars are set back to normal.

Advantages of the approach:

- Collar mechanisms for trades improves overall market quality by:
  - Ensuring fair participation of all types of orders in the Uncrossing,
  - Guaranteeing Market Makers a fair protection of their quotes and limits the risk of breaching MM protections attained after the first trade following the Uncrossing,
  - Preventing trades from occurring away from the fair prices (aberrant trades),
  - Improving daily price and trade management for participants, by decreasing number cancelled trades.
- Spike protection mechanism shields market participants from rapidly occurring extreme volatile conditions, while
  - allowing clients to continue trading, with price limits behaving effectively in response to the market conditions,
  - allowing clients to return to the market in a controlled manner.
- Provides unified and consistent approach for management of trade price checks across markets running Optiq.

## *Example*

***Time intervals and values provided here are indicative and provided as an example only***




**EXAMPLE TIMELINE**

| | |
|---|---|
| 10:15:00 | FSP Value of 500.0 is snapped according to a fixed timeframe |
| 10:15:12 | FSP Event Trade triggered, due to potential trade @ 484.50<br>Dynamic collars are Widened and capped on lower limit of FSP Spread. |
| 10:15:15 | NO fixed time frame FSP Value snap during cool down period |
| 10:15:17 | End of cool down period<br>FSP Value snap triggered<br>Dynamic collars to NORMAL |
| 10:15:30 | Fixed time frame FSP Value snap is resumed |

**LEGEND**

- Dynamic Collar Reference Price DCRP
- Dynamic collars > change with every DCRP update > orders are checked against these collars
- FSP Value snap > every 15 seconds. Based on DCRP at moment of snap
- Price range within which trading is allowed based on the applied limits
- Unused dynamic collar boundaries due to FSP Spread cap
- FSP Spread > change every 15 sec., connected to the FSP Value snap > potential trades are checked against these boudaries
- Potential trade breach

**IN SUMMARY: AUTOMATED TRADE CONFIRMATION (TPV & FSP)**

- **Use of Collars as a trading safeguard for trade validation and execution introduced with Trade Price Validation (TPV), reusing collar mechanism and improving quality of the market.**
- **New mechanism of Future Spike Protection strengthens Exchange's ability to protect market participants when Prices on Futures move too far and too fast (e.g. Flash crash), while still allowing participants to continue trading within reasonable and effective price limits.**

# 7. TRADING FEATURES & SERVICES

## 7.1 WHOLESALES FACILITIES

### 7.1.1 Wholesale trade types

Management of Wholesales (On Exchange Off Book regulated trades) is provided in Optiq through a single approach that covers all available Wholesale trade types in a harmonized and streamlined manner. The supported Wholesale and Large-in-Scale (LIS) facilities include:

- **Against Actuals Trade**
- **Exchange for Swap/Option Trade**: allows market participants to organize and execute a Futures transaction as an offset to an identifiable over-the-counter (OTC) swap transaction in a similar commodity or a direct product of such commodity.
- **Large-in-Scale Transactions**: allows clients to enter into Large-in-Scale Trades with one or more counterparties and/or in strategies involving combinations of trades on one/multiple instruments of the same Contract. The facility also allows submission of Delta-Neutral transactions.

### 7.1.2 Wholesale trade submission

Optiq Wholesale facility allows submission of trades through the same mechanism for all trade types. The processing rules and checks leading to the validation or rejection of the submitted transaction may differ from one type to another. These rules are described in the next section.

Optiq provides a dedicated order entry message for submission of wholesale transaction.

A client *initiating* a transaction **(initiator)** submits a message which:

- Identifies a wholesale Trade Type as well as the contract identifier for the wholesale.
- Indicates (when applicable) if the transaction is a LIS Strategy transaction (i.e. where multiple instruments are involved).
  - If the transaction is a LIS Strategy, client must:
    - select the code of the applicable exchange known strategy.
    - provide the overall price of the Large-in-Scale (LIS) strategy transaction.
    - provide the overall volume of the Large-in-Scale strategy transaction.
    - If the Strategy is a Delta-Neutral Strategy, client must replace the contract identifier by the Central Order Book identifier of the Delta-Neutral strategy.
- Indicates the Symbol Index(s) of the individual traded instrument(s) on which the transaction relies
  - For each indicated Symbol Index client provides at least one side of the transaction with associated price and volume. If multiple sides are provided on a single Symbol Index (buy and

sell), Optiq takes the first of the submitted list as the leading side[6] of the transaction on this Symbol Index i.e. the side that must be matched exactly to complete the trade on this instrument.

Optiq proceeds to complete the transaction in the following two (2) steps:

5. Pre-Trade Validation: Optiq validates transaction structure and eligibility as a wholesale transaction (e.g. volume thresholds) according to the rules described in the next section.
    - If the Pre-Trade Validation step is successfully passed, client receives an acknowledgement, and is provided a **Transaction ID.** Transaction ID is a unique Exchange assigned numeric code, unique per contract and transaction, across trading days.

6. Matching Validation: Optiq checks if the transaction can be executed as a fully consistent trade, i.e. for each individual instrument involved, both sides are submitted with equal volume.
    - If the transaction is consistent, transaction is executed and disseminated via Market Data on the public feed (MDG). On the private feed (OEG), the transaction is breakdown per individual trade. Each trade carries both its individual trade ID and the Wholesale Transaction ID.
    - When executed, each individual trade is sent to clearing, flagging all individual trade legs (for all counterparts) with both individual Trade ID, the overall Wholesale Transaction ID and the Strategy code. This allows to reconciliate all individual trade legs, on both clearing and back-office side, as one unique execution of a single Large-in-Scale strategy when applicable.
    - If the transaction is not yet consistent, Optiq flags it in a pending state, waiting for the needed additional incoming volume to complete the transaction – that may come from potentially[7] other counterparts: **reactors**.
        - Reactors are clients that must complete the pre-negotiated transaction with the initiator. Submitting a reaction relies on the same Order Entry message and framework as used for initiating one.

A Client *reacting* to a transaction (**reactor**) submits a message which:

- Contains the Transaction ID of an existing pending transaction.
    - As this unique code has been provided privately by the Exchange to the **initiator,** it is the initiator's responsibility to safely communicate this ID to their counterparts of the pre-negotiated deal.
- Identifies a wholesale Trade Type.
    - It must match the type of the identified wholesale transaction, and that transaction must still be active / waiting for the reactors.
- Flags if the transaction is on a single instrument or multiple instruments:
    - The transaction ID may point to an Individual LIS or a Strategy LIS. Reactor can either react to the full transaction or in the case of a LIS Strategy, to one component of the transaction. To enable

[6] As an example, if transaction is initiated on Buy side, the leading side is Buy side. If a transaction is initiated on the Sell side, the leading side is Sell side.

[7] Wholesales facility allows to submit transactions via one or multiple messages.

this a reactor must indicate if the reaction is on an individual instrument, or on all instruments of a LIS Strategy transaction.

- If the reactor's transaction is a LIS Strategy, the reaction must be on all instruments of the strategy. To ensure it, reactor must:
  - Select the applicable exchange known strategy code. It must match the original one submitted by the initiator.
  - Provide the overall price of the LIS Strategy transaction. It must match the original one.
  - If the strategy is a Delta-Neutral, provide the overall volume of the LIS Strategy transaction.

> **Note:** Optiq allows reactions to a LIS Strategy to be submitted either at strategy level (all instruments) or at individual instrument of the strategy. Submission for a subset of instrument involved in the LIS Strategy for Wholesale is not allowed as a single reaction.

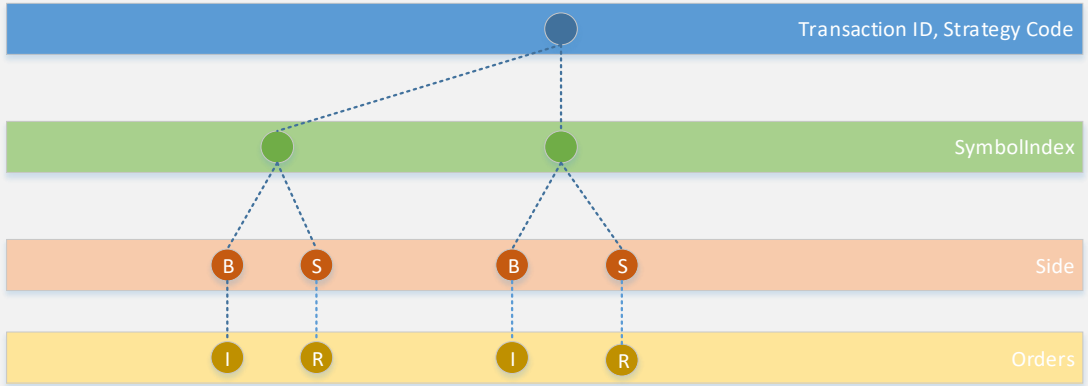
- Indicates the Symbol Index(s) of the traded instrument(s) on which the transaction relies on.
  - For each indicated Symbol Index client provides the opposite side of the transaction compared to its leading side as defined when it was initiated – with associated price and volume (*Cf. section "Optiq Wholesales Facility Reaction Validation" for the detailed view on the reaction rules*).

***Examples for Reacting to a LIS strategy with different combination of multiple counterparties***

*Client A (Initiator) submitting A LIS Strategy on a spread. Two possible combinations are illustrated below. Each one independent from the other.*

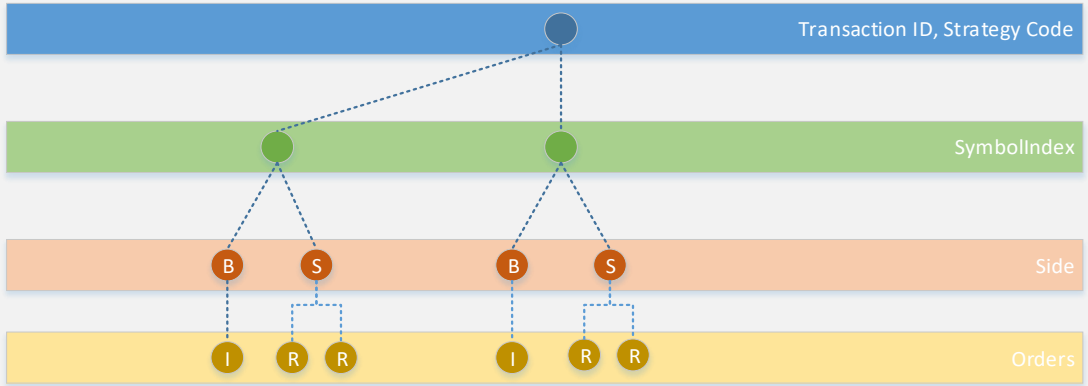
***Possible reactor combination 1***

This submission may be completed via a transaction with two counterparts, one for each leg of the spread.




***Possible reactor combination 2***

It may also be completed with three counterparts, with one counterparty reaction on a leg of the spread and the other two submitting two reactions on the second leg of the spread, each one providing half the volume.



Each time a valid reaction is received on an existing pending transaction, Optiq checks if the transaction has reached a consistent state, i.e. for each individual instrument involved, both sides are submitted with equal volume.

According to rules set by MiFID II[8] and associated Trading Procedures adopted by the exchange a transaction cannot remain in a pending state for more than 15 minutes after initiation. All pending wholesale transactions that have exceeded this time threshold are automatically cancelled by Optiq, and all involved parties (both initiator and potential reactors) are notified. The time threshold is triggered upon reception and validation of the transaction by Initiator.

> **Note:** In the case of LIS Strategy transaction, Optiq does not require the strategy to be actually created as a tradable instrument on the Central Order Book (COB), with exception of Delta-Neutral Strategies. (*Cf. dedicated section "Wholesale Referential Data & Optiq Central Order Book"*)
>
> For submission of a Delta-Neutral as a LIS Strategy an explicit creation of such strategy in COB is required.

### 7.1.3 Optiq Wholesales Facility Pre-Trade Validation

The following rules are used by Optiq to validate a transaction is eligible for matching:

1. Against Actuals & Exchange for Swap/Option Wholesale trades must only be submitted with a single instrument. If a transaction is submitted with an Against Actual or Exchange for Swap trade type and any selected Strategy Code, the transaction is rejected by Optiq.
2. Any LIS Transaction must be of volume above the LIS threshold defined for each contract and is available in the referential data. The volume for individual submissions participating in the transaction must meet the rules that apply depending on the Contract and Strategy type liquidity category set by ESMA. Annexe Two "Exchange Recognized Strategies" of the Trading Procedures identifies strategy types that are treated as eligible for processing as an illiquid package at all times, or only under the expiry conditions.
    - If the Transaction is an individual LIS trade:
        - For a liquid instrument, its volume must be above the LIS threshold.
        - For an illiquid instruments, no specific size conditions or checks apply.
    - If the Transaction is a LIS Strategy trade:
        - For a strategy type that is eligible to processing as an illiquid package – at least a single leg of the transaction must be above the LIS threshold.

[8] Article 7 or COMMISSION DELEGATED REGULATION (EU) 2017/583 of 14 July 2016 supplementing Regulation (EU) No 600/2014 of the European Parliament and of the Council on markets in financial instruments with regard to regulatory technical standards on transparency requirements for trading venues and investment firms in respect of bonds, structured finance products, emission allowances and derivatives

- For a strategy type that is not eligible to processing as an illiquid package – volume of each individual leg must be above the LIS threshold.
- For delta-neutral strategies – only the Option leg must meet the LIS threshold.
- For Options only – **multiple reactors volume may be combined to reach the LIS threshold**, allowing clients to aggregate responses in front of a single need for liquidity in a single execution.

> **Note:** Euronext Derivatives trading members have the ability in Optiq to aggregate small responses in front of a single need (whether offer or bid) above LIS threshold, within the same single execution. It allows Euronext Derivatives clients to internalize matching of smaller orders of their own customers (identified through individual Client Within Firm MifID 2 shortcodes) in front of a single LIS beneficiary on the Euronext Financial Derivatives (Index and Equity) Option markets. The execution is then processed on Euronext Exchange through the Optiq LIS facility, as any listed derivatives wholesale trade, benefitting from both standard clearing

3. Prices of a transaction are validated when submitted by the initiator against:
   - Dynamic Collars of the Central Order Book for each individual instrument on which the transaction relies on, snapped at the time of the initiation time.
   - Daily or lifetime[9] High/Low price recorded for each individual instrument on which the transaction relies on, snapped at the time of the initiation time.
   - In case of a LIS Strategy transaction, individual constituent prices are checked against the overall strategy price submitted based on the strategy formula.

   Information on which of these price validation conditions (Collars And/or daily high and low spreads) are enabled is identified at contract level in daily referential data.
4. If the submission is a LIS Strategy trade, the same check is done to the structure of the submitted instruments against strategy structure, as done for intra-day strategy creation. (Cf. section "Intra-day creation of strategies").

### 7.1.4 Optiq Wholesales Facility Reaction Validation

1. Any reaction providing incoming volume for an existing pending transaction on a leading side of its constituent trade(s) is individually rejected. The transaction is not cancelled due to this. As Wholesales are pre-negotiated deals, initiated transaction cannot be updated once created.
2. Any reaction providing incoming volume for an existing pending transaction exceeding the remaining volume on the leading side of one of its constituent trade(s) is individually rejected. The transaction is not cancelled due to this. As Wholesales are pre-negotiated deals, initiated transaction cannot be updated once created, nor can Optiq determine the origin of the mismatch.

[9] Depending on the setup for the instrument

3. All prices submitted in a reaction must match the price submitted by the initiator.

### 7.1.5 Wholesale Referential Data & Optiq Central Order Book

While the general mechanism / logic of trading patterns and timetables are the same as those for Optiq Central Order book, Wholesale submission follow a dedicated timetable that is not governed by the timetable of the Central Order Book. Specific Wholesale timetables are provided for all eligible Contracts.

The conditions actively checked between Central Order Book and Wholesales are:

- In case an entire Contract in the Central Order Book enters a regulatory or trading condition (e.g. halt) that blocks submission of wholesales, and until this state is lifted, wholesale submissions on the affected Contract are rejected.
- Wholesale submissions are checked against Collars or daily high/low valid for the individual instruments in the Central Order Book, upon reception of the initiation message.

> **Note:** A Wholesale private message for a particular Contract should be submitted via the same OEG through which Central Order Book messages are submitted to Optiq.

Referential data used by Optiq for the Central Order Book, is also used for Wholesale facilities.

Types of Wholesales submissions supported for a Contract are identified in the daily Standing Data file, and in the real-time Contract Standing Data messages.

All Wholesale types are validated against the tick sizes & tick table that is defined for wholesales setup for the Contract. Standing data will identify which tick table to use, which may be the same as the one for the Central Order Book, or could be specific to Wholesales facilities.

*For more information on Wholesales please refer to the dedicated technical note.*

**IN SUMMARY: WHOLESALES**

- **Wholesales facility is streamlined to use three (3) types of Wholesales trades.**
- **Submission will be done via OEG with one or multiple messages being submitted for all available types of Wholesales, allowing one or multiple counterparties to participate in a transaction.**
- **Volume and price checks of Wholesales are rationalised and use data provided in standing data.**

## 7.2 REQUEST FOR CROSS (RFC)

The **Request for Cross (RFC)** facility is a trading mechanism used to submit a committed cross trade to an open auction for possible price improvement. RFC allows members to attain best execution and cross trades both above and below Large-In-Scale threshold. RFC, under the client priority algorithm, should be positioned as a dedicated facility for the Client flow execution with a guarantee of full execution and conformity with the best-exec requirement from MiFID II.

RFC can be submitted in Outrights Contracts as well as in any type of Exchange supported strategies, including delta-neutrals.

### 7.2.1 RFC Algorithms

The RFC is submitted by the **RFC Initiator** (the member submitting the RFC) using a private message containing both buy and sell side. Once an RFC is submitted, validated and published, a short auction period is triggered, also referred to as the **RFC Response Period**, that lasts a predefined period of time (provided in standing data) and is open to all participants in the market.

During this RFC Response Period, other participants, also referred to as the **RFC Reactors**, may choose to match or price-improve the cross level.

Following the RFC Response Period, the cross is executed. Depending on the prices submitted during the RFC Response Period, one or more RFC Reactors can take part in the cross trade.

At each step of the RFC uncrossing sequence, if matching occurred, trades are generated. The uncrossing could thus result in executions at different price levels.

Euronext manages two (2) uncrossing algorithms in Optiq to handle specific requirements of different types of underlyings: Standard RFC and Client Priority RFC.

For both algorithms Contract may be setup with COB inclusion enabled or not. The RFC model with interaction of COB orders allows:

- The executing members who are aggregating the Client orders to have the chance to improve the execution price against COB (‘best-exec’).
- The Market Makers to have the opportunity to participate in the incoming Client orders which otherwise will be executed completely off the book.

The RFC algorithm and COB inclusion parameters are both set up at the Contract level and are indicated in the daily standing data.

If COB inclusion functionality is enabled for the contract, orders in the Central Order Book are automatically included to the RFC Reactor order book at the moment of the RFC Response Period ends, which implies those will be already available for the RFC uncrossing sequence, and processed together in the Price-Time logic. This means the top of the book orders (determined with highest priority) represents the best limit orders.

Thus, COB orders participate in the RFC when their Minimum Volume is greater than or equal to the Reactor Minimum Volume and their price do allow to match with the RFC Initiator, which means COB order price needs to be strictly better or equal than cross level. Implied COB orders do not participate in the RFC.

The current target setup[10] of RFC algorithms and characteristics for Euronext contracts is provided below:

| | RFC Algorithm | COB Inclusion |
|---|---|---|
| **Equity Derivatives (EQD)** | | |
| Equity Options | Client Priority RFC | Enabled |
| Equity Futures | Not enabled | Not enabled |
| **Index Derivatives (IDD)** | | |
| Index Options | Client Priority RFC | Enabled |
| Index Futures | Not enabled | Not enabled |
| **Commodities (COM)** | | |
| Commodities Options | Standard RFC | Enabled |
| Commodities Futures | Not enabled | Not enabled |
| **Financial Derivatives (FID)** | | |
| Currency Options | Not enabled | Not enabled |
| Currency Futures | Not enabled | Not enabled |

### Standard RFC algorithm:

The RFC uncrossing for this algorithm does not apply any priorities on the basis of Account Type. It consists of four (4) steps described below:

- **Step 1:** Responses that improve the RFC Initiator price match with the relevant side of the RFC Initiator.
- **Step 2:** RFC responses with a price equal to the RFC Initiator are matched with the RFC's remaining Bid and Ask quantities according to a Price-time priority rule for the Remaining Tradable RFC Quantity:

$$\text{Remaining Tradable RFC Quantity}^{*} = \min(\text{RFC quantity left on each side}) \times \text{Pick Up Percentage}$$

- **Step 3:** Remaining quantity for the RFC Initiator is executed as a cross trade. Unfilled quantity of the RFC Initiator is immediately cancelled.
- **Step 4:** Remaining RFC responses with prices that are crossed are matched amongst themselves according to the PET algorithm. Any remaining RFC responses from the above matching process are cancelled. The latter does not apply to COB orders which are not fully executed, meaning if there is still a remaining quantity form the COB order left, then that order is not cancelled but rather will continue to participate in COB without losing its priority.

### Client Priority RFC algorithm:

The RFC uncrossing for this algorithm does apply priorities on the basis of Account Type. The uncrossing algorithm for RFC with Client Priority consists of five (5) distinct steps:

[10] Please note, that this setup is subject to change in the future.

- **Step 1:** Responses that improve the price at which RFC was initiated match with the relevant side of the RFC Initiator in the following priority:
  - In case the RFC is initiated for a Client vs. a Non-Client, the Client leg of the RFC Initiator is matched first.
  - If the RFC is initiated for a Client vs. a Client, any Response that improves the RFC Initiator price matches with each Client leg, up to the same quantity on both sides. Any remaining unmatched quantity is executed between the two sides of the RFC Initiator.
  - In case RFC is initiated for a Non-Client vs. a Non-Client, any response that improves the RFC Initiator price matches with the relevant leg of the RFC Initiator.
- **Step 2:** RFC responses with a price equal to the RFC Initiator are matched in the priority as identified below.
  - In case the RFC is initiated for Client vs. Non-Client, or for Client vs. Client, the Client leg of the RFC Initiator is matched with the RFC Reactors using Price-time methodology.
  - The matching is done up to the 'Remaining Tradable RFC Quantity' identified as follows:

$$\text{Remaining Tradable RFC Quantity}^{*} = \text{Remaining RFC Client quantity} \times \text{Pick Up Percentage}$$

  - In case the RFC is initiated for a Non-Client vs. a Non-Client, RFC responses with a price equal to that of the RFC Initiator are matched with the RFC's remaining Bid and Ask quantities according to a Price-time priority rule.

    The matching is done for the 'Remaining Tradable RFC Quantity' identified as follows:

$$\text{Remaining Tradable RFC Quantity}^{*} = \min(\text{RFC quantity left on each side}) \times \text{Pick Up Percentage}$$

- **Step 3:** Performed only in case the RFC is initiated for Client vs. Non-Client.

  Following Step 1 and 2, any response that improves or matches the RFC Initiator price is matched with the non-Client leg of the RFC. The Non-Client leg of the RFC can match with Reactors for at most the **same quantity** matched by the Client leg of the RFC Initiator in Steps 1 and 2.
- **Step 4:** The remaining initially submitted quantity of RFC is executed as a cross trade. Unfilled quantity for the Non-Client leg of the RFC Initiator is immediately cancelled.
- **Step 5:** Remaining RFC responses with prices that are crossed, are matched amongst themselves according to the PET algorithm. Any remaining RFC responses from the above matching process are cancelled. The latter does not apply to COB orders which are not fully executed, meaning if there is still a remaining quantity form the COB order left, then that order is not cancelled but rather will continue to participate in COB without losing its priority

Rounding Rule applied to all the algorithms and calculations of the Remaining Tradeable RFC quantity is (*):

- The calculated quantity is rounded down in favor of the RFC Initiator.
- The RFC Initiator remaining quantity - ((1-Pick Up percentage) x Remaining Tradable RFC Quantity) - is rounded up in favor of the RFC Initiator.

### 7.2.2 RFC Process & Conditions

RFCs can only be submitted if the instrument is in Continuous phase. Only one RFC can be active in a given instrument or strategy at a time. Once submitted, an RFC cannot be cancelled by the RFC Initiator.

Each RFC message is submitted with a set of characteristics, including price, volume, quantity for the RFC Initiator and RFC Reactor.

Optiq ensures that RFC submission is above the respective minimum volume threshold defined per Contract and performs price checks of the submission for Outrights and Strategies:

1. The price submitted by the RFC Initiator (including RFC on delta-neutral strategies) are validated against the best bid and/or best offer in the Central Order Book. Prices lower than the Best Bid or higher than the Best Offer are rejected even if only one side is present in the book.
2. RFC price must be within the Dynamic collars.
3. For Strategies, the price is also validated against the BBO prices for the strategy in the Central Order Book, but the prices of the individual legs are not validated against the BBO prices of the individual leg in the Central Order Book.
4. For Delta Neutral, the prices of the individual legs must be within the DN DCRP Adjusted strategy leg that we will calculate each time we received an order RFC Delta Neutral from the Initiator with the formula below:

    - ***DN DCRP Adjusted strategy leg = Option Price (Pricer) + [ { Underlying price (Trader) - current Underlying price (ME) } * Option Delta (Pricer) ]***

    And we will calculate the DN leg collars with the formula below:

    - ***DN Low strategy leg collar = (DN DCRP Adjusted strategy leg = Option(s) Price (Pricer) + [ { Underlying price (Trader) - current Underlying price (ME ) } * Option Delta (Pricer ) ]) - Collar spread of option lef***
    - ***DN High strategy leg collar = (DN DCRP Adjusted strategy leg = Option(s) Price (Pricer) + [ { Underlying price (Trader) - current Underlying price (ME ) } * Option Delta (Pricer ) ]) + Collar spread of option leg***

The characteristics used by the RFC submission process, including the “RFC Initiator Minimum Quantity”, “Pick Up Percentage” and the “RFC Response Period”, are provided in the daily standing data file, set at the Contract level.

Additionally, Optiq also guarantees that RFC Reactors orders are not submitted by the same participant member that submitted the RFC request, thus avoiding self-trade, which means the following per segment:

- **Commodities segment:** RFC Responses are rejected if the ExecutionWithinFirmShortCode and FirmID are the same between the RFC Response and RFC submission sent by the initiator.
- **Equity/Index Derivatives segment:** RFC Responses are rejected if the FirmID is the same between the RFC Response and RFC submission sent by the initiator.

Plus, during the RFC Response period only RFC Reactors are allowed to cancel their own RFC responses by submitting a private cancellation message. In the same way as for standard orders, the OrderID or the Original Client Order ID are used to identify the RFC Response to cancel.

### Publication in Market Data

RFC Publication is a parameter defined in Matrix-D at contract level, enabling the definition rule for sending MarketUpdate (1001) messages to MDG.

Once an RFC order is submitted and accepted, a first Market Update (1001) message is sent to the market to notify either the activation of an RFC order, or to notify that it is queued due to the presence of an another active one RFC. This means, once an RFC Initiator submission is checked and accepted it is communicated to the market via a real-time Market Update (1001) message with the following characteristics:

- Standard RFC algorithm: The price and the quantity of the original RFC are **not** published through MDG.
- Client Priority RFC algorithm: When at least one of the parameters "RFC Initiator Minimum Quantity" or "RFC Reactor Minimum Quantity" of the submission is below the LIS minimum volume of the Contract, the price and quantity of the RFC are published. If minimum quantities are equal or above the LIS minimum volume, the RFC initiator prices and quantities are not published, benefiting from a LIS waiver that allow these order to be consider as dark and thus exempt from market data publication in pre-trade.

At the end of the Response Period, and before the execution of the RFC, all RFC Responses may be published to the market via a real-time Market Update (1001), based on the following conditions:

- Standard RFC algorithm: The price and the quantity of the RFC Responses are **not** published through MDG. Similarly, when COB Orders are included for a Contract, the COB orders are not published at the end of the RFC Response Period as the RFC Responses, as they were already published when entered in the COB.
- Client Priority RFC algorithm: When at least one of the parameters "RFC Initiator Minimum Quantity" or "RFC Reactor Minimum Quantity" is below the LIS minimum volume of the Contract, all RFC responses are published, aggregated by price. If minimum quantities are equal or above the minimum volume, the RFC Initiator and RFC Response prices and quantities are not published.

Execution messages are the last in the process to be published in MDG (via Full Trade Information (1004) after the publication of the Market Update (1001) with an Update Type = '56' Request for Cross Trade). All trades are flagged 'RFC', including when there is a matching between a RFC Initiator and a RFC Reactor orders or a COB order included in the reactor's book. After the uncrossing of the RFC Reactor order book, all remaining Reactors' orders not fully executed are then removed from the uncross book which implies another communication to the market via real-time market data message indicating the clearance of the order book (Update Type = '254' Clear Book).

Additionally, the aggregated volume of RFC executions (including with COB order interaction) are also captured via dedicated Statistics (1009) message for each instrument. This means a statistics message is sent to the market each time:

- A RFC execution occurs with the information of the execution counter incremented (Stats Update Type = 16 "Trade Count (Cash and Derivatives)"
- A RFC execution occurs with the information of the statistic Off book volume modified (Stats Update Type = 19 "Off book cumulative quantity (Cash and Derivatives")
- A RFC execution occurs with the information of the statistic Off and On book volume modified (Stats Update Type = 23 "On and Off book cumulative quantity")

**IN SUMMARY: REQUEST FOR CROSS**

- **Request for Cross service is available in Optiq as a crossing mechanism and will replace Wholesales trade type: Guaranteed Cross.**
- **Euronext maintains distinct uncrossing algorithms for RFCs, with the type of algorithm enabled identified in the daily standing data.**
- **Interaction with COB orders is implemented in Optiq for RFC. Setup of this functionality for individual Contracts is to be provided in the daily standing data.**

### 7.2.3 Examples for Client Priority Algorithm

#### Example 1 : Client versus Non Client

- RFC pick up percentage: 60%.
- RFC Algorithm: Client Best Execution RFC
- RFC Inclusion is set to 0: No
- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.
- Pre Trade Transparency mode is On the contract.
- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000.

Price limit checks are applicable to validate the RFC, including on delta price limit checks

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(Client)** | 1000 | 1.00 | 1.00 | 1000 | MBR1 **(Non Client)** | 01 |

The following responses are received in the following order during the RFC improvement period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Buy 100 lots @ € 0.90 No Market Data Sent.
- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.90 No Market Data Sent.
- 3rd response n°03 of MBR4 (Time stamp 04): Buy 200 lots @ € 1.10 No Market Data Sent.
- 4th response n°04 of MBR5 (Time stamp 05): Sell 1000 lots @ € 1.00 No Market Data Sent.
- 5th response n°05 of MBR6 (Time stamp 06): Buy 850 lots @ € 1.00 No Market Data Sent.

At the end of the response period, the following Market Update messages are sent just before improvement step 1 (there is no predefined order of publication):

| Update Type | Price | Quantity | Number of orders |
|---|---|---|---|
| 3 = New Bid | 1.10 | 200 | 1 |

| | | | |
|---|---|---|---|
| 3 = New Bid | 1.00 | 850 | 1 |
| 3 = New Bid | 0.90 | 100 | 1 |
| 4 = New Offer | 0.90 | 150 | 1 |
| 4 = New Offer | 1.00 | 1000 | 1 |

**Step 1: RFC Initiator Client Improvement**

Once the RFC improvement period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 04 | MBR4 | 200 | 1.10 | 0.90 | 150 | MBR3 | 03 |
| 06 | MBR6 | 850 | 1.00 | 1.00 | 1000 | MBR5 | 05 |
| 02 | MBR2 | 100 | 0.90 | | | | |

The following transaction is executed with the cross:

- First trade of 150 lots MBR3 @ € 0.90 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(C)** | 850 | 1.00 | 1.00 | 1000 | MBR1 **(NC)** | 01 |

*C: Client NC: Non-Client*

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 04 | MBR4 | 200 | 1.10 | 0.90 | 0 | MBR3 | 03 |
| 06 | MBR6 | 850 | 1.00 | 1.00 | 1000 | MBR5 | 05 |
| 02 | MBR2 | 100 | 0.90 | | | | |

**Step 2: Execution of reactors at RFC Price with RFC Initiator Client**

The following transaction is executed:

- Second trade of 510 lots MBR5 @ € 1.00 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 850 * 60% = 510

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(C)** | 340 | 1.00 | 1.00 | 1000 | MBR1 **(NC)** | 01 |

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 04 | MBR4 | 200 | 1.10 | 1.00 | 490 | MBR5 | 05 |
| 06 | MBR6 | 850 | 1.00 | | | | |
| 02 | MBR2 | 100 | 0.90 | | | | |

MatchQty possible for MBR1 **(Non Client)** with Reactor = 150 + 510 = 660.

**Step 3: RFC Initiator Non Client Improvement**

- Third trade of 200 lots MBR4 @ € 1.10 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty).
- Forth trade of 460 lots MBR6 @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty).

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(C)** | 340 | 1.00 | 1.00 | 340 | MBR1 **(NC)** | 01 |

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 04 | MBR4 | 0 | 1.10 | 1.00 | 490 | MBR5 | 05 |
| 06 | MBR6 | 390 | 1.00 | | | | |
| 02 | MBR2 | 100 | 0.90 | | | | |

**Step 4: Final Cross Execution**

- Fifth trade of 340 lots MBR1 **(Client)** @ € 1.00 with MBR1 **(Non Client)**. Market Update sent with update type= 56 (with price and qty).

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(C)** | 0 | 1.00 | 1.00 | 0 | MBR1 **(NC)** | 01 |

| Bid | | | | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 06 | MBR6 | 390 | 1.00 | 1.00 | 490 | MBR5 | 05 |
| 02 | MBR2 | 100 | 0.90 | | | | |

MatchQty possible for MBR6 with MBR5 = 390.

**Step 4: Uncrossing of the RFC Reactor book**

- Sixth trade of 390 lots MBR6 @ € 1.00 with MBR5. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 06 | MBR6 | 0 | 1.00 | 1.00 | 100 | MBR5 | 05 |
| 02 | MBR2 | 100 | 0.90 | | | | |

**Step 5: Cancellation of remaining orders**

The following orders are cancelled:

- Order of 100 lots MBR2 @ € 0.90
- Order of 100 lots MBR5 @ € 1.00

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| ~~02~~ | ~~MBR2~~ | ~~100~~ | ~~0.90~~ | ~~1.00~~ | ~~100~~ | ~~MBR5~~ | ~~05~~ |
| | | | | | | | |

Market Update sent with update type = 254 Clear Book.

### Example 2 : Client versus Client

- RFC pick up percentage : 60%.
- RFC Algorithm: Client Best Execution RFC
- RFC Inclusion is set to 0: No
- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.
- Pre Trade Transparency mode is On the contract.
- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000.

Price limit checks are applicable to validate the RFC, including on delta price limit checks

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(C1)** | 1000 | 1.00 | 1.00 | 1000 | MBR1 **(C2)** | 01 |

The following responses are received in the following order during the RFC improvement period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR3 (Time stamp 02): Sell 150 lots @ € 0.90 No Market Data Sent.
- 2nd response n°02 of MBR4 (Time stamp 03): Buy 200 lots @ € 1.10 No Market Data Sent.
- 3rd response n°03 of MBR5 (Time stamp 04): Sell 200 lots @ € 1.00 No Market Data Sent.

- 4th response n°04 of MBR6 (Time stamp 05): Buy 850 lots @ € 1.00 No Market Data Sent.

At the end of the response period, the following Market Update messages are sent just before improvement step 1 (there is no predefined order of publication):

| Update Type | Price | Quantity | Number of orders |
|---|---|---|---|
| 3 = New Bid | 1.10 | 200 | 1 |
| 3 = New Bid | 1.00 | 850 | 1 |
| 4 = New Offer | 0.90 | 150 | 1 |
| 4 = New Offer | 1.00 | 200 | 1 |

**Step 1: RFC Initiator Client 1 Improvement**

Once the RFC improvement period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 03 | MBR4 | 200 | 1.10 | 0.90 | 150 | MBR3 | 02 |
| 05 | MBR6 | 850 | 1.00 | 1.00 | 200 | MBR5 | 04 |

Min total reactor Qty = min (850, 350) = 350 so we start with side 'Ask'

The following transaction is executed with the cross:

- First trade of 150 lots MBR3 @ € 0.90 with MBR1 **(Client 1)**. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(Client 1)** | 850 | 1.00 | 1.00 | 1000 | MBR1 **(Client 2)** | 01 |

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 03 | MBR4 | 200 | 1.10 | 0.90 | 0 | MBR3 | 02 |
| 05 | MBR6 | 850 | 1.00 | 1.00 | 200 | MBR5 | 04 |

**Step 2: Execution of reactors at RFC Price with RFC Initiator Client 1**

The following transaction is executed:

- Second trade of 200 lots MBR5 @ € 1.00 with MBR1 **(Client)**. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 850 * 60% = 510

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(Client 1)** | 650 | 1.00 | 1.00 | 1000 | MBR1 **(Client 2)** | 01 |

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 03 | MBR4 | 200 | 1.10 | 0.90 | 0 | MBR3 | 02 |
| 05 | MBR6 | 850 | 1.00 | | | | |

MatchQty possible for MBR1 (Client 2) with Reactor = 150 + 200 = 350 which is the same quantity than for Client 1

**Step 3: RFC Initiator Client 2 Improvement**

- Third trade of 200 lots MBR4 @ € 1.10 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty).
- Forth trade of 150 lots MBR6 @ € 1.00 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(Client 1)** | 650 | 1.00 | 1.00 | 650 | MBR1 **(Client 2)** | 01 |

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 03 | MBR4 | 0 | 1.10 | | | | |
| 05 | MBR6 | 700 | 1.00 | | | | |

**Step 4: Final Cross Execution**

- Fifth trade of 650 lots MBR1 Client 1 @ € 1.00 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 **(Client 1)** | 0 | 1.00 | 1.00 | 0 | MBR1 **(Client 2)** | 01 |

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 05 | MBR6 | 700 | 1.00 | | | | |

**Step 4: Uncrossing of the RFC Reactor book**

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

**Step 5: Cancellation of remaining orders**

The following orders are cancelled:

- Order of 700 lots MBR5 @ € 1.00

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| ~~05~~ | ~~MBR6~~ | ~~700~~ | ~~1.00~~ | | | | |

Market Update sent with update type = 254 Clear Book.

### Example 3: Non Client versus Non Client

- RFC pick up percentage : 25%.
- RFC Algorithm: Client Best Execution RFC
- RFC Inclusion is set to 0: No
- RFC Publication is set to 1: Yes
- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.
- Price and quantity is published.
- A Market Update message is sent to participants with update type = 26 with price = 1.00 and quantity = 1000.

Price limit checks are applicable to validate the RFC, including on delta price limit checks

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 | 1000 | 1.00 | 1.00 | 1000 | MBR1 | 01 |

The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90 No Market Data Sent.
- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92 No Market Data Sent.
- 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00 No Market Data Sent.
- 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02 No Market Data Sent.
- 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05 No Market Data Sent.
- 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05 No Market Data Sent.
- 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00 No Market Data Sent.
- 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95 No Market Data Sent.
- 9th response n°09 of MBR8 (Time stamp 10) cancels previous order No Market Data Sent.
- 10th response n°10 of MBR8 (Time stamp 11): Buy 150 lots @ € 1.10 No Market Data Sent.

At the end of the Response Period, the following Market Update messages are sent just before step 1 (there is no predefined order of publication):

| Update Type | Price | Quantity | Number of orders |
|---|---|---|---|
| 3 = New Bid | 1.10 | 150 | 1 |
| 3 = New Bid | 1.05 | 200 | 1 |
| 3 = New Bid | 1.02 | 200 | 1 |
| 3 = New Bid | 1.00 | 100 | 1 |
| 4 = New Offer | 0.90 | 100 | 1 |
| 4 = New Offer | 0.92 | 150 | 1 |
| 4 = New Offer | 0.95 | 150 | 1 |
| 4 = New Offer | 1.05 | 250 | 1 |

**Step 1: RFC Initiator Improvement**

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator trade:

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| Time Stamp | Firm | Quantity | Price | Price | Quantity | Firm | Time stamps |
| 11 | MBR8 | 150 | 1.10 | 0.90 | 100 | MBR2 | 02 |
| 06 | MBR6 | 200 | 1.05 | 0.92 | 150 | MBR3 | 03 |
| 05 | MBR5 | 200 | 1.02 | 0.95 | 150 | MBR9 | 09 |
| 04 | MBR4 | 100 | 1.00 | 1.05 | 250 | MBR7 | 07 |

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty).
- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty).
- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty).
- Fourth trade of 150 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty).
- Fifth trade of 200 lots MBR6 @ € 1.05. Market Update sent with update type= 56 (with price and qty).
- Sixth trade of 200 lots MBR5 @ € 1.02. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| Time Stamp | Firm | Quantity | Price | Price | Quantity | Firm | Time stamps |
| 04 | MBR4 | 100 | 1.00 | 1.05 | 250 | MBR7 | 07 |

**Step 2: Execution of reactors at RFC Price**

The following transaction is executed:

- Seventh trade of 100 lots MBR4 @ € 1.00. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 450 * 25% = 112.5

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 | 600 | | | 350 | MBR1 | 01 |

**Step 3: Final Cross Execution**

The following transaction is executed with the cross:

- Eighth trade of 350 lots @ € 1.00. Market Update sent with update type= 56 (with price and qty).

The following order is cancelled:

- Unfilled MBR1 order for the remaining quantity of Buy 250 lots @ € 1.00. No Market Update Sent.

**Step 4: Uncrossing of the RFC Reactor book**

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

**Step 5: Cancellation of remaining reactors responses**

The following order is cancelled.

- Order of 250 lots MBR7 @ € 1.05

Market Update Sent with Update Type = 254 Clear Book.

### 7.2.4 Examples for Standard RFC Algorithm

#### Example 1 – Standard Algorithm with COB inclusion

The Standard RFC Algorithm with COB inclusion follows the same steps as the Standard RFC Algorithm without COB. The main difference pertains with the inclusion of COB orders, if they deemed to a given set of criteria, to participate in the RFC Reactor order book after the RFC Response Period ends. The COB orders to be included must met the following criteria:

- Price of COB order needs to be strictly better or equal than RFC Initiator price; and
- Quantity of COB order needs to be greater than or equal to the RFCMinimumQuantityReactor parameter.

- RFC pick up percentage : 25%.
- RFC Algorithm: Standard
- RFC Inclusion is set to 1: Yes
- RFC Publication is set to 1: Yes

- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.
- A Market Update message is sent to participants with update type = 26 without price and quantity.

Price limit checks are applicable to validate the RFC, including on delta price limit checks

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 | 1000 | 1.00 | 1.00 | 1000 | MBR1 | 01 |

The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90 No Market Data Sent.
- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92 No Market Data Sent.
- 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00 No Market Data Sent.
- 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02 No Market Data Sent.
- 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05 No Market Data Sent.
- 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05 No Market Data Sent.
- 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00 No Market Data Sent.
- 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95 No Market Data Sent.
- 9th response n°09 of MBR8 (Time stamp 10) cancels previous order No Market Data Sent.

Plus, one COB order of MBR8 (Time stamp 11): Buy 150 lots @ € 1.10 is deemed to participate in this RFC uncrossing. No Market Data Sent

**Step 1: RFC Initiator Improvement**

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses with addition of the COB order (order #11 on the buy side) without the RFC initiator trade:

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 11 | MBR8 | 150 | 1.10 | 0.90 | 100 | MBR2 | 02 |
| 06 | MBR6 | 200 | 1.05 | 0.92 | 150 | MBR3 | 03 |
| 05 | MBR5 | 200 | 1.02 | 0.95 | 150 | MBR9 | 09 |
| 04 | MBR4 | 100 | 1.00 | 1.05 | 250 | MBR7 | 07 |

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty)
- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty).
- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty).
- Fourth trade of 150 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty).

- Fifth trade of 200 lots MBR6 @ € 1.05. Market Update sent with update type= 56 (with price and qty).
- Sixth trade of 200 lots MBR5 @ € 1.02. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 04 | MBR4 | 100 | 1.00 | 1.05 | 250 | MBR7 | 07 |

**Step 2: Execution of reactors at RFC Price**

The following transaction is executed:

- Seventh trade of 100 lots MBR4 @ € 1.00. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity = 450 * 25% = 112.5

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 | 600 | | | 350 | MBR1 | 01 |

**Step 3: Final Cross Execution**

The following transaction is executed with the cross:

- Eighth trade of 350 lots @ € 1.00. Market Update sent with update type= 56 (with price and qty).

The following is cancelled:

- Unfilled MBR1 order for the remaining quantity of Buy 250 lots @ € 1.00. No Market Update Sent

**Step 4: Uncrossing of the RFC Reactor book**

This step is triggered only in the case where the RFC Reactor book is crossed. In this example, the RFC Reactor book is uncrossed.

**Step 5: Cancellation of remaining reactors responses**

The following transaction is cancelled.

- Order of 250 lots MBR7 @ € 1.05

Market Update Sent with Update Type = 254 Clear Book

### Example 2 - Standard Algorithm without COB inclusion

- RFC pick up percentage : 25%
- RFC Algorithm: Standard
- RFC Inclusion is set to 0: No
- RFC Publication is set to 1: Yes
- MBR1 submits an RFC for 1000 lots @ a crossing level of 1.00€.

- A Market Update message is sent to participants with update type = 26 without price and quantity.

Price limit checks are applicable to validate the RFC, including on delta price limit checks

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 01 | MBR1 | 1000 | 1.00 | 1.00 | 1000 | MBR1 | 01 |

The following responses are received in the following order during the RFC Response Period (10 seconds). Only limit orders are accepted.

- 1st response n°01 of MBR2 (Time stamp 02): Sell 100 lots @ € 0.90. No Market Data Sent.
- 2nd response n°02 of MBR3 (Time stamp 03): Sell 150 lots @ € 0.92. No Market Data Sent.
- 3rd response n°03 of MBR4 (Time stamp 04): Buy 100 lots @ € 1.00. No Market Data Sent.
- 4th response n°04 of MBR5 (Time stamp 05): Buy 200 lots @ € 1.02. No Market Data Sent.
- 5th response n°05 of MBR6 (Time stamp 06): Buy 200 lots @ € 1.05. No Market Data Sent.
- 6th response n°06 of MBR7 (Time stamp 07): Sell 250 lots @ € 1.05. No Market Data Sent.
- 7th response n°07 of MBR8 (Time stamp 08): Buy 1500 lots @ € 1.00. No Market Data Sent.
- 8th response n°08 of MBR9 (Time stamp 09): Sell 150 lots @ € 0.95. No Market Data Sent.
- 9th response n°09 of MBR8 (Time stamp 10) cancels previous order. No Market Data Sent.
- 10th response n°10 of MBR8 (Time stamp 11): Buy 1100 lots @ € 1.10. No Market Data Sent.

**Step 1: RFC Initiator Improvement**

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses without the RFC initiator front loaded trade:

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 11 | MBR8 | 1100 | 1.10 | 0.90 | 100 | MBR2 | 02 |
| 06 | MBR6 | 200 | 1.05 | 0.92 | 150 | MBR3 | 03 |
| 05 | MBR5 | 200 | 1.02 | 0.95 | 150 | MBR9 | 09 |
| 04 | MBR4 | 100 | 1.00 | 1.05 | 250 | MBR7 | 07 |

The following transactions are executed with the cross:

- First trade of 100 lots MBR2 @ € 0.90. Market Update sent with update type= 56 (with price and qty).
- Second trade of 150 lots MBR3 @ € 0.92. Market Update sent with update type= 56 (with price and qty).
- Third trade of 150 lots MBR9 @ € 0.95. Market Update sent with update type= 56 (with price and qty).
- Fourth trade of 1000 lots MBR8 @ € 1.10. Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 11 | MBR8 | 100 | 1.10 | 1.05 | 250 | MBR7 | 07 |
| 06 | MBR6 | 200 | 1.05 | | | | |
| 05 | MBR5 | 200 | 1.02 | | | | |
| 04 | MBR4 | 100 | 1.00 | | | | |

**Step 2: Execution of reactors at RFC Price**

No trade to be executed since the RFC Initiator residual quantity after all price improvements have been executed is zero.

**Step 3: Final Cross Execution**

The following is cancelled with the cross:

- Unfilled MBR1 order for the remaining quantity of Buy 600 lots @ € 1.00 No Market Update Sent.

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 11 | MBR8 | 100 | 1.10 | 1.05 | 250 | MBR7 | 07 |
| 06 | MBR6 | 200 | 1.05 | | | | |
| 05 | MBR5 | 200 | 1.02 | | | | |
| 04 | MBR4 | 100 | 1.00 | | | | |

**Step 4: Uncrossing of the RFC Reactor book**

The following transactions are executed since the reactors' book is crossed:

- Sixth trade of 100 lots @ € 1.10 where MBR8 order matches fully for 100 lots @ € 1.10 with MBR7. MBR7 order remains for Sell 150 lots @ € 1.05 Market Update sent with update type= 56 (with price and qty).
- Seventh trade of 150 lots MBR6 @ € 1.05 Market Update sent with update type= 56 (with price and qty).

| | | | Bid | Ask | | | |
|---|---|---|---|---|---|---|---|
| **Time Stamp** | **Firm** | **Quantity** | **Price** | **Price** | **Quantity** | **Firm** | **Time stamps** |
| 06 | MBR6 | 50 | 1.05 | | | | |
| 05 | MBR5 | 200 | 1.02 | | | | |
| 04 | MBR4 | 100 | 1.00 | | | | |

**Step5: Cancellation of remaining reactors responses**

The following orders are cancelled:

- Order of 50 lots MBR6 @ € 1.05
- Order of 200 lots MBR5 @ € 1.02
- Order of 100 lots MBR4 @ € 1.00

Market Update Sent with Update Type = 254 Clear Book.

## 7.3 TOTAL RETURN FUTURES (TRF) SERVICE

A Total Return Future (TRF) is a listed Contract which replicates economics of a total return swap within the infrastructure of a centralized Exchange.

This is accomplished as follows:

- One party, a Buyer holding Long TRS and receiving the total return, to collect any income generated by the asset and benefits if the price of the asset appreciates over the life of the Expiry. Buyer receives payments based on the return of an underlying asset (Total Return leg), which includes both the total return (income generated) by the underlying and any capital gains a.k.a. dividends.
- In Exchange Buyer must pay the asset owner, i.e. the Seller holding Short TRS, a set rate, over the life of the Expiry (Funding leg).

Transactions are executed in basis and index points with final price calculated at the end of the day.

TRF uses indexes for its pricing and calculations. Currently TRF offered by Euronext is based on returns of CAC 40, and funding rate based on EONIA.

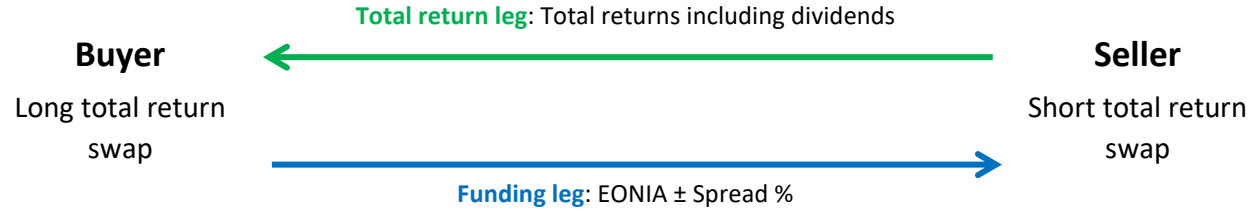
Advantages offered by TRF to market participants are:

- Provide a listed solution to the increased capital requirements arising from regulatory changes for trading OTC transactions.
- Strong margin offsets when trading Euronext Futures. TRF allows investors to benefit from margin efficiencies while trading through the centralised order book.

  The TRF is cleared by LCH SA. Participants will consequently benefit from:

  - mitigation of counterparty risk due to Central Counterparty Clearing.
  - margin offsets across listed equity index products.
- Transparency and accessibility available through a centralised order book and central clearing, through which investors can access the Implied repo market.
  - The buyer benefits from the returns generated from the performance of the underlying index, including its ordinary dividend distributions.
  - In Exchange for this, the buyer pays an interest rate which corresponds to the risk-free rate, plus a basis which corresponds to the lending rate.

Euronext's Total Return Future enables investors to gain exposure to the Implied equity repo rate. In other words, it represents the price for going short a security.




**Make-up of a Total Return Future**

TRF Future price is calculated based on the following four elements:

1. Underlying Index levels.

2. Underlying Cumulative Dividend Index.
3. Underlying Funding Index.

All three of which are used to calculate the **Synthetic Index price**, and

4. Total Return Futures Spread.

Synthetic Index price, which is publicly available[11], is calculated as follows:

$$Synthetic\ Index\ Price = Underlying\ Index\ Level + Underlying\ Cumulative\ Dividend\ Index - Underlying\ Funding\ Index$$

Total Return Future (TRF) Spread is quoted/agreed by market participants, with on-screen transparency.

When all the elements at the close are known, the daily settlement price of the Total Return Future on the underlying index corresponds to the closing level of that index, the accrued dividends, the accrued funding at the close, plus the traded basis converted into index points.

$$TRF\ Future\ Price = Synthetic\ Index\ Price + TRF\ Spread$$

TRF prices are expressed in basis and index points, depending on the method of trading, and have daily settlement in basis points for each maturity. Due to calculation in points values used in pricing may be positive, negative or zero.

**TRF Trading Methods**

There are two ways of trading the Total Return Futures on Euronext:

1. Trading at Index Close (TAIC),
2. Trading at Market (TAM).

Main characteristics of each method are:

| | Trading At Index Close (TAIC) | Trading At Market (TAM) |
|---|---|---|
| **Trading facility** | Via Central Order Book & Wholesale Facilities | Via Wholesale Facilities only |
| **Order entry** | TRF Spread in basis points (bps)<br>e.g. 50 bps | Futures price in index points<br>e.g. 5,739 points |
| **Trade price** | Final Futures price is known at the end of the day (after the index closing level is known) | Final Futures price is known at the time of trading |

Euronext provides clients with two (2) daily TRF Conversion Parameters files on EFS:

[11] Synthetic Index prices are available in real-time from the data vendors, and End of Day in the TRF data file made available on EFS and the Euronext website.

1. "Preliminary" file: available before opening with limited data, and
2. "Final" file: available after closing with extended data

The TRF Conversion Parameters files provide:

- Contract characteristics, e.g. Maturity name, Number of days to Expiry, Daily Settlement Price, etc.
- Indices values of the previous and current days for all three indices involved in the calculations

*For more information on TRF please refer to the dedicated technical note.*

***Example of a Trading At Index Close (TAIC) Trade for TRF***

*Assume that the following order book exists:*

| | TRF CAC40 Dec Expiry | | | | |
|---|---|---|---|---|---|
| | | Bid | Offer | | |
| *Buyers →* | Qty (lots) | Price | Price | Qty (lots) | *← Seller* |
| | 300 | 50.0 | 50.0 | 300 | |
| | 420 | 49.5 | 50.5 | 250 | |

***Trade Execution***

*The equilibrium in the order book generates one transaction:*
*300 lots of TRF CAC40 Dec Expiry are traded at 50.0 bps; Trading mode: Trading at Index Close (TAIC)*

***End of Day***

*At the end of day, final Futures price will be calculated based on Underlying Synthetic Index Close, with value at close for this example being:*

| | |
|---|---|
| *CAC40 Index Level at close on the day of transaction (1):* | *5,370.14* |
| *CAC40 Cumulative Dividend index closing (2):* | *323.09* |
| *CAC40 Funding index closing (3):* | *-30.91* |
| *TRF Spread [Basis traded] (4):* | *15.53* |

$$Traded\ Future\ Price = Underlying\ Index\ Level + Underlying\ Cumulative\ Dividend\ Index - Underlying\ Funding\ Index + TRF\ Spread = 5{,}739.67$$

*300 lots of TRF CAC40 Dec Expiry will be delivered at the price of 5,739.67*

## 7.4 MARKET ON CLOSE (MOC) SERVICE – TO BE DEVELOPED

Market On Close (MOC) service aims to enable market participants to trade Futures, during the day with an agreed spread against the index close, in index points, with the final price of the Future Contract being calculated at the end of the day. MOC uses Trading At Index Close (TAIC) trading method.

MOC service can be traded via Central Order Book and Wholesale Facilities, and are expressed in index points. Due to calculation in points values used in pricing, as such prices, may be positive, negative or zero. Trading will be done using TAIC trading method also used for TRF.

As a listed solution advantages offered by MOC to market participants are:

- Increased transparency and accessibility - available through a centralised order book and central clearing.
  - prices will be displayed on-screen during the trading day, creating a reference price, while allowing off-book Large-in-Scale transactions.
- Reduced counterparty risk and decreased cost of failure - MOC will be cleared / covered by LCH SA. Participants will consequently benefit from mitigation of counterparty risk due to Central Counterparty Clearing.
- Cost efficient solution – with reduction in costs compared to an OTC solution with brokers fees.
- Simplicity - index Futures Contracts will be immediately available after settlement. Trades will immediately be included into the risk management system of the market participants.

Underlying of the MOC Contract is the main Index Future. Calculations for the MOC Future will be based on the underlying index Future, and the levels of the index on which this underlying Future is constructed.

MOC Future Expiry settlement price is calculated based on:

- Daily Settlement Price (DSP) of the Underlying Index Future,
- Underlying Index levels.

MOC Future DSP is publicly available and is calculated as follows:

$$MOC\ DSP_{expiry} = Underling\ Future\ DSP_{expiry} - Underlying\ Index\ Closing\ Level$$

During the day trades are done on preliminary (or temporary) basis, in index points. Final prices will be calculated at the end of the day, once the final price is known, and preliminary pricing is done based on the previous day's index close.

$$MOC\ Temporary\ Future\ Price = Previous\ Day\ Index\ Close + Basis\ Traded$$

When final prices are determined the traded MOC Future will be fungible with the normal Index Future. Calculating MOC Future based on the DSP of Underlying Future's respective Expiry and the Underlying index closing level makes this possible.

$$MOC\ Final\ Future\ Price = Final\ Index\ Close + Basis\ Traded$$

After the end of the trading day all remaining orders in MOC will be deleted.

MOC Futures are expected to be traded under their own, dedicated Contract codes. These Contracts will be made available in standing data, with their own tick size table ID and pattern ID (for schedule of trading).

***Example of a Trading At Index Close for MOC***

| | |
|---|---|
| *MOC Future on CAC 40 Index:* | *FCB* |
| *Underlying Future is "CAC 40 Index Future":* | *FCE* |
| *Underlying Index of FCE:* | *CAC40* |

*Assume that the following order book exists:*

| FCB Dec 18 Expiry | | | |
|---|---|---|---|
| | Bid | Offer | |
| Qty (lots) | Price (bps) | Price (bps) | Qty (lots) |
| 300 | -5 | -5 | 300 |
| 420 | -6 | -4 | 250 |

***Trade Execution***

*The equilibrium in the FCB Dec 18 order book generates one transaction:*

# 8. MARKET MAKING

The Optiq Market Making functionality aims to support Market Makers in the Euronext Derivatives Markets. These Market Makers are required to maintain bid and offer prices in all individual order books in the contract for which they are market-making, ensuring maximum trading opportunities are realized.

Multiple categories of Market Makers can be defined by the exchange, each defining a set of rules of presence for a Market Maker to meet. Examples of Market Maker categories are Primary Market Maker (PMM) and Competitive Market Maker (CMM). On a given Contract, a Euronext Member (identified by a Member Firm ID) can have only one Market Making category.

The registration of Maker Makers is on a per Euronext Member firm (FirmID) and Contract basis. As an example, a firm (identified through its Firm ID) acting as Primary Market Maker for Contract A cannot at the same time be a Competitive Market Maker for Contract A, but can also be a Competitive Market Maker for Contract B.

Optiq identifies a Market Making desk within a Firm based on both the Euronext Member Firm and an Executing Within Firm MiFID II short code.

The 'Sign-In' message allows Market Makers to be identified as Market Makers with their Executing Within Firm short codes, and then to use the Market Maker's functionalities.

In addition, the 'Sign-In' message allows Market Makers to submit clearing data before being able to trade on a contract and to specify in which logical access the member wants to receive unsolicited Market Maker Protection messages. As other Market Maker messages, it can't be sent cross-partition, but different Logical accesses, of the same Firm, specifying the same execution within firm short code could replace, update or get data.

> **Practical Note:** Market Makers sign-in before their trading session on Optiq. This identification must be done after the technical Login into the platform at session level. This sign-in is done for each Market Maker (Firm ID / Short code) for the list of contracts they will quote during their session, and on which they may want to setup Market Maker Protection.
>
> Sign-in attempt on a contract on which the Firm doesn't have Market making authorization will be individually rejected.

*For detailed information on contracts and obligations in the different Market Making programs please contact the Euronext Market Maker team.*

Client registered as Market Makers have the possibility to request dedicated accesses for Optiq Order Entry Gateway, allowing them to access the Market Making Order functionality.

This functionality is supported in Optiq by enabling submission of Quote message of many two-sided orders in a single transaction. Since Market Makers react to changes in market conditions by updating their quotes, the vast majority of orders in busy contracts are submitted using the Quote mechanism.

This section details in the first part the Optiq Market Making Spread Obligation framework. The second section is dedicated to the management and behaviour of Quote messages and the third section describes Market Maker Protections available and provided by Optiq.

## 8.1 MARKET MAKING SPREAD OBLIGATION FRAMEWORK

Market Quality Spread (MQS) is the widest spread between the bid and offer sides that Market Makers are obligated to maintain in a particular Contract. The Contract and associated presence obligations are specified in the Market Maker's agreement with the Exchange. Market Quality Spread (MQS) is set with the values defined in the MM agreement *(Cf. section "Trading Safeguards")*.

### 8.1.1 Market Making Framework

Euronext introduces with Optiq the granularity of the Market Making Key to support customers market making activity. This granularity is defined as a sub layer under the customers Member Firm ID.

The MM key designates the combination of the Firm ID and a declared Execution Within Firm short code:

Market Making (MM) Key = (Firm ID + Execution Within Firm short code)

In the MiFID 2 framework, an Execution Within Firm short code designates any entity (e.g. trading strategy algorithm, individual trader) that submits orders to the market. From Optiq perspective a key is such an entity.

Euronext uses the MM Key to provide customers with the maximal granularity for their Market Making algorithms, as well as risk management.

The purpose of this section is to illustrate how customers can make the most benefit of the Optiq MM framework.

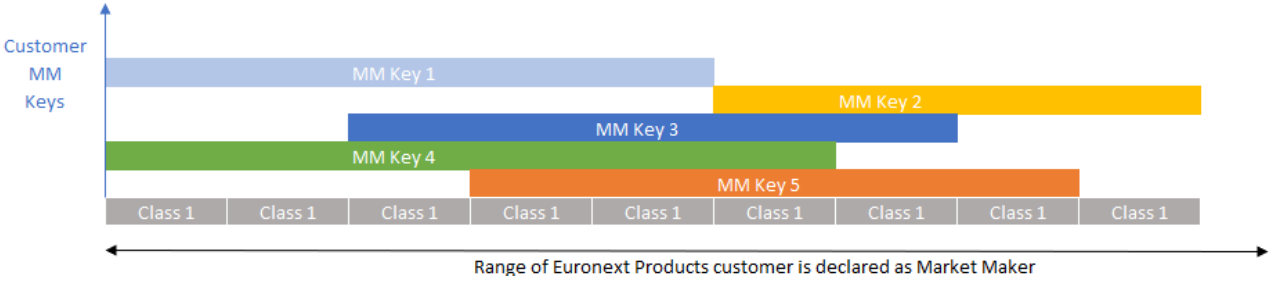
**Note**: While Quote messages are only available for Options, the same principles apply to Futures and order messages.

#### Use of multiple MM Keys across range of Products

Through the Optiq Sign-In mechanism, an Euronext Market Maker declares a key as active on a given Product. Optiq registers this key and allows submission of Quotes from a Market Making Optiq Logical Access. A key can use any Market Making Optiq Logical Access to support its quoting activity.

MM Sign-In mechanism also allows this key to define – for the given Product (Class or Contract) – risk parameters for the Market Maker Protection (MMP) facility.

Customers can declare the same key across multiple Contracts. This is illustrated in the following diagram:



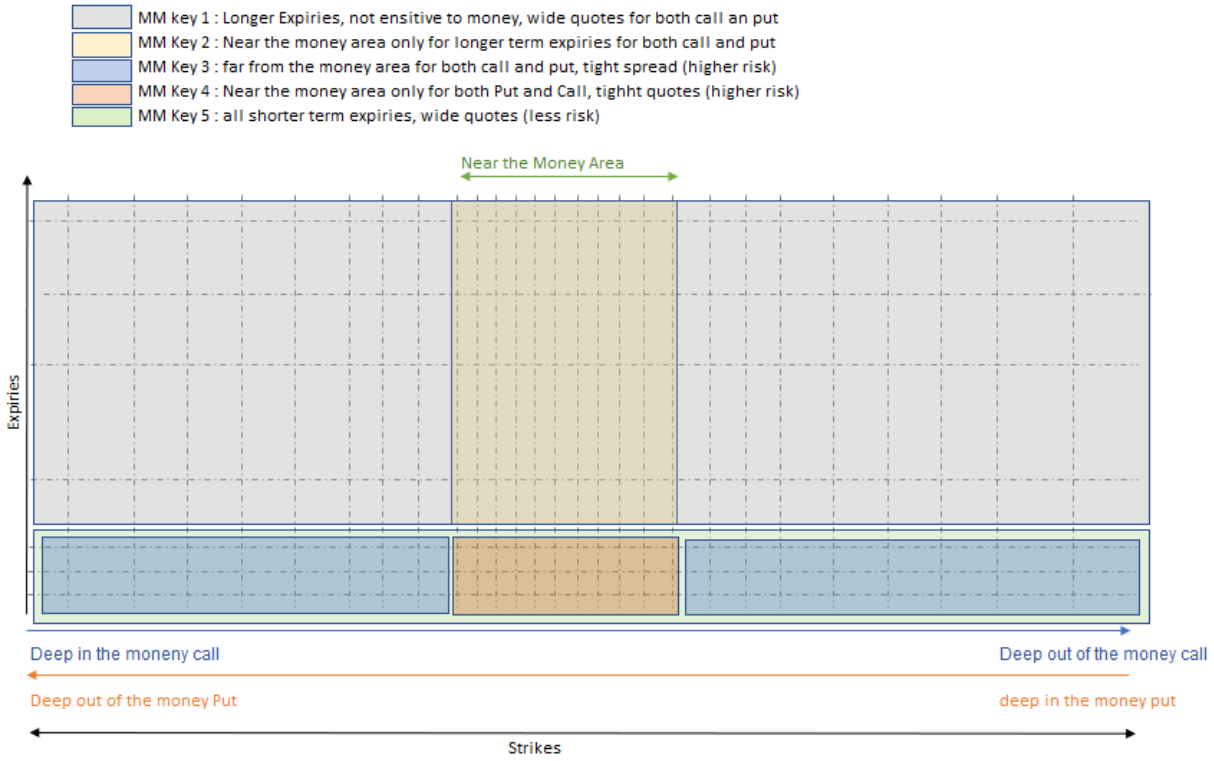

## Use of multiple Keys for a given Product (Class)

Customers might take multiple parameters into account for their different trading strategies:

- Volatility
- Underlying Price vs. Strike / Money
- Premium
- Option type
- Maturity
- Any other parameter

Values for each of these parameters will lead to a different trading strategy, different risk consideration or policy and different decision when pricing Quotes. Through the use of multiple Market Making keys – identifying a change in the decision - customers have full flexibility to perform this in the Optiq framework.

The following diagram is a basic illustration of this feature, considering a given Class on which multiple keys would be simultaneously active:



As a reminder, Optiq offers three complementary features with regards to such setups:

- Quote management at Key level: orders and quotes of each individual key are independent in the order book and do not replace one another,
- Self-Trade Prevention at Firm ID level ensuring that two MM keys wouldn't trade against one another,
- Market Maker Protection at MM Key level,
- Mass Cancellation at Contract (Class) + Key level.

This allows to anticipate multiple scenarios (below Keys refer to the example above):

- If volatility increases, and even though MMP is not triggered: if customers deems strategy of MM Key 4 too risky, customers can pull out MM Key 4 contribution on NTM area for short maturities individually, through Mass Cancel at Key level. It wouldn't pull all Quotes of other keys out, and customers would fall back on Quotes owned by MM Key 5 (wider quotes) without having to leave the market.
- If MMP is triggered, only the impacted Key gets its orders and Quotes pulled by Optiq. This allows customers to have a very granular risk management on the overall contract:
  - Customer can aggregate all keys' MMP positions across the Class to have an overall position.
  - Customer can define a dedicated risk policy (delta/volume) for each individual key.
- With movements of the underlying prices, quoting activity adapts seamlessly: the money moves and triggers start of quoting of the relevant Keys. This contribution would add to the wide quoting one (i.e. fall back strategies, MM keys 5 and 1).

  Fall back strategy is not mandatory if there is 100% coverage of strikes by other keys and not deemed necessary.

All these trading keys act in parallel, but an individual key situation (e.g. MMP triggered) can be used by customer as a trigger for a global action (Mass Cancel at Firm ID level).

### Focusing on Risk management

Through Market Maker Protection (MMP) at each key level, customers benefit from alignment between their set-up and the exchange.

The MMP will naturally follow the setup customers will decide to put in place. Customers have the hand on how many keys are used, strategy they would define for each one, and declare them in Optiq. Optiq provides back to customers the possibility to define a risk set-up on both delta and volume for each individual key.

Self-Trade prevention completes the picture to make sure that with these keys being present with their own quotes in the same order book, there is no risk of self-match between them.

The other way around, customers with multiple desks that might interact, can decide which key could actually match the others and decide on the STP setup. As a reminder STP is provided at each 'Quotes' or 'New Order' level.

### Focusing on capacity allocation and Logical Access management

In Optiq, there is no dependency enforced between the technical means to access the market and the functional behaviour. The only distinction come with use of Market Making Logical Accesses versus Trading Logical Accesses.

Only MM Logical Accesses can submit MM related messages:

- Market Making Administrative messages
  - MM Sign-In: declaration of a key on a Product
  - MM Protection messages
- 'Quotes' messages

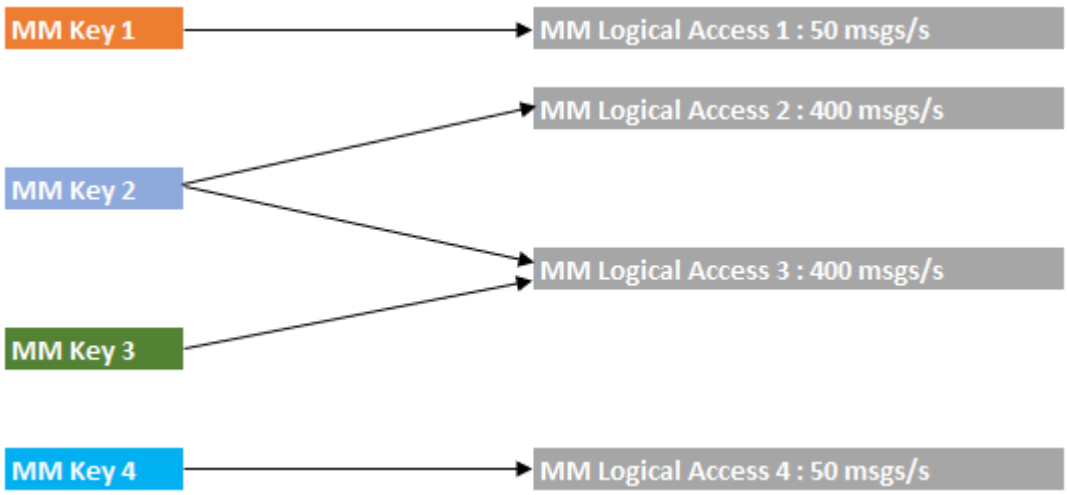
Still, Trading Logical Accesses can submit Orders flagged with account type 6 'Liquidity Provider' for contribution to the Market Making activity.

Each Logical Access ordered comes with its capacity in terms of throughput (number of messages per second).

Customers have the possibility to freely allocate Logical Accesses – and therefore throughput capacity – to their Market Making keys:

- Multiple MM Keys can use the same Logical Access
- One MM Key can use several Logical Accesses
- Both can be combined

This is illustrated by the example in diagram below:




Customers are completely autonomous in the way they allocate their capacity to their different trading strategy without any constraint enforced by Optiq.

The only element to pay attention to is with regards to the Market Maker protection Unsolicited messages sent by Optiq towards customers.

As a reminder, 'Market Maker Protection Ack' messages can be sent by Optiq in two scenarios described in the technical documentation:

1. Solicited messages: sent as a response to an action received from the customer (e.g. setting of protection, change of threshold),
2. Unsolicited messages: sent by Optiq to update customers' position versus thresholds upon trade.

In case a Key uses multiple Logical Accesses, Optiq wouldn't know up front to which Logical Access to route the unsolicited messages to. Therefore Optiq requires at Sign-In level for each key to indicate the Logical Access to which to route messages. In any case, Optiq will route the messages to the Logical Access provided by the customer in Sign-In message.

Customers can choose to have multiple implementations in front of this:

- For Each Market Making key, define a 'lead Logical Access'. This Logical Access would be used for both Quoting and Administrative messages by this key (for example in the above, MM Key 2 would declare MM Logical Access 2 as lead).
- For all Market Making Keys, define one Logical Access dedicated to MM Administrative messages: sending of the MM Sign-In messages, sending of all MMP related settings and updates, collection of all MMP Ack messages to update risk parameters and positions for all keys.

The first option is in favour of independence of the different MM Keys, while the second is in favour of centralization and dedicated process for risk management, that would not interfere with quoting (no MMP messages in the quoting LAs queues, whether in submission or reception).

Note: Market Maker Protection takes into account both Quotes and 'New Orders' flagged as LP submitted by customers, whether the last are submitted via a Trading Logical Access or A Market Making Logical Access. Customers can define an MMP set-up through a MM Logical Access for a MM Key that would exclusively rely on Orders flagged as LP submitted through a Trading Logical Access.

### Performance Monitoring

Customers must be aware that Market Making performance monitoring is not done at Market Making key level but rather aggregated on a per Firm ID level.

When multiple Keys are present at the same time on a given strike, the best quote (the closest to the top of the book if not on the top of the book) is used for performance calculation.

> Optiq introduces on Euronext Derivatives a framework for Market Making activity for Options that allows customers to fully set-up their activity in terms of strategies and capacity. This is achieved while also providing the adequate level of risk management and monitoring capabilities, allowing customers to take minimal risk while providing the best liquidity on screen.

### 8.1.2 Market Quality Spread: Spread Obligation Definition

Spread Obligations are provided to market participant through the Market Making schemes defined by the exchange.

These Market Making schemes define spread obligations through several **Spread Classes.** Multiple contracts may refer to the same spread class, while only one spread class can be associated to a contract.

For each spread class, the spread obligations framework in Optiq is defined through a relative value of the bid. This value may differ between expiries to distinguish obligations of presence for longer term instrument compared to shorter term ones. To accommodate this a spread class definition provides bid values for several layers of Time To Expiry.

**Time To Expiry (TTE)** in the Spread classes is defined as a fraction of a month.

For each time to maturity category (e.g. an indicated TTE of one week identifies all instrument of the contract with a maturity date shorter than or equal to D+6 days), a spread obligation is defined as a relative (%) value of the bid price (obtained in real time through Market Data).

For cases where trading brings prices of the instrument to their low or high bounds, i.e. cheap or very expensive instruments, this rule may not be applicable. As such, for each TTE layer, three sub-layers are defined based on the price criteria (low bid, standard bid, high bid) to compare the bid with:

- Cheap instrument: if the observed best bid price of the instrument is lower than the low bid threshold, the indicated fixed spread is applied.
- Standard instrument: if the observed best bid price of the instrument is higher than the low bid threshold but is lower than the high bid threshold, the indicated relative value is applied.
- Expensive instrument: if the observed best bid is higher than the high bid threshold, the indicated fixed spread is applied.

***Example with AEX Index Option Contract***

*Client must consider this example as an indicative one.*

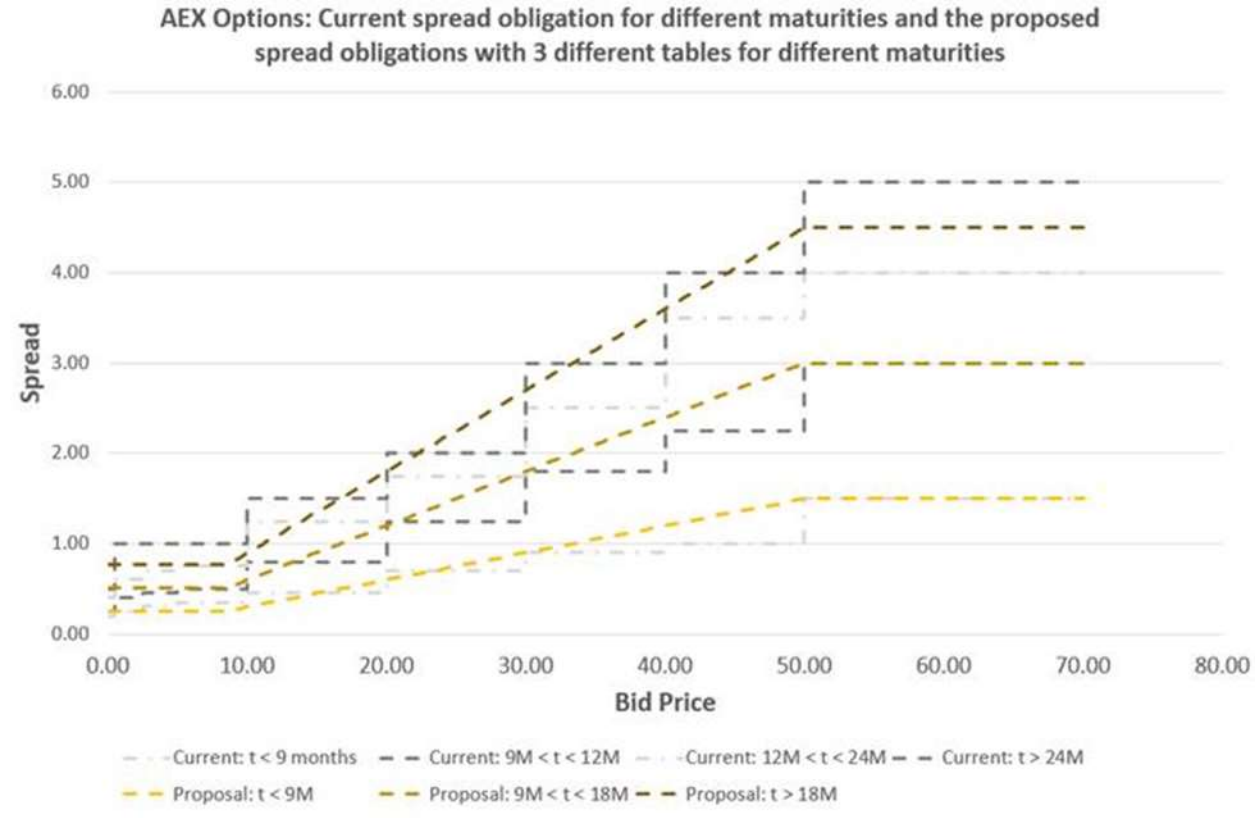
*Values provided here are NOT the one defining the scheme for the contract and are provided solely for the sake of this example.*

*The following table provides an example of a spread class:*

| Spread Class 1 | | | |
|---|---|---|---|
| **Maturities up to (months) a.k.a. Time to Expiry** | **Bid up to (€)** | **Spread** | |
| 9 | 8.33 | 0.25 | *Cheap Instrument (implying price range from 0 up to 8.33)* |
| | 50 | 3% | *Standard Instrument (implying price range from 8.33 up to 50)* |
| | ∞ | 1.50 | *Expensive Instrument (implying price range from 50 to infinity)* |
| 18 | 8.33 | 0.5 | *Cheap Instrument* |
| | 50 | 6% | *Standard Instrument* |
| | ∞ | 3.00 | *Expensive Instrument* |
| ∞ | 8.33 | 0.75 | *Cheap Instrument* |
| | 50 | 9% | *Standard Instrument* |
| | ∞ | 4.50 | *Expensive Instrument* |

*Assuming that AEX Index Option Contract is indicated as following the rules defined by this spread class, the graph below provides the future associated obligations, and their comparison with the current ones (Feb 2018) applicable for the same contract.*

*Client must take into account that the values proposed here are solely for the sake of the example.*




### 8.1.3 Actual Quality Spread Multiplier and Spread Obligations: Intraday Update

Under some circumstances the Exchange may wish to change the value of the Quote Spread that Market Makers are obligated to maintain. This is done by applying an Actual Quality Spread multiplier (AQS multiplier) to the AQS. The market is informed of this change by the sending of a real-time MDG message.

Euronext Market Services can change the AQS Multiplier for a Contract, intraday, to a value identifies either as Normal market operation (set to 1) or widening by the provided value in the real-time MDG message.

Messages of AQS multiplier change are for informational purposes only. No monitoring of Market Maker obligations is carried out by Optiq. It is the obligation of Market Makers to alter their Quote Spreads as appropriate.

### 8.1.4 Authorized Price Fluctuation: Static Daily Referential

As described in the dedicated section *(Cf. section "Trading safeguards"),* on a daily basis clients are provided a Reference Spread table identifying Authorized Price Fluctuation (APFs). In the daily standing data files for each contract clients are provided the spread class to which it is associated.

The spread classes provided in Market Making Arrangements are covered by the Authorized Price Fluctuation configurations. Compared to spread classes, Reference Spreads (APFs), for each configuration, provide information for each TTE.

Per TTE and price threshold, it indicates:

- The Market Quality Spread (MQS).

  If the Reference Spread (APF) configuration corresponds to a Market Making Spread Class, the MQS indicated in Reference Spread (APF) tables will match the spread indicated in the Market Making Arrangements.

- The default Actual Quality Spread multiplier applicable for the day *(Cf. previous section on "Actual Quality Spread Multiplier")*.
- The Collars Multiplier *(Cf. section on "Trading safeguards")*.

The two multipliers should be applied to the MQS to get respectively the AQS and Collars spreads.

> **Note:** with the Optiq Spread Obligation framework, there is no differentiation of the applicable spread depending on market phases (Call versus Continuous) and associated trading mechanism (order collection period or open trading).

## 8.2 MARKET MAKER ORDERS: QUOTES

When client sets up multiple Logical Accesses for the same Member Firm ID, and wishes to spread the message load between connections, these different connections can be used to quote on the different instruments of the same Contract. Logical Accesses created for Market Making must be requested explicitly with functional access role of Market Making.

Market Makers are required to maintain bid and offer prices in all individual order books in the contract for which they are market-making, ensuring maximum trading opportunities are realized.

This functionality is supported in Optiq by enabling submission of Quotes message of many one-sided or two-sided orders in a single transaction. Since Market Makers react to changes in market conditions by updating their price and volume information of multiple instruments in the contract for which they are a market maker , the vast majority of orders in busy contracts are submitted using the Quotes mechanism. Quotes messages are also called Market Maker Orders.

One Market Maker's bid and offer into an outright instrument is also referred to as a single-sided or double-sided quote. A single-sided quote (SSQ) consists in one bid or one offer ; A double-sided quote (DSQ) consists

in one bid and one offer. So each individual 'Quotes' message allows to submit a set number of single-sided and/or double-sided quotes. Quotes message is only possible to enter via the SBE Protocol.

> **Practical Note:** The maximum number of Double Sided Quotes (DSQs) available in a single Quotes message is 30 (60 individual side orders). It will allow clients to update their quotes on up to 30 instruments in a single message.

### 8.2.1 Validation of Quotes

Within each Contract, only Firms that are registered Market Maker for that Contract are allowed to submit 'Quotes' messages into the contract. Firms registered to submit 'Quotes' messages also have the ability to enter any other order types in the Central Order Book using the same Logical Access. This means that for a Firms setup for market making, the same Logical Access setup to submit quotes may also be used to submit non-quote order messages.

However, Logical Access requested with functional access role set to Trading or RiskGuard does not allow to submit 'Quotes'. Only registered Market Makers are allowed to request Market Maker Logical Access.

All Single-sided (SSQ) or Double-sided (DSQ) quotes in a 'Quotes' message must be for the same Contract meaning that all Symbol Indexes provided in a Quotes message must belong to the same Contract.

The identification of the contract for the 'Quotes' message is done based on the first SSQ/DSQ where the Symbol Index is existing. If one SSQ or DSQ is not on the same contract than the first one, then it is individually rejected. Each individual SSQ or DSQ within the Quotes message should specify the Symbol Index it is to be entered into and the combination of prices and volumes for the bid and/or the offer side.

Optiq prevents double-sided quotes from being submitted with bid and offer sides at equal price (thus preventing the two sides of the quote trading with each other) or with the bid side at a higher price than the offer side (i.e. backwardation). In addition, each one sided quote is checked for duplicates (i.e. same Symbol Index) and where such duplicate exists, only the last one sided quote is kept.

Clearing fields specified in the 'Sign-In' message are the same for all records in the Quotes message and are checked for technical validity, if submitted, in the same manner as for a standard order.

Market Maker Orders may be entered during Call, Reserved or Continuous book states and are also taken into account by STP mechanism.

> **Note:** A quote submitted using the Quotes message, is a simplified version of the standard submitted order, but the full order validation is applied to it.

### 8.2.2 Processing of Quotes

Each Single-sided quote contained in the 'Quotes' message effectively acts as a Limit order and has all the attributes of limit orders.

When a SSQ or DSQ is submitted it replaces any existing SSQ/DSQ of that Market Maker (identified through the unicity of Member Firm ID, Executing Within Firm Short Code) in that series in the following manner:

- Bids replace existing bids and offers replace existing offers, regardless of price.
- If either side of a quote has a volume of zero, then the corresponding side of the quote is cancelled.
- If either side of a quote has a volume of null, then that side of the quote is not altered.

> **Practical Note:** For clients that may already be using 'Quotes' messages on the Warrants segment, the update of quantity using these messages has a different behaviour for the instruments in the Equity and Index Derivatives segments.
>
> For the Derivatives markets the quantity provided in the update of the quote is used by Optiq exactly as submitted (as it is displayed on screen).
>
> The total quantity (which is the sum of the on-screen quantity and the previously matched quantity) is updated by Optiq accordingly, i.e. increased or decreased based on the delta between the previous on screen quantity and the update.
>
> Handling of quantity updates for individual order messages works differently than described above for the 'Quotes' messages. For individual orders modification of quantity is submitted as delta, as for the Cash markets.

When an incoming DSQ replaces an existing order, the original order timestamp remains unchanged unless the order volume is increased, or the order price amended.

Clearing information for a quote is not revised, even if subsequent quote in the same Outright are submitted with altered account and posting information.

SSQ/DSQ are included in the calculation and trading of Implied prices in real-time, as a normal Explicit order.

SSQ/DSQ are validated against Dynamic Collars and if either side of the quote fails this validation the invalid side only is rejected. If this occurs, any existing quote in the series remains in the Central Order Book.

SSQ/DSQ do not persist in the Central Order Book if the originating Market Maker logs out or is disconnected.

**Note:** Market Makers* must be present at a single price in the order book they are animating. This is ensured via Quote processing mechanism described above.

To ensure consistency of their presence rule, only FOK and IOC validity type can be submitted by a registered Market Maker through single Order messages with account type Market Maker*.

Therefore, any other combination submitted for any known registered Market Maker* on that instrument will be rejected.

* Reminder: Market Maker in Optiq is identified through a combination of Firm ID / Short code.

## 8.3 MARKET MAKER PROTECTION (MMP)

The Market Maker Protection functionality implemented in Optiq is aimed at preventing too many simultaneous trade executions on quotes provided by a Market Maker, offering additional control of the market risk.

The basic principle can be envisioned as a counter calculating a cumulative position (Delta or Volume) and maintained on a Contract basis.

When the cumulative position, for a specific protection type, for either a Contract exceeds a set protection type limit, a pre-defined action is then taken.

MMP is calculated taking into account quotes and standard orders submitted, based on the Market Maker account type.

MMP is computed per single trading desk (identified under MiFID II by the couple [Member Firm ID, Execution Within Firm short code].

Protection mechanisms apply for Continuous Trading mechanism. They are not applicable during Price Discovery mechanism as all trades are executed by Optiq at the same time during the Uncrossing, making this protection inadequate.

Market Making Position data is maintained for the duration of the day independent of the Market Maker login sessions. That is, position data is reset only upon Market Maker sending a specific MMP reset instruction for the specific Firm ID and short code combination.

TPV mechanism, which ensures fair participation of all orders types, also guarantees Market Makers (i) a fair protection of their quotes during any trading phase and (ii) limits the risk of breaching their protections realized after the first trade following the Uncrossing.

### 8.3.1 Configuring Market Maker Protection

Each protection type is only available for Contracts that have been explicitly registered for this type of protection and can be configured in the standing data at Contract level.

Any Euronext Member Firm acting as market maker on a Contract can setup the Market Maker Protection for individual Market Making desk (Firm ID, Short code).

At the beginning of each Market Maker's trading session, all protections are set to be inactive, Protection Limits and Protection Positions are both set to zero.

Once signed-in, a Market Maker can activate Market Making Protection for each Contract.

At the time of activation, the Market Maker can set Protection Limits and Limit Breach actions for each protection type activated in a Contract. The limits and breach actions can be updated by submitting an adjustment at any time whilst the facility is active.

The following Limit Breach Actions are available:

1. Ignore – no checking takes place and any limit set is ignored.
2. Pull – All Market Maker's* quotes submitted through MMO in the Contract are pulled.

** Reminder: Market Maker in Optiq is identified through a combination of Firm ID / Short code.*

If the trader revises the limit to a value which places it in breach, the limit breach action will not occur until a further trade takes place.

> **Note:** On activation, Protection Limits and Protection Positions are zero, irrespective of whether the Market Maker has executed any trades in that Contract during the day.

### 8.3.2 Market Maker Protection Type

Optiq supports the two following Market Maker Protection types:

- Delta Protection
- Volume Protection

Delta Protection is dedicated to Options products; Volume protection is available for Options and Futures products.

The processing and configuration of each protection type follow the same rules. The calculation of the Protection Position only differs from one type to another.

### 8.3.3 Processing Market Maker Protection

The following section describes the dynamic workflow between Optiq and a Marker Maker. A Market Maker is referred to by a combination of a Member Firm ID and Execution Within Firm short code.

Whilst the protection facility is active for a specific protection type, every time an MMO trades (i.e. a Market Maker Quote), the following steps are applied:

1. Recalculate the new cumulative Protection Position for that Contract.

2. Compare the new calculated positions in absolute magnitude (i.e., ignoring any sign) to the Market Maker configured Protection Limits.
3. If the Protection Limit is breached, trigger the Limit Breach Action.
4. Send to the Market Maker an Updated Position message including the following information:
    - The Market Maker cumulative Position for that Contract;
    - The Market Maker Protection Limit for that Contract;
    - Whether the Market Maker's DSQ in that class have now been pulled as a result of a Protection Limit breach.

Since the position is not recalculated and checked (and therefore the requested breach action is not performed) until after the incoming order has completed processing, the Market Maker protection facility does not prevent the limit from being breached.

Trades executed during the Uncrossing process update the Protection Positions of the Market Maker, but do not directly result in actions triggered by a breach (e.g. Pull). The first trade occurring after the Uncrossing phase updates the Protection Position further and may potentially cause the configured breach action to be applied at this time.

During Continuous, if a single incoming order results in multiple trades against the same market maker's orders, it is possible for the market maker's Protection Limit to be breached by the first trade but no limit checking will take place until after the last trade.

When a Market Maker Protection Limit is breached and the relevant Limit Breach Action is set to "Pull", quotes are automatically pulled and further Quote message submitted to that Contract from that Market Maker are rejected. For the avoidance of doubt this includes Quote messages that are queued to be processed by Optiq as well as remaining quotes that are part of a Quote message, where part of the Quotes has been processed.

Following the breach any further Quote messages submitted from that Market Maker will not be accepted for that Contract until the Market Maker performs one of the following actions:

- Amends his position or Limit such that it is no longer in breach.
- Changes the configured Breach Action to "Ignore".
- De-activates the Protection facility.

If a breach occurs, the configured breach action is applied and any further 'Quotes' messages submitted from that Market Maker will not be accepted for that Contract.

### 8.3.4 Calculating Cumulative Positions

The cumulative position can be calculated as trades resulting from quotes. However, if a Market Maker is not restricted to quotes, but is allowed to submit other standard order types, the cumulative position is calculated taking into account quotes and standard orders submitted, based on the Market Maker account type.

### Volume Position

Volume Protection monitors the Market Maker's cumulative traded volume of a Contract.

After each trade of a quote / Market Maker standard order, Optiq recalculates the cumulative Volume Position of the Market Maker as follows:

$$NewV_{Position} = CurrentV_{Position} + VolumeTraded \times Unit\ of\ Trading$$

*For Options:* Added "VolumeTraded x Unit of Trading[12]" is always positive, both for buying and selling a Call or a Put

*For Futures:* Added "VolumeTraded x Unit of Trading" is always positive, both for buying and selling Futures

### Delta Position

*For Options:*

The Delta of an Option measures the sensitivity of an Option's price to a change in the price of the underlying asset.

The Delta is that Options Greek which indicates how much money an Option will rise or drop in value with a 1€ rise or drop in the underlying asset price, which also translates to the amount of profit or loss the Market Maker will make when the underlying asset rises or drops.

The cumulative Delta Position allows a Marker Maker to assess the risk of taking certain Option positions. The Market Maker can then weigh the strength of his expectation against the risk Implied in the Options delta value and select the Options that best suit his expectations by setting appropriate Delta Protection Limits.

After each trade of a quote / Market Maker standard order on an Option, Optiq recalculates the cumulative Delta Position of the Market Maker as follows:

$$New\Delta_{Position} = Current\Delta_{Position} + (\Delta_{Option} \times OptionVolumeTraded) \times Unit\ of\ Trading$$

For example, a Market Maker configures a Delta Protection Limit to 100. Trades executed during the uncrossing cause the Market Maker's cumulative Delta Position to be updated to 110. No breach action occurs at this point. A subsequent trade of delta -1 causes their position to be updated to 109 and at this point the breach action occurs.

> **Note:** For a Delta-Neutral strategy trade, the delta is assumed to be zero and so no delta position update is made.

*For Futures:*

[12] Unit of Trading in the contract specifications, were previously referred to as Lot Size. In standing data this field is Trading Unit

A Delta protection for Futures consists in the same as volume protection but taking into account side of the trade (buying or selling) to adjust the position (resp. increment or decrement).

After

After each trade on a quote / Market Maker standard order on a Future, Optiq recalculates the cumulative Delta Position of the Market Maker as follows:

$$New\Delta_{Position} = Current\Delta_{Position} + Side \times VolumeTraded \times Unit\ of\ Trading$$

where Side = 1 for buying and side = -1 for selling.

**IN SUMMARY: MARKET MAKING**

- **Market Making framework for Spread obligations in Optiq allows to:**
  - ✓ **Adjust obligations per group of maturity and associated liquidity pool (provided in the Spread Class as break-down per TTE).**
  - ✓ **Have obligations that adjust to the bid price on the market instead of a fixed pre-set value.**
  - ✓ **Provide a simplified model with a single set of obligations per contract (or group of contracts), and is independent of trading phases.**
- **Market Makers can use "Quotes" messages in Optiq allowing to quote up to 30 instruments on both sides in a single message (60 individual side orders).**
- **Market Maker Protection (MMP) can only be managed at Contract level.**
  - ✓ **Granularity previously provided by "ITM-level" (trading key) is replicated by use of the short codes to setup MMP. Clients should adjust their MMP setup to be provided for combination of Firm + Short code.**
- **MMP protection setup previously available by sliding time window will no longer be available in Optiq.**
  - ✓ **To manage required configuration setup at different times throughout the day, clients may submit a message modifying their MMP configuration.**

# 9. RISK MANAGEMENT SERVICES

Optiq offers a number of risk management services, that assist clients in reducing their daily operational and trading risks, including Euronext RiskGuard (ERG) services, Self-Trade Prevention (STP) and Cancel on Disconnect (CoD) mechanisms.

## 9.1 EURONEXT RISKGUARD

Euronext RiskGuard (ERG) aims to provide Risk Managers at Clearing Member firms and Trading Member firms with the ability to set pre-trade risk controls in order to manage their customers' or trading firm's risk exposure in real-time. It complements the Members' and Clearing Members' own pre-trade risk management systems already in place.

Pre-trade risk controls that are part of the Euronext RiskGuard service are made available for Euronext Derivatives markets through FIX 5.0 API, with message submission via Optiq OEG.

ERG provides the Suspend and Block features to address MiFID II regulatory requirements and offers the extended risk control feature of Order Size Limit (OSL). This service extends to all asset classes of traded via Euronext Derivatives Central Order Book.

In Optiq RiskGuard API messages have the maximum scope of an Optiq segment. If an action is required across segments, then the associated API messages need to be sent by the Risk manager for each individual impacted Optiq segment.

### 9.1.1 Suspend & Block

The Suspend and Block features provides Risk Managers at Clearing Member firms (GCM) with a fast and efficient way to halt trading activity at the Exchange in the event that a trading firm breaches its obligations to its clearer.

The functionalities are similarly provided to Risk Managers at Trading Member firms (NCM / ICM) to halt trading activity for their trading firm, one or more of the firm's Logical Accesses or individual traders.

Upon submission of a Suspend command with Purge of orders enabled, all open orders and quotes of the impacted entity will be pulled. Any attempt to submit further orders will be rejected until the Risk Manager explicitly reinstates the trading status of the entity by sending an 'Unsuspend' command. Block command has similar functionality, but is executed for an individual Contract.

The Suspend and Block commands can apply to a whole trading firm, one or more Logical Accesses, or an individual trader identified by a combination of a Firm ID, the Execution Within Firm short code or the Client Identification Short code, as well as the MiFID II DEA flag.

These functionalities allow a GCM to pull orders and stop an NCM's trading activity; and is available to NCM / ICM members for their own trading firm.

### 9.1.2 Order Size Limit

The Order Size Limit control provides Risk Managers with the ability to set a maximum number of contracts that can be bought and/or sold per order. The limit can be configured more broadly, e.g. for the whole trading firm or to one or more Logical Accesses, or more narrowly, e.g. on individual trader level, by using combination of Logical Access and Execution within Firm short code, as well as the MiFID II DEA flag.

The limits can be set at different levels:

- All Futures and/or Options contracts with a specific Exchange Code
- At the contract level.

**IN SUMMARY: EURONEXT RISKGUARD**

- **Euronext RiskGuard (ERG) services are incorporated into Optiq, offering pre-trade risk management features of Suspend, Block and Order Size Limit (OSL).**
- **In Optiq ERG service is provided via FIX private message protocol, with submission via OEG.**
  **To access the Euronext RiskGuard service via Optiq, both LCH SA Clearing Members and Euronext Trading Members must sign the Euronext Risk Management Services Agreement.**
  - ✓ **For more information on how to adjust existing ERG / ITM setup, or obtain new ERG accesses, clients should contact Euronext Membership department.**
- **With changes in access model, the use of existing ERG setup will shift from ITM to Logical Access level.**
  - ✓ **To achieve trader level granularity clients will be able to use Execution within Firm short code in combination with Logical Accesses.**

## 9.2 SELF-TRADE PREVENTION (STP)

The **Self-Trade Prevention (STP)** mechanism allows clients to avoid unintentional self-trading that results from the matching of two opposite orders on the same instrument, of the same Member Firm (i.e. with the same Member Firm ID). The mechanism applies to orders that are submitted via OEG private messages, for a pre-defined sub-set of Account Types as defined below.

In the event that two opposite orders belonging to the same Member Firm would match against each other, the mechanism cancels either the resting or the incoming order, depending on the **STP Type** chosen.

- If STP Type chosen is "Cancel Resting": the resting order is cancelled, and the incoming order enters into the order book.
- If STP Type chosen is "Cancel Incoming": no changes occur in the order book and the incoming order is rejected.

For Derivatives markets STP mechanism will only apply to the individual Explicit orders and quotes, i.e. it would **not** apply to Implieds, and its scope covers orders within a single order book.

For contracts setup with Price Pro Rata as the matching policy, only STP Type "Cancel Resting" is accepted. If orders or quotes for such contracts are submitted with selection of Cancel Incoming such messages will be rejected.

### Account Management for Derivatives

STP mechanism for Derivatives markets is enabled for Account Types 'MM' and 'House'. As such possible transactions are checked when two matching orders are between:

- Two MM accounts
- MM account vs. House account
- Two House accounts

### How STP will work with Quotes

STP mechanism applies only upon matching after all quotes within the 'Quotes' message have been processed and orders are incorporated into the order books. 'Quotes' messages may contain multiple orders, including for the same instrument. A single 'Quotes' message is fully processed before being assessed for possibility of matching. Quote response messages will therefore not contain rejection due to STP. If an order from a 'Quotes' message is rejected due to STP it will receive a separate cancellation message.

> **Note:** In interaction with contracts that have Price Pro Rata (PPR) as the matching policy only STP Type "Cancel Resting" is accepted. Submission with STP Type set to "Cancel Incoming" will result in rejection of the messages.
>
> STP Type "Cancel Resting" is not allowed for FOK and Minimum Quantity orders. This means that for FOK and Minimum Quantity orders on contracts

**IN SUMMARY: SELF-TRADE PREVENTION**

**New optional STP mechanism introduced on Euronext Derivatives markets:**

- **Service provides additional risk management to clients.**
- **Service is enabled for Account Type 'MM' and 'House'.**
- **Clients may choose to setup the behaviour they would expect on order entry.**
- **As the service is optional, clients may choose not to use it at all.**
- **All orders are checked for STP to ensure fairness, and service dos not introduce any additional latency to the clients that choose to use it.**

## 9.3 CANCEL ON DISCONNECT

Cancel on Disconnect (CoD) is a mechanism which triggers an automatic cancellation of all non-persisted orders upon disconnection of the client whether voluntary or due to an issue.

Cancel on Disconnect implemented for the Derivatives markets in Optiq is activated, or disabled, for each individual order message entered during the current trading day, based on value populated by the client, in that individual message. Field is mandatory, and by default its value is set with Cancel on Disconnect activated, which means, that order is not to be persisted by the system after client disconnects.

CoD applies to all types of orders and validities, and is enabled system-wide. The mechanism applies and behaves in the same manner for all clients, for all their Logical Accesses and on all Optiq Segments of the Derivatives Markets.

Every single entering order message is checked for the Cancel on Disconnect setting. 'Quotes' messages do not have a field for selection whether to participate in CoD or not. In cases when CoD functionality is triggered all live quotes are mandatorily cancelled.

The Cancel on Disconnect mechanism is triggered when the connection between a client and the Order Entry Gateway (OEG) is interrupted, either due to client closing the connection or in case of a failure. If the client application is disconnected from the OEG, then all live quotes and orders not flagged to be persisted, belonging to the corresponding OE Session are cancelled for their remaining quantity, regardless of order type and validity type.

Scope of CoD only includes orders sent during the current day. Orders entered during a previous business day are not in scope of CoD and remain in the system, without being cancelled, in case of disconnection.

**IN SUMMARY: CANCEL ON DISCONNECT**

- **Cancel on Disconnect (CoD) mechanism in Optiq gives clients flexibility to choose if individual orders should be persisted or cancelled in case of disconnection.**
- **Mechanism applies to all order and validity types, submitted during the current trading day. Unlike on UTP-D day and GTD / GTC orders are subject to the same CoD behaviour.**
- **Quotes are always cancelled in case of disconnection, and can't be excluded from CoD.**

# 10. ARCHITECTURE PRINCIPLES

## 10.1 MARKET SEGMENTATION

Market segmentation in Optiq reflects main architectural principles of parallelization, targeted use of system resources and increased granularity of processing to deliver its advantages, including high systems performance, capacity and throughput, reduced impact to clients in case of Exchange technical updates, low time to market. The chosen segmentation that allows to achieve this also drive its technical features, i.e. the access model and system throttling.

On the Optiq platform, an Optiq segment defines a universe of instruments sharing common trading and financial properties.

Referential standing data, provided on a daily basis for each instrument via messages and files, identifies which Optiq Segment an instrument belongs to.

Optiq Segments are technically independent from one another, and each encompasses all of its the trading elements, i.e. Order Entry, Matching Engine and Market Data. Access to each Optiq Segment requires dedicated order entry access.

Euronext Derivatives Optiq Segments and their constituents are:

| | Equity Derivatives *(EQD)* | Index Derivatives *(IDD)* | Financial Derivatives *(FID)* | Commodity Derivatives *(CMO)* |
|---|---|---|---|---|
| Instrument Types | ✓ Individual Equity Options<br>✓ Single Stock Futures<br>✓ Single Stock Dividend Futures | ✓ Index Futures<br>✓ Index Dividend Futures<br>✓ Index Options<br>✓ Total Return Futures | ✓ Currency Futures<br>✓ Currency Options | ✓ Commodities Futures<br>✓ Commodities Options |

## 10.2 ACCESS MODEL & CAPACITY

In Optiq clients are able to connect to each of the Optiq segments with dedicated Logical Accesses. The connectivity model is the same for Euronext Cash & Derivatives Markets.

Individual Optiq Segments may be comprised of at least one and up to ten **Optiq Partitions**. An Optiq Partition is a technical subdivision of an Optiq Segment. Each Partition relies on an optimized technical environment, physically independent from one another, but connected.

Access to Optiq Partitions is managed through Order Entry Sessions. For each Logical Access, an OE Session will be set up per Partition.

***Example***

*If a client orders a Logical Access for the EQD segment, with two partitions, they will get automatically two OE Sessions (one per partition).*

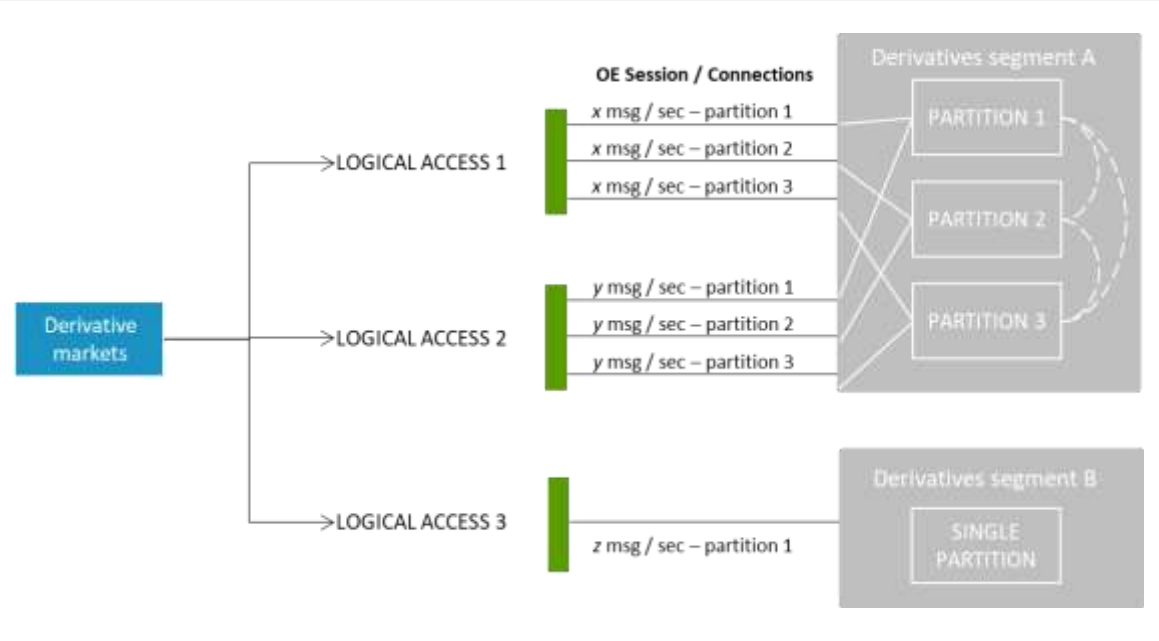
*Since a Logical Access allows trading on the whole Optiq Segment, two technical paths are possible for a market participant to reach an instrument order book:*

*- A direct path through an OE Session established to the partition hosting the targeted instrument*

*- An indirect path through an OE Session established to another partition (within the same Optiq Segment), relying on internal connectivity between Matching Engines of the various partitions.*

*In the second case, additional latency is introduced due to the extra step involved in forwarding messages by the system between partitions via the indirect connection.*

***Example: Diagram of Order Entry Sessions, Partitions for Two Segments***




*As with Euronext Cash Markets Market Makers have the possibility to order dedicated sessions to fulfil their quoting obligations.*

*This access model provides Derivatives members with full flexibility to access each Optiq segment in the most*

Optiq is scaled as follows for the Go-Live of the platform. Reader must be aware that this infrastructure can be upgraded to add additional partitions for a given segment if assessed by Euronext as a market need. In this case, such a change will be announced to the market, and will require minimal development on Client side, as it will only update the Partition IP target of the contracts provided in daily referential files.

| Equity Derivatives *(EQD)* | Index Derivatives *(IDD)* | Financial Derivatives *(FID)* | Commodity Derivatives *(CMO)* |
|---|---|---|---|
| *3 Partitions* | *1 Partition* | *1 Partition* | *1 Partition* |

## 10.3 DIRECT ELECTRONIC ACCESS (DEA)

Management of Direct Electronic Access in Optiq differentiates order entry for Sponsored Access and Direct Market Access (DMA).

- DMA orders may be submitted through a client's existing Logical Access, as a "mutualized" feed of data
- Sponsored Access requires one of several dedicated Logical Access(es) to be setup under the Sponsoring Member Firm id

Orders entered through either access type are required to be correctly flagged as DEA and be populated with required associated MiFID II short codes.

## 10.4 THROTTLING

The Optiq platform provide clients with a predictable and flexible throttling mechanism, which applies on the OE session level. Each session has a maximum number of messages that can be sent. This maximum number of messages depends on the throughput chosen by the client for their Logical Access.

**In Optiq, throttling does not apply at the contract level.**

This limit applies to all messages sent, irrespective of the message type, the instrument on which it was sent, or the Market Maker role client may have on the instrument.

Optiq provides queueing of messages as a service in case throttling is triggered to allow a limited number of messages over the throttling limit. On each logon client can choose whether to enable the queuing service, or use the default rejection mechanism for the messages over the limit.

Main concepts of the throttling mechanism already available for the Euronext Cash markets are also used for the Derivatives markets, ensuring harmonization and uniform approach for Cash and Derivatives markets.

Specifics of implementation for the Derivatives markets and what clients should consider using the throttling mechanism most effectively will be provided in further updates.

Additional details of the Optiq throttling solution for the Cash markets may be obtained from the dedicated section within the *Euronext Markets – Optiq OEG Connectivity Specifications* document.

## 10.5 DROP COPY

Drop Copy is a service, providing near real-time copies of trade reports & order messages, usually used for risk management, back-offices and compliance teams.

Clients require one (or several) dedicated Drop Copy Logical Access(es) to receive Drop Copy messages, which can be setup with different configuration that fits their needs.

Drop Copy is one-way (outgoing from the Exchange) and can only be used to receive messages. A Drop Copy connection cannot be used to submit any other trading and trading-related commands or to perform any other operation on the market.

A Drop Copy Logical Access may be assigned a Member Firm ID with which the client is setup to trade on the Euronext markets, or which they are identified as managing (e.g. in their role of Risk Manager).

The data provided via Drop Copy is based on the same data that is provided via regular client Order Entry session / private messages, however is provided separately to allow for:

- Use a different network bandwidth / connectivity bandwidth from that used by the private order entry messages used for trading purposes
- Grouping of data from various connections a client may have on a specific market into a single source of data via a drop copy connection
- Simpler integration, as only a few message types are provided

## 10.6 MARKET DATA

Market data for Derivatives markets will be modified with this step of migration to accommodate the updated segmentation of the Optiq segments, new features added as improvements with the migration as well as changes mentioned throughout this document.

As setup in Phase 1, market data for Derivatives instruments will be published from the Optiq segment and partition on which the instrument is hosted.

# 11. HOW TO PREPARE FOR OPTIQ

Section below lists a number of topics that should be considered by client for impact, to ensure smooth and successful migration to Optiq.

## 11.1 MEMBERSHIP MODEL CHANGE

### 11.1.1 Firm ID

Firm ID is a unique identifier of an investment firm or financial institution that deals, advises, clears and/or acts on behalf of its clients and possibly itself on the Euronext markets, and with its clearing and settlement partners. During the process of becoming a participant of the Euronext markets a firm is assigned this ID.

Firm ID is replacing the MNE, and is used for setup of connections to Optiq, manage authorization and access rights, Market Maker obligations, as well as for various other administrative purposes (e.g. reporting).

In Optiq, with exception of the clearing firms on the Commodities markets, it is a numeric ID.

All existing active Euronext clients already have a Firm ID.

As a Firm ID represents a firm it is expected to reduce the number of MNEs currently in use. This means that different authorizations previously managed for individual MNEs will all be combined under a single Firm ID.

In addition to rationalization of connections and improvement of administration and management of partition information, this also simplifies the associated market maker setup with the clearing partners.

If clients require to differentiate access further, they may obtain additional Firm IDs.

*For further information on setup of authorization in Optiq as well on how to obtain new Firm IDs clients should contact MCC.*

### 11.1.2 Use of MIFID II Short Codes

On the Optiq platform, use of Member Firm IDs in place of MNEs re-groups rights, authorization and other operational setup to a broader level. The granularity of any actions on behalf of individual trader, as well as risk management functionalities of Suspend and Block are transferred to the short code granularity.

Each private message submitted to the Exchange already identifies the short codes, provided in various cases and are:

- ExecutionWithinFirmShortCode: mandatory in all inbound application messages;
- InvestmentDecisionWFirmShortCode: mandatory only when the order is from a Market Maker or House
- ClientIdentificationShortCode: mandatory only when an order is from a Client, or if order is flagged as DEA
- NonExecutingBrokerShortCode is Optional field, which not checked by the system for completion. While it is available in order entry messages for reporting purposes, it isn't used for any other checks or functionalities.

Clients can use the short codes populated in their private messages, to request Euronext Market Operations to perform actions on behalf for their firm, with the additional required granularity.

## 11.2 ITM REMOVAL

Optiq requires creation of new connectivity sessions, called Logical Accesses. With increase in throughput provided by Optiq, Logical Accesses should allow to reduce the number of ITMs, and improve administration and management of the connections.

With removal of ITMs, management of market maker authorization and roles will migrate to the Member Code level. The granularity of the individual trader in interaction with Euronext Market Operations for "on behalf of" actions (e.g. cancellation of orders), can be replaced with the user of the Short codes that clients provide in every private order entry message.

> **Note:** In UTP Client Order ID is unique per ITM / Contract. With removal of ITMs and rationalization of MNEs, clients must ensure in their systems, for front and back-office reconciliation, that the Client Order ID submitted by different Logical Accesses for the same Member Firm ID continue to maintain sufficient unicity.

*To setup new connections on Optiq, or obtain further connectivity details, clients should contact MCC.*

## 11.3 MARKET MARKER PROTECTION SERVICE IMPROVEMENT

MMP can be setup on Member Firm ID + ExecutionWithinFirmShortCode level.

MMP protection setup previously available by sliding time window will no longer be available in Optiq. To manage required configuration setup at different times throughout the day, clients may submit a message modifying their MMP configuration.

When client sets up multiple Logical Accesses for the same Member Firm ID + short code, if required to spread the load between connections, and differentiate the MMP for different expiries, the connections of these Logical Accesses can be used to quote on the different instruments of the same Contract.

## 11.4 CONTRACTS WITH SHORT TERM MATURITIES

Contracts that represent maturities that are shorter than one months, will be merged into their "main" monthly equivalent contracts. With this change all expiries will be managed in a single Contract.

As a result of this MMP protection expands to cover daily, weekly and monthly expiries in one unique setup. Clients need to adapt their threshold for MMP to manage this change, and use the Firm ID + short code granularity.

This will also allow for the shorter term maturities (daily and weekly) that start being managed as part of single main contract, to be included in the use in exchange recognized strategies with the standard monthly maturities.

Standing data will include data on whether the expiry is daily, weekly or monthly, and may also be incorporated by clients in use of this information for trading.

More details on the how migration of expiries will be implemented, will be provided at a later date with the overall details of the migration strategy.

## 11.5 MARKET DATA CHANGES

While all attempts are made to maintain the Derivatives specific logic implemented in Phase 1 of Optiq implementation, some changes will be inevitable with full migration of Derivatives markets to Optiq. An updated version of market data and file specifications will be published with complete list of adjustments.

This document identifies some of the improvements and changes expected in Market data, however clients are advised to review the updated Market data specification when they are published.

# 12. MODIFIED & DECOMMISSIONED FUNCTIONALITIES

Sections below provide a list of Euronext Derivatives functionalities that have been moved to be managed by other applications, or are otherwise no longer supported by Optiq.

## Automated Market Reference (AMR)

Optiq uses Symbol Index as the unique identifier of all tradeable instruments. As such, AMR as the core Contract and tradeable instrument identifier for trading is replaced by the Symbol Index.

**AMR code remains available in the standing data.**

To ensure consistency with overall Optiq setup, and limitations brought about due to merger of contracts with maturities shorter than a month active use of AMR as a key for trading is decommissioned.

As already the case, instruments provided in standing data, will contain the Symbol Index, and will be used for Derivatives and Cash instrument references for order entry messages, including for creation of strategies.

To assist in reconciliation of trade data between the CCPs, client back-offices and Optiq private messages, the field for the AMR in the standing data will remain, to provide mapping between the identifier used by the CCP and the Symbol Index used as the identifier for trading and market data used by Optiq.

The format of the field will change. The field length will be extended to support the required additional identification of the Expiry date, and length of the contract mnemonic.

In the standing data a new dedicated field will provide AMR code, which will be **18** characters long (compared to current length of 15 characters). This extension of the code will core the addition of 1 characters to the Contract Code, and 2 characters to the Expiry Date. AMR construction and rules of construction will otherwise remain as setup currently.

All existing instruments will be updated to this extended AMR code.

As this change was implemented in order to enable merger of contracts with expiries shorter than one month. Due to this a change is also made to the AMR for contracts that have a difference between their Maturity and Last Trading dates.

- In order to maintain multiple different maturities within the same contract, the Last Trading date must now be used to create the AMR code.
- When Maturity and Last Trading date are different, the date of reference is now the Last trading date. As a consequence, AMR codes for the associated contracts changed in some cases. All segments are impacted.
- If due to handling of holidays, Maturity and Last Trading dates differ on listing of any new instrument, they will also be subject to such assignment of the AMR codes.
- If due to a corporate action, last trading date of the instrument changes, the date in the already existing AMR will not be modified. Nb: if due to a corporate action the strike price is adjusted – the strike part of the AMR will be subject to modification.

***Example***

| *Instrument* | *In UTP / MDG* | | *In Optiq* | |
|---|---|---|---|---|
| | *AMR* | *Symbol Index* | *AMR* | *Symbol Index* |
| *A.F.AA8 – Dec 22* | *AFAA8221200000F* | *4221800006* | *AFAA8_22121600000F* | *4221800006* |
| *A.F.ABCD – Dec 22* | *N/A* | *N/A* | *AFABCD22121600000F* | *4325600019* |

## Order type: Market on Open (MOO)

Due to limited use, as well as enhancements made to the Uncrossing phase, order type "Market On Open" (MOO) will no longer be available for Euronext Derivatives Contracts traded on the Optiq platform.

## Inter-Commodity Spreads (ICS)

As identified elsewhere in this document, merger of contracts with shorter maturities provides flexibility to clients to create inter-expiry spreads as required, using standard strategy functionalities available in Optiq.

The pre-defined inter-commodity (ICS) are decommissioned, and will no longer appear in the standing data files. A separately

## Wholesales

All Wholesales that are supported by Euronext are managed via a single mechanism, with Against Actuals, Block trades, Exchange for Swaps and Prof trades being merged into a single technical facility. With the streamlining of the facility all minimum volume checks for all wholesale trade types requiring this will be done against the pre-trade LIS threshold assigned per Contract.

Guaranteed Cross previously managed through the wholesales message, for trades below LIS threshold, is managed through the Request for Cross functionality, and Basis Trades are being managed via the Market on Close functionality.

Asset Allocation type is decommissioned.

## Exchange for Physical

Functionality of Exchange for Physical (EFP) will no longer be supported in Optiq.

## Implied BBO publication in MDG

In Optiq all Explicit and Implied volume is aggregated for the BBO. Clients have to process the last value for BBO (Best bid and Offer) from Market Update message (1001). Implied Bid and Offer will no longer be provided, and values Implied Bid and Offer from Market Update message (1001) will be decommissioned.

## Stock Order Routing

Due to limited use, service of "Stock Order Routing" will no longer be available for Euronext Derivatives Contracts traded on the Optiq platform.

Market makers that use this functionality with UTP-D are advised to contact their clearing member managing this trading activity on Euronext Derivatives markets to assess an alternative solution.

## Account Authorization for Clearing

In Optiq, the service of Account Authorization that allowed clients to trade on behalf of another member of the market with automatic allocation of the trades to the member on whose behalf trading was done will no longer be supported.

# APPENDIX A: ANNEXES OF HOW THE MARKET WORKS

## A.1 EXCHANGE RECOGNIZED STRATEGIES

Euronext maintains an Annexe to its trading procedures, with the list of the exchange recognized strategies: "*Euronext Derivatives Markets: Trading Procedures Annexe Two – Recognised Strategies on the Euronext Trading Platform*".

Exact list of strategies that are enabled on individual contracts should be retrieved from the daily Contract Standing Data file.

The components of a strategy (whether a buy or sell order) must always be created from the BUY perspective.

# APPENDIX B: DOCUMENT REVISION HISTORY

## REVISION HISTORY

| DOCUMENT VERSION | CHANGE DESCRIPTION |
|---|---|
| 5.0 | Update of the document containing the following changes:<br>• In section 5.2.4 “Future Market Price” updated the Reference Price Origin from ‘Future Market Price’ to ‘Fair Value’.<br>• In section 7.2 Request For Cross (RFC) updated with the inclusion of RFC and COB book interaction<br>• In section 1.2 Glossary updated the description regarding Request For Cross functionality |
| 4.0.1 | Minor version update with inclusion of a check for Delta-Neutral RFC legs (price legs must be within the collars) in section 7.2.2 RFC Process & Conditions. |
| 4.0 | Final clarifications for the document following go live of Optiq. |
| 3.1 | Clarification of the document containing the following changes:<br>• In sections 4.4.2 “Price Pro Rata (PPR)” and 9.2 “SELF-TRADE PREVENTION (STP)” added notes on interaction of STP with FOK and Minimum quantity orders.<br>• In section 4.5 “Trading on Strategies Without Implieds” - In Summary clarified the note on rounding rules that apply to Collar calculation for strategies<br>• In section 4.9 “Optiq Tick Table Mechanism” - added clarification for the strategy leg trades<br>• In section 7.2.1 “RFC Algorithms” corrected the table to flag COB inclusion as Not Enabled for Commodities<br>• Added section 8.1.1 “Market Making Framework”<br>• In section 12 “Automated Market Reference (AMR)” clarified for use of the Last trading date in the AMR |
| 3.0 | Update of the document containing the following changes:<br>• In section 1.2 “Glossary” - Request for Execution (RFE) adjusted to be Request for Implied Execution (RFIE)<br>• In section 1.3 "RELATED DOCUMENTS" updated URL of the Optiq page, added associated documents<br>• In section 3.2 “The Optiq Trading Patterns” - Re-arranged section to clarify rules used to determine states of instruments, for multiple outright legs; Added a note that inter-contract strategies (strategies between different contracts) with exception of Delta-Neutral, are not currently supported by Optiq.<br>• In section 4 “Trading on Optiq” - Throughout sub-section - clarified references to Implieds, as Implied prices.<br>• In section 4.1 added a note that maximum lifetime of GTC and GTD orders is one year.<br>• In section 4.3 “Price Discovery for Outrights without Implieds” - (i) Description of Standard Uncrossing Sequence decoupled from Outrights, (ii) Rules for leg state severity moved to be provided together with similar rules in section 3.2 "The Optiq Trading Patterns".<br>• In section 4.4 “Continuous Trading Algorithm without Implieds” - (i) In Summary added a note that when applied relevant parameters are provided in referential data.<br>• In section 4.4.2 “Price Pro Rata (PPR)” added details of the processing algorithm, minimal pro-rata threshold, and a note on interaction with STP.<br>• In section 4.5 “TRADING ON STRATEGIES WITHOUT IMPLIEDS” – added reference to the Annex 2 for the Exchange Recognized Strategies.<br>• In section 4.6 “Implied Mechanisms” - Clarified (i) references to Implieds, as Implied prices, (ii) rules for use of use of timestamps in implied prices (ii) wording of rules for Strategy and Component implied prices (iv) Clarified rules for allocation of quantity.<br>• In section 4.6.3 “Implied Trading Policy” – graph of implieds adjusted to indicate generic Outright and Strategy codes.<br>• In section 4.7 “Event Driven Implied Matching (EDIM) Model” - Clarified (i) Price discovery in Call Phase with a simpler rule, (ii) Steps of the EDIM Uncrossing Sequence, (iii) triggering and processing of implied prices in case of a priority order or submission of Request for Implied Execution (RFIE).<br>• In section 4.7.3 “Continuous Trading with EDIM” - Request for Execution (RFE) adjusted to be Request for Implied Execution (RFIE); added clarification that Priority order that triggers EDIM uncrossing of a strategy must enter that strategy book. |

| DOCUMENT VERSION | CHANGE DESCRIPTION |
|---|---|
| | • In section 4.7.4 “Throttling Considerations for RFIE in EDIM” - Request for Execution (RFE) adjusted to be Request for Implied Execution (RFIE).<br>• In section 4.8 “Spontaneous Implied Matching (SIM) Model” - Clarified (i) behavior for instruments during the Call Phase with a simpler rule, (ii) steps of the SIM Uncrossing Sequence, (iii) description of Aggregates in SIM.<br>• In section 5.1 “DEFINITIONS AND MAIN PRINCIPLES” – (i) check of collars for bid and ask side corrected to be “…the bid orders are checked against the upper collar, and sell orders are checked against the lower collar.”, (ii) added a note on provision of type of Reference Price Origin in standing data.<br>• In section 5.2 “Dynamic Collars Reference Price origin” – (i) table of reference prices updated, and footnote updated to clarify that in case of Trading interruption of a Blue month, the Indicative Matching Price (IMP) is used as the DCRP, and in other cases last known FMP is used in other cases; (ii) Individual rules for DCRP calculation turned into numbered sub-sections, (iii) clarified text of existing rules, (iv) explanation of Future Market Price moved to the end, and clarified with details.<br>• In section 5.3 “TRADING SAFEGUARD MANAGEMENT MODEL” – adjusted explanation of AQS from being in “tick”, to be “absolute value”.<br>• In section 5.4 “Step for Dynamic Collar Determination” – corrected calculation of the dynamic collars in the example. Adjusted example to correct AQS from being in “tick”, to be in “absolute value”, and updated example to clarify the use of “bid up to” price range.<br>• In section 6.2 “Future Spike Protection (FSP)” – renamed FSP Freeze Period to be FSP Cool Down period<br>• In section 7.1 “Wholesale Facilities” - Added clarification for (i) Delta-Neutral, (ii) Pre-trade and Matching validation; Added a note on possible aggregation of the reactor volume for the LIS orders.<br>• In section 8.1.1 updated Example, to clarify use of the bid up to price range.<br>• In section 8.3 “MARKET MAKER PROTECTION (MMP)” – removed references to Sign-out. Reset to be done by MMP instruction.<br>• In section 8.3.3 “Processing Market Maker Protection” – corrected for the processing during Uncrossing and Continuous phases.<br>• In section 9.1 “Euronext RiskGuard” – renamed “Kill switch” feature to Suspend and Block features; Added clarification that ERF API messages are sent and processed on a per segment basis.<br>• In section 9.2 “Self-Trade Prevention (STP)” – note added on system rejecting messages in case of selection of Cancel Incoming for contract setup with Price Pro Rata matching policy<br>• In section 10.4 "THROTTLING" replaced reference to the dedicated Throttling document by Euronext Markets – Optiq OEG Connectivity Specifications document.<br>• In section 11.1.2 “Use of MIFID II Short Codes” renamed RiskGuard services from Kill switch to Suspend and Block.<br>• In section 12 “Modified & Decommissioned functionalities” – Added “account authorization for clearing”<br>• Appendix A added as “Annexes of How the Market Works”, which includes notes on A.1 Exchange Recognized strategies.<br>• Document Revision History moved to Appendix B (previously Appendix A) |
| 2.0 | First update of the document containing the following changes:<br>• Spelling, formatting corrections throughout the document<br>• Added definitions of “Spread Class” and “Time to Expiry” in glossary<br>• In section 2.1 “TRADING INSTRUMENT & EXPIRY MANAGEMENT”: reference to “merger of expiries” were replaced with “merger of contracts with shorter maturities”; clarified text about "merger of Contracts with shorter maturities”<br>• In section 3.2.1 “Trading Phases Characteristics”: added clarification that a pattern are assigned on the level of Contract and the supported exchange market mechanisms (i.e. COB, Wholesales, RFC); removed topic of Trading At Last (TAL) phase which was under consideration<br>• Added section 3.1.3 “Trading Interruptions”<br>• Chapter 4 “Trading on Optiq”:<br>  ○ In section 4.1 “Order Management Functionalities” – added clarifications on available and activated order types, validity types, and their use.<br>  ○ In section 4.3 “Price Discovery for Outrights without Implieds”<br>  ▪ All references to Executable Price Range changed to Tradable Price Range<br>  ▪ Clarified description of steps for IMP determination. Removed the different options in step 5 of IMP calculation associated selection of IMP around the Reference price, and replaced it with single choice of IMP as a mid-point of price range limits |

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| | ▪ Removed note that "No new orders may be entered into a Strategy book during Call phase, as such a Strategy cannot be crossed when Implieds are not enabled." and replaced with the clarified rules for reservation of strategies<br>▪ Added clarification on checks of potential trades and dynamic collars for strategies<br>▪ In section 4.5 "TRADING ON STRATEGIES WITHOUT IMPLIEDS" – adjusted reference to strategy trading to be Trading mechanisms.<br>o In sections 4.6.1 "Strategy and Component Implieds" & 4.6.2 "SIM & EDIM Implied Matching Models" – add a clarification that Implieds won't be generated if implied prices are outside of Collars, and Implieds can't be traded if they are outside of Collars<br>o In section 4.7.2 "Price Discovery with EDIM" removed box "ABOUT UNCROSSING STRATEGIES AND THEIR LEGS IN EDIM"<br>o In section 4.8.2 "Price Discovery with SIM" removed box "ABOUT UNCROSSING STRATEGIES AND THEIR LEGS IN SIM"<br>o Post section 4.8 in Summary: "IMPLIED MECHANISMS (EDIM & SIM)" – content re-arranged and clarified<br>o In section 4.9 "Optiq Tick Table Mechanism" added clarification that a tick tables are assigned on the level of Contract and the supported exchange market mechanisms (i.e. COB, Wholesales, RFC)<br>o Added section 4.10 "Processing of Data for Products in Optiq" covering granularity of processing in public (MDG) and private (OEG) feeds.<br>• Chapter 5 "Trading Safeguards": Content has been redistributed between sections, and simplified in structure for readability purposes. Reference to APF table were renamed to Reference Spread table.<br>o In section 5.1 "DEFINITIONS AND MAIN PRINCIPLES" added clarification on use of collars, and prices being checked against only one collar that is relevant to the side of the order<br>o Section 5.2 renamed to "DYNAMIC COLLARS REFERENCE PRICE ORIGIN" and adjusted with adjustment of naming convention and clarification of rules.<br>o Content of section 5.4 "DETERMINING THE SPREADS: AUTHORIZED PRICE FLUCTUATION (APF)" is redistributed into the other sections within this chapter<br>o In Section 5.3<br>▪ Fields for Dynamic Collar Logic in standing data are renamed to *Reference Price Origin in Opening Call* and *Reference Price Origin in Continuous*<br>▪ Reference Spread (APF) table adjusted to provide the updated layout / fields of the APF table, formulas and rules for determining which spread to use are simplified<br>▪ Added field "Units of Spread" to indicate if table for Spread is provided in percent of tick<br>o Section "STEP FOR DYNAMIC COLLAR DETERMINATION" changed from 5.5 to 5.4; with following content updates:<br>▪ Rules for calculating Collars are simplified<br>▪ In section 5.4 "Step for Dynamic Collar Determination" – removed step 5 "Apply rounding rules" in explanation and example<br>▪ Added Dynamic Collar price rule / logic used during Trade Interruptions<br>▪ The rule for rounding of dynamic collars adjusted to be: "the lower limits rounded to the tick above, and higher limit to the next identified tick below." This aligns the implementation of collar rounding across Optiq segments.<br>▪ Examples for Options and Futures are combined, as single method is now used following simplification. Example updated to reflect simplification in rules.<br>o Section "DYNAMIC COLLARS FOR STRATEGIES" changed from 5.6 to 5.5; with content modified with further simplification of rules.<br>• Section 6.1 "TRADE PRICE VALIDATION (TPV)"<br>o Added a note on check of prices against only one side of collars, and added the graphical example of TPV event & replaced reference to Request for Quote (RFQ) with one for Request for Price (RFP)<br>o Mechanism clarified and rationalized to work in the same manner at Uncrossing and Continuous<br>o Section 6.1.1 renamed to "Triggering of Trade Price Validation"<br>o Dedicated section 6.1.2 "Trade Price Validation in Continuous phase" is removed and contains content of TPV for Strategies, formerly section 6.1.3.<br>• Section 6.2 "FUTURE SPIKE PROTECTION (FSP)" - added clarification on Collars widening at start of FSP Freeze period, and being set to Normal at the end of the FSP Freeze period, in text and example<br>• Section 7.1 "WHOLESALE FACILITIES" - Major rewrite of the section to provide the modified and detailed view of processing of the Optiq Wholesales facility, including submission being done via single or multiple messages, various validation rules. Added clarification on length of 15 minutes for completion of a wholesale transaction. Added examples and important notes. |

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| | • Section 7.2 "REQUEST FOR CROSS (RFC)" – format and naming conventions adjusted, content rephrased for readability purposes. No changes in rules or technical implementation brought by this adjustment.<br>• Section 8 "MARKET MAKING" and its subsections with large number of modifications:<br>  ○ Additional details, terms and other clarification added of Market Maker categories and schemes. Existing content and sections are re-arranged for ease of readability and better organization of data. Added information on MM Sign-on.<br>  ○ Most reference to Market Maker Orders and MMO replaced to be Double Sided Quotes and DSQ respectively<br>  ○ Section 8.1 introduced providing detailed views of the Optiq Spread Obligation Framework<br>  ○ Section 8.2.1 name adjusted to "Validation of Double Sided Quotes"; content updated with corrections and clarification, text corrected to indicate that both Quotes and Order messages may be submitted by market makers through the same logical accesses setup to submit quotes<br>  ○ Section 8.2.2 name adjusted to "Processing of Quotes"; notes updated with the defined max number of possible repeating groups in a single Quotes message; Added clarification on use of quotes and orders for Market makers<br>  ○ In section 8.3 "MARKET MAKER PROTECTION (MMP)"<br>  ▪ Removed reference to setup on Firm ID only level, and "Protection period" (or sliding window) as it will not be supported. Added clarification on MM session sign-in and sign-out holding the position data.<br>  ▪ In section 8.3.1 "Configuring Market Maker Protection"<br>  - Configuration at Firm ID level removed, as only Firm ID + Shortcut combination level will be used,<br>  - Removed "Protection period" as it will not be supported,<br>  - From the list of available in Limit Breach Actions: "Warning" and "Warning and Pull" are removed<br>  ▪ In section 8.3.3 "Processing Market Maker Protection" removed reference for Firm Id only level of MMP, and removed possibility of setting MMP to "Warning" in case the threshold is breached. Removed all references to Protection period and sliding calculations associated to it.<br>  ▪ In Summary of "Market Making" – reference to MMP "may" be done on short code level to replicate ITM-level protection are adjusted in line with updates above<br>• Section 10.1 "MARKET SEGMENTATION" – removed mention of "Equity Total Return Futures" under Equity Derivatives segment<br>• Section 11.2 "ITM REMOVAL" – added a note on maintaining unicity of Client Order ID, and move of Market Maker management from ITM to Member code levels<br>• In Section 11.3 "MARKET MARKER PROTECTION SERVICE IMPROVEMENT" - management of MMP setup based on a protection period (sliding time window) basis removed; adjusted reference to granularity by Member Firm ID adjusted to include the Shortcode<br>• Section 11.4 renamed to "Contracts with Short terms Maturities"; Text clarified to explain that expiries themselves are not merged, but contract under which the existing maturities are managed will be merged. Added notes on contracts standing data and use of strategies.<br>• Section 12 updated with:<br>  ○ Automated Market Reference (AMR) – text clarified on merger of contracts with shorter maturities<br>  ○ Added "Stock order routing" to the list of decommissioned services |
| 1.0 | Initial version for migration of Euronext Derivatives markets to Optiq |

## DOCUMENT HISTORY

| DOCUMENT VERSION | DATE | CHANGE DESCRIPTION |
|---|---|---|
| 5.0 | 7 July 2021 | Introduction of COB interaction with Request For Cross Functionality |
| 4.0 | 14 April 2020 | Final clarifications for the document following go-live of Optiq |
| 3.1 | 2 December 2019 | Clarification for the document following go-live of Optiq |

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| 3.0 | 6 September 2019 | Update of the document with clarifications and adjustments for additional scope delivered in Optiq |
| 2.0 | 28 February 2019 | First update of the document with adjustments & clarifications |
| 1.0 | 16 October 2018 | Initial version for migration of Euronext Derivatives markets to Optiq |