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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, with a focus on key principles, examples where possible, as well as advantages and benefits.

Moreover, at the end of the document, technical and architectural topics are also covered for the sake of completeness.

1.2 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:

- Euronext Derivatives Markets - Optiq Kinematics Specifications
- Euronext Markets – Optiq OEG Connectivity Specifications
- Euronext Markets – Optiq File – Interface Specifications
- Euronext Markets – Optiq MDG Messages – Interface Specifications
- Euronext Markets – Optiq OEG SBE Messages - Interface Specifications
- Euronext Markets – Optiq OEG FIX Messages – Interface Specifications.
- Euronext Markets – Self Trade Prevention Functional Overview.
- Euronext RiskGuard – How the service works

Euronext publishes all the Technical Specification on the IT Documentation page of the Connect customer webportal.

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

For the latest version of documentation please visit:

euronext.com/regulation/euronext-regulated-markets.

1.3 DOCUMENT HISTORY

The following lists only the most recent modification made to this revision/version. For the Document History table, see the Appendix.

VERSION NO.	DATE	CHANGE DESCRIPTION
5.8.2	16 November 2026	• In section 4.11 "Passive Liquidity Protection (PLP)" removed reference to "pending regulatory approval" for PLP.

1.4 GLOSSARY

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

- **Actual Quality Spread (AQS):** expressed as a decimalised multiple of the MQS, this spread is the operational reference in terms of liquidity, which considers market conditions. When determining the DCRP, the AQS is used to identify which price type to use if the contract is set up 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 a summary of volume of submitted explicit orders at a price level.
- **Implied Aggregate:** contains a summary of volume at a price level generated by the Matching Engine based on SIM and EDIM models through Implieds.
- **Blue Month:** mostly used for Futures and depicts the most active expiry available for trading based upon volume and open interest which is determined by the Exchange officials. The BlueMonth Reference Price is used to calculate the Reference Price of other futures expiries if the contract is configured with Future Market Price
- **Book:** for an Exchange, the Book represents a list of orders on an instrument waiting for counterparts.
- **Cascading**: A specific feature of power derivatives consists of a cascading mechanism applied to contracts' expiries, in accordance with contract's specifications. Contracts with yearly and quarterly maturities are subject to cascading whereas contracts with monthly, weekly and daily maturities are not subject to cascading.
- **Collar:** safeguard mechanism, i.e. a limit, constraining the instantaneous order price fluctuation, to protect the market from aberrant order prices and 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 strategy legs' order books.
- **Contract Symbol Index:** a unique system-wide identifier for the derivative contract. This identifier is a combination of five digits and five zeros, which are later populated in the (instrument) symbol index. It is defined by the combination of the following contract characteristics: Underlying, Product type, MIC, Currency, Settlement type and Exercise style.
- **Delivery Period:** The **delivery period** for a futures contract refers to the time frame during which the (physical delivery) or financial settlement of the underlying contract is expected to occur.
- **Double Sided Quote (DSQ):** represents submission of price and volume for the two sides for an Outright. Technical submission is done via quote messages.
- **Dynamic Collar Logic:** 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):** price used as base for Dynamic Collar calculation of a derivatives instrument. Determined based on the rules in the Dynamic Collar Logic set-up for the contract.

- **Euronext Operational Client Support team (OCS):** Exchange team responsible for management of the Exchange's External User Acceptance (EUA) test environments, providing technical and functional assistance to clients for testing in these test environments. Euronext currently offers two separate EUA test environments: i) Current EUA mirroring the production environment, and ii) Next EUA for future developments.
- **Euronext Market Services (EMS):** Exchange team responsible for surveillance and operations of the markets in Production, ensuring fair and orderly markets in real time as well as providing functional assistance to clients in the Production environment.
- **Euronext Membership and Customer Connectivity (MCC):** Exchange team responsible for the creation and modification of clients' membership on Euronext markets, as well as set-up and management of clients' connectivity to private Order Entry gateways.
- **Event Driven Implied Model (EDIM):** an implied matching model under which strategy Implieds are calculated in the case of submission of i) an order that improves BBO price, or ii) an RFIE messages.
- **Exchange Defined Strategy (EDS):** real-time strategy created by the trader via a dedicated message during the trading day based on the list of standard pre-defined strategies as well as delta-neutral strategies supported by Optiq®.
- **Exchange Market Mechanism (EMM):** represents the different trading facilities available within the Optiq® platform. On Optiq® Derivatives, one Symbol Index (ISIN/MIC/Currency) may have several order books (i.e. COB, Wholesale, RFC), each one identified by a dedicated Exchange Market Mechanism. The EMM represents an order book for a Symbol Index. It is specified in the order entry message in addition to the Symbol Index to route the message to the right order book.
- **Expiration Date:** indicates the specific day of expiry of the contract (year, month and day). After this date, the product is no longer available in Optiq®. For monthly, weekly and daily Power Derivatives the exchange determines an EDSP on the Expiration Date by using the average of the applicable Spot Prices published in the Delivery period by the issuer (Nord Pool) of the relevant Contract Underlying
- **Explicit:** order or quote that has been explicitly entered in the order book by a market participant (and different from an Implied).
- **Fair Value:** a neutral and balanced estimate of the market price of an instrument that considers a pre-defined set of actual and intangible factors.
- **Firm:** 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. Usually, this term refers to futures; however, for the purposes of the calculations explained in this document, the same term and definition can be applied to options too. For power derivatives the Front month is defined as the nearest month that is currently not in the Delivery Period. **Future Limit Interruption Protection (FLIP):** trading safeguard mechanism set up by Euronext Derivatives markets to provide protection to the Futures markets from extreme price movements within a short timeframe (e.g. in the case of a flash crash), triggering a reservation of the impacted instrument.
- **Future Spike Protection (FSP):** trading safeguard mechanism set up by Euronext Derivatives markets to provide protection to the futures markets from extreme price movements within a short timeframe (e.g. in the 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 the MDG and facilitates price discovery.
- **Inter-Contract-Strategy (ICS):** a contract that only contains strategy instruments, with the legs of the strategies belonging to different contracts.
- **Last Trading Date:** the date indicating the specific day until which the contract is available for trading. Can be different from the expiration date.
- Load: that apply to power derivatives covering all hours of the Delivery period according to the Product Specification. **Logical Access:** an OEG (Order Entry Gateway) entry point, set up 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 network 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 (MM) and Liquidity Providers (LP) 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]. Protection types and limit breach actions are set by MMs / LPs.
- **Market Quality Spread (MQS):** reference spread value identifying the Exchange standard for liquidity for individual books. It is independent of market conditions. Using the MQS, clients can 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 sharing common trading properties. An Optiq® Segment can contain one or several asset classes and can be accessed through a Logical Access.
- **Optiq®:** Euronext's multi-market full trading chain technology platform.
- **Order Entry Gateway (OEG):** software that manages the access for Trading Members and acts as the private interface between clients and Optiq® Matching Engine.
- **Order Entry Model (OEM):** available through Standing Data files, it defines which orders and/or quotes can be inserted for each contract at Exchange Market Mechanism (EMM) level.
- **Outright:** represents a unitary component of a contract identified by a Symbol Index and with its own order book. For futures contracts, it identifies an expiry, while for options it represents a put or a call on the underlying product, at a given strike price and with a given expiry.
- **Partition:** technical subdivision of an Optiq® Segment. An Optiq® Segment may be made up of one or several partitions, one physically independent from 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 as First-In First-Out (FIFO), to prioritise 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 technical message provided by Optiq® to MMs, enabling bulk submission of two-sided orders in a single message. Each individual quote 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).
- **Reference Spread:** defines the maximum spread around the DCRP allowed for Market Maker quotes. This spread is also used for the Dynamic Collar determination, where the Collar multiplier is applied on the Reference Spread.
- **Request for Cross (RFC):** trading facility used by a participant to submit a committed cross trade to an open auction for possible price improvement.
- **Request for Implied Execution (RFIE):** facility that allows clients to send a private message to trigger recalculation of Implieds and possible matching in a strategy order book related to a contract where EDIM is set up, if the member submitting the RFIE has an active order in the strategy order book.
- **Request for Quote (RFQ):** a private message mechanism giving the market and MM 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 the case of the instrument's reservation.
- **Self-Trade Prevention (STP):** mechanism allowing clients to avoid unintentional self-trading (e.g. matching of two opposite orders or quotes on the same instrument of the same Member Firm). It is available to clients performing specific types of activities (e.g. MM) depending on the rules defined at Optiq® Segment level.
- **Spontaneous Implied Model (SIM):** an implied matching model under which strategy and component Implieds are continuously calculated and available for matching on a permanent basis.
- **Spread Class:** structure that defines the set-up of Time to Expiry (TTE) and spread values of MM obligations for each individual contract. For a given TTE, 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. MM schemes (MMSs) and MM agreements (MMAs) 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:** 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 contracts and trading instruments available on Euronext markets. The data is provided via files and messages.
  - Standing data files contain referential data characteristics of the contracts, underlyings and trading instruments and strategies that may be required or provided as value-added information. These files are provided daily and can be obtained from a separate HTTPS and SFTP 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:** contingent order in a strategy order book derived from the combination of existing orders in individual order book legs of the strategy (individual legs being Outrights). For a given 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 all trades on all strategy legs to be executed simultaneously at the same time under the exact same market conditions.
- **Symbol Index:** unique system-wide identifier (in private and public messages) assigned to a trading instrument in Optiq®. Note that an instrument represents either a single tradeable instrument, an index or a strategy. It is defined by the combination of the following instrument characteristics: ISIN, MIC, Currency and, when required, the MIC of the Market of Reference. The Symbol Index does 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). Instruments belonging to the same contract will share the first five digits, while the second five digits identify the unique instrument (Outright or strategy).
- **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 number of months.
- **Total Return Future (TRF):** listed contract that replicates the economics of a total return swap within the infrastructure of a centralised 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):** trading safeguard mechanism for trade validation at execution, to ensure that all earlier entered orders participating in a trade are within the price limits, thus reducing the risk of aberrant trades.
- **Trading At Index Close (TAIC):** mechanism 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 index closing levels.
- **Trading At Market (TAM):** mechanism 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 the wholesale facility and done in index points.
- **Trading Cycle Pattern:** sequence in which a defined set of trading phases are triggered throughout the trading day for a given Contract/EMM. Each trading phase in a pattern is assigned a specific time of triggering.
- **Trading Phase:** time period within the trading day 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 Implieds are set up to be calculated and, if so, which Implied mechanism is to be used. These sequences are defined in the applicable sections later in this document.

2. REFERENTIAL MANAGEMENT

Referential data provides the characteristics of all tradeable instruments and their underlyings, as well as other information required for trading, including trading schedule and 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 AND EXPIRY MANAGEMENT

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

The primary key to identify a contract and an individual tradable instrument is the Symbol Index.

In addition to the Symbol Index, the Derivatives Instrument Trading Code (formerly AMR) is provided in the standing data and can be used to map the instrument Symbol Index used for trading to the Derivatives Instrument Trading Code, although all information in the AMR can be retrieved in individual fields. *More details on modifications of this code are provided later in this document, but clients are advised to use the individual fields in standing data for retrieval of information instead of decoding the Derivatives Instrument Trading Code.*

Within Optiq®, derivatives instruments 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. *More details on this field in standing data are provided in Optiq MDG Messages – Interface Specification and Optiq File – Interface Specification documents.*

The identifier of a contract will be kept and used for all expiries.

2.1.1 Daily, Monthly and Weekly Expiries

Three level of expiry may be configured by the Exchange on each given contract:

- **Monthly expiries** are defined through the year for calendar months. Their expiry date is usually set as the third Friday of the month (with calendar exceptions 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 to the start of a new calendar month for up to the next five (5) calendar weeks.
- **Daily expiries** allow creation of instruments for clients to hold a daily position.

Different expiries will be managed in a single contract as much as possible, with a unique Product code and Contract Symbol Index, but weekly and daily expiries will be managed separately in their own individual contracts.

2.1.2 Power Derivatives Expiries

On the Power Derivatives products the Exchange will configure the following expiries, that are defined by their delivery period:

- **Yearly expiries** are defined by the year in which the underlying is in delivery, the Start Delivery Period and End Delivery Period considers the full year for this product.
- **Quarterly expiries** are defined by a specific quarter within a year in which the underlying is in delivery, the Start Delivery Period and End Delivery Period considers the entire quarter for this product
- **Monthly expiries** are defined by a specific month within a year in which the underlying is in delivery, the Start Delivery Period and End Delivery Period will be the start and end of the month for this product
- **Weekly expiries** are defined by a specific week within a year in which the underlying is in delivery, the Start Delivery Period and End Delivery Period will be an entire week for this product
- **Daily expiries** are defined by a specific day in which the underlying is in delivery, the Delivery Period is one single day.

All the above mentioned expiries will be managed in different contracts, however as cascading is applicable on Power Derivatives products, it should be noted that positions from Yearly expiries will be cascaded into the Quarterly expiries of that respective year and subsequently positions from Quarterly expiries will cascade into the respective Monthly expiries on the cascading day. The cascading mechanism will be applied on the CCP level.

2.1.3 Trading Characteristics

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

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

2.1.4 Lot Multiplier

Field available in standing data file and MDG to define the contract multiplier (including decimals, where needed) and used to calculate the contract size and other contract-based metrics (e.g. Delta and /or Volume Protection in MMP). For power derivatives the lot multiplier will be the number of Megawatt hours within each series of the contract as defined in the contract specification and might differ from one expiry to the other within the same contract.

2.1.5 Corporate Action Counter

Numeric field (e.g. 0, 1, 2, etc.) available in the standing data file to identify the number of corporate action adjustments each instrument has been subjected to during its lifetime[1].

For a detailed description of referential data files and messages, clients should refer to the Optiq File – Interface Specifications and Optiq MDG Messages – Interface Specifications documents.

[1] Clients should note that this field will be initialised at zero (0) for Euronext Legacy contracts, irrespective of past corporate action adjustments.

3. TRADING PHASES AND PATTERNS

3.1 MAIN TRADING PHASES

Throughout the trading session, the Matching Engine uses a pre-defined schedule to trigger the use of trading rules and mechanisms. Rules and mechanisms are referred to as the trading phases while the schedule is referred to as the trading pattern. This chapter explains the trading phases, patterns and some of the associated rules that are enforced by Optiq®.

3.1.1 Price Discovery Mechanism

There are two trading phases: 1) Call, followed by 2) Uncrossing. These two phases are applicable only for the Central Order Book (COB) Exchange Market Mechanism (EMM) and must exist in combination with each other. For every call phase, there must be an uncrossing following it.

- Call phase: orders and quotes accumulation period, during which the system records all orders and quotes entered but matching does not occur. The same applies when the instrument is in the Reservation or Suspension state with order entry enabled.
- Uncrossing phase: a (very short) scheduled period during which the system attempts to match orders and quotes present in the order book, based on the uncrossing auction price algorithm.

The **Uncrossing Sequence** is defined in Optiq® and used depending on the parametrisation of the derivatives contract (depending for instance if Implied is activated in the contract). Parameters allowing to determine the rules applied are provided in the Contract Standing Data. The different rules are explained in the "Trading on Optiq®" section of this document.

During the Uncrossing phase, no order or quote may be modified, cancelled or entered, and its end can be randomised (random uncrossing). At the end of this phase, matched orders and quotes are disseminated as trades to clients in private messages and as public messages via market data.

3.1.2 Continuous Trading Mechanism

This covers the phases managed during continuous trading.

- Continuous phase: trading phase during which orders and quotes are submitted and matched continuously.

Different Matching Algorithms are defined for trading on Optiq® and applied depending on the set-up indicated in the contract specifications. Matching algorithm rules are explained in the "Trading on Optiq®" section of this document.

3.1.3 Trading Interruptions

In Optiq®, in the case of interruption of trading, instruments may be in one of three book states: Reservation, Suspension and Halt. For all trading interruptions, and for their resumption, a market status change message is sent to inform the market about the status of contracts and instruments, including the setting of order entry.

- Reservation: an automated temporary interruption of trading (matching) of an instrument triggered by potential matching outside of prevailing prices. For strategies, the Reservation state may be triggered by a reservation on one of the constituent legs, or by the Leg pricing algorithm (see section "Leg pricing algorithm"). Reservation

applies only to the instruments in the COB. In the case of Reservation all resting orders remain in the book, except for the case where Trade Price Validation (TPV) is triggered, and the result of the iterative process is the cancellation of the breaching order.

- 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/instrument listing
  - On request of regulator or issuer
  - To ensure fair and orderly trading

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

  The Suspension may apply to COB, Derivatives On-Exchange Off-Book, and Wholesale facilities. The market data message sent for the change in status identifies the Exchange Market Mechanism (EMM) to which it applies. In the case of Suspension, all orders remain in the book, and order entry may or may not be allowed, depending on the reason.
- Halt: an interruption of trading (matching) of a contract due to a technical issue which takes priority over any other contract state or trading phase. The Halt applies exactly at the same moment to both COB, Wholesale and RFC facilities. In case of a Halt, all orders remain in the book, and order entry is not allowed.

3.2 OPTIQ® TRADING PATTERNS: PREDEFINED SEQUENCE OF TRADING PHASES

A trading phase defines the order entry and matching rules applied by Optiq®. Each trading phase in a pattern is defined by its starting time, its type and several associated phase qualifiers and characteristics. As such, the pattern provides the standard timetable for trading. A trading pattern is set at contract level and relates to the Exchange Market Mechanisms supported (i.e. COB, Wholesales, Derivatives On-Exchange Off-Book), 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 triggers the use of the associated rules and mechanisms. Each pattern provides clients with a configuration applicable for the trading day.

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

Except for Reservation cases (see 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. It is worth noting that this set-up is because all strategies in Optiq® are defined within a contract (inter-contract strategies are currently not supported by Optiq®). Strategies are placed in the most restrictive instrument state and set with the most restrictive order entry qualifier of any of the strategy's component legs.

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

	LEG STATE SEVERITY <= Lower Higher =>				
Instrument/ Contract State	Continuous	Call	Reserved	Suspended	Halted
Order Entry Qualifier	Yes			Cancel Only[2]	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: 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 resulting in matching
- Continuous: market open, orders accepted, automatic continuous matching.

Scheduled Event: Expiry Management

- Timetables are linked to derivatives contracts. The Expiry time 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.
- Typically, a pre-expiry message informing Clients of the impending Expiry is also sent out via real-time market data message, a few minutes before the Expiry event.
- For specific products when the Last Trading Date is a day before the Expiry Date, an "End of Trading" message will be communicated to the market on the Last Trading Date.

Scheduled Event: 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 the case that a specific widening is applied.

Phase Qualifier: Random Uncrossing

[2] When suspension is due to a reservation on a Euronext Underlying, the Order Entry Qualifier remains in state "Yes".

- The random uncrossing qualifier signifies that the phase in question has the random uncrossing mechanism enabled. What this means depends on the phase in which it is active, which could be either during the uncrossing or continuous phases:
  - Uncrossing: the contract and its linked instruments will transition to continuous trading at the scheduled time plus a random period of between zero (0) and thirty (30) seconds.
  - Continuous: for every interruption at instrument or contract level (reservation, suspension or halt), upon resumption of trading, if Market Surveillance schedules a reopening time, a random period between zero and thirty seconds will be added to this scheduled time.

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 can 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 be also applied for strategies, to enable same level of consistency and predictability
- Offer flexibility to react to intraday events with clear and consistent process
- Provide a harmonised approach for applying trading pattern and timetable mechanism across markets running Optiq®.

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 on Derivatives market conditions. The changes are indicated to the market through dedicated Market Data messages.

4. TRADING ON OPTIQ®

To provide the full overview of how to trade on Optiq®, the definitions below are provided as an introduction.

4.1 ORDER MANAGEMENT FUNCTIONALITIES

Optiq® supports the following basic functionalities for derivatives segments, all of which are defined in the Order Entry Model (*see section 4.1.3*):

- Order Types: Limit, Market, Stop-Limit and Stop-market
- Validity Types: Day, GTC, GTD, IOC, FOK
- Volume Qualifiers: Minimum Quantity
- Account Types: House, Client, Market Maker, RO[3].

Combinations of order and validity types available for derivatives markets are as follows:

	Order Types			Validity Types				
Phase	**Market**	**Limit**	**Stop-Limit & Stop-Market**	**Day**	**GTD[4]**	**GTC[5]**	**IOC**	**FOK**
Call	n/a	**X**	**X**[6]	**X**	**X**	**X**	n/a	n/a
Continuous	**X**	**X**	**X**[7]	**X**	**X**	**X**	**X**	**X**

4.1.1 Market orders

On derivatives markets, market orders are not available during the call phase and do not rest in the order book, therefore they must be submitted with an IOC validity and any unexecuted quantity from a partial execution is automatically cancelled by the system.

4.1.2 Stop Orders

A stop order is an inactive order which is inserted into the COB upon meeting a specific price condition (i.e. trigger price). There are two types of stop orders available in Optiq® for derivatives markets:

- **Stop market order**: only the trigger price must be specified at order entry. Once triggered, it becomes a market order and matches against the best price(s) available on the opposite side of COB until the quantity is exhausted. Any unexecuted quantity is automatically cancelled by the system.
- **Stop limit order**: at order entry, both the order price (or limit price) and trigger price must be specified. Once triggered, a limit order is generated and enters the COB at the

[3] Available for Euronext Derivatives Milan only.

[4] Maximum duration equal to 364 days and, if not cancelled before that date by the member, automatically cancelled by the system.

[5] Maximum duration equal to 365 days and, if not cancelled before that date by the member, automatically cancelled by the system.

[6] Stop orders are available during the call phase and can be triggered by a validated call price, however they do not participate in the uncrossing phase. Only applicable for IDEM instruments as from 25 March 2024 (listed on MIC = XDMI).

[7] Stop orders are only applicable for IDEM instruments as from 25 March 2024 (listed on MIC = XDMI) and to Commodity Derivatives Paris Wheat, Corn and Rapeseed contracts as from May 11, 2026.

specified limit price, provided this limit price is consistent with the price collar defined by the Exchange for the related instrument.

Stop orders are triggered by the Last Traded Price (LTP) of the instruments (expiry or series) on which it was submitted.

Stop orders are not available for strategies and Total Return Futures (TRFs) and are not applicable for quotes.

Orders resulting from the triggering of a stop order (i.e. market or limit orders) behave in the same way as regular orders. Once triggered, resulting orders are routed through the COB with a time priority equal to the time they enter the COB, regardless of the stop order's priority.

Stop orders are managed in a separate order book, the Stop Order Book (SOB), and remain inactive until the trigger price condition is reached. In the SOB, they are sorted by trigger price and time priority to determine which stop order is to be processed first in the COB when multiple stop orders are triggered at the same event. The only trigger price condition is the last traded price on the same instrument the stop order is related to; however, the trigger price is not validated against Dynamic Collars at stop order entry.

It should be noted that trades originating from stop orders do not update the Dynamic Collar Reference Price (DCRP).

It is possible to specify two validities in the order entry message: i) for the un-triggered stop (Day, GTD or GTC), and ii) for the resulting order upon triggering (Day, GTD, GTC or IOC).

Stop orders can be submitted and modified during the Call and Continuous phases, whenever order entry is set to "yes" (including during the evening session, for index and commodity futures only). They must not be considered in the Indicative Matching Price (IMP) calculations and do not participate in the uncrossing process; however, any stops in the SOB can be triggered by a validated call price if triggering condition is met.

Book State	Stop Order Entry/Modification	Stop Order Cancellation	Trading allowed
Call	Yes	Yes	No
Continuous Trading	Yes	Yes	Yes
Uncrossing	No	No	Yes[8]
Reservation	Yes	Yes	No
Suspension	Yes[9]	Yes	No
Halt	No	No	No
Closed	No	Yes	No
Inaccessible	No	No	No

Stop Orders are validated against the following protection mechanisms once triggered:

- Trading Safeguard: Dynamic Collars (including Trade Price Validation), Future Spike Protection, Future Limit Interruption Protection and Static Collars.
- Euronext RiskGuard: i) Order Size Limit (OSL) will be checked at order entry and upon modification; ii) Maximum Exposure Protection (MEP) considers only triggered order; iii) if RiskGuard user performs "suspend action + purge" or "block", pending stop orders are cancelled too.

[8] Trading is allowed but stop orders do not participate in the uncrossing.

[9] In the case that the Order Entry is set to "Yes".

- Market Maker Protection (MMP): an order resulting from a stop order can trigger MMP; however, since stops orders cannot be submitted with Account Type "LP", MMP will not cancel them.
- Cancel on Disconnect: if a member does not want its stop orders to be cancelled after disconnection, COD flag must be disabled.
- Self-Trade Prevention (STP): when a triggered stop order enters the COB, any potential match versus an opposite side order that meets the STP criteria is subject to the configured STP rules.
- Mass Cancellation: if activated, this results in the cancellation of i) active orders not filled in the COB, ii) active orders partially filled in the COB, iii) untriggered orders in the SOB.

4.1.3 Order Entry Model

Similarly to on Cash Markets, each contract is assigned an order entry model from one of the options below, restricting the type of order that can be entered on the contract. This information is not disseminated via the contract standing data. Clients can find the applicable order entry model per product type in the Appendix A.2.

Order Entry Model	Limit Orders	Market Orders	Stop-Limit	Stop-Market	Quotes
Orders	X	X	X	X	n/a
Orders without Stops	X	X	n/a	n/a	n/a
Orders and Quotes	X	X	X	X	X
Orders without Stops and Quotes	X	X	n/a	n/a	X
Priced-only Orders	X	n/a	X	n/a	n/a
Priced-only Orders and Quotes	X	n/a	X	n/a	X

4.2 MARKET MECHANISMS AND POLICIES

4.2.1 Market Mechanisms

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

- Price discovery
- Continuous trading

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

- Call/Reservation phase is an order and quote accumulation period, during which the 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.
- 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 relating to Uncrossing:
  - Uncrossing phase: phase during which matching is attempted after a Call phase. During Uncrossing phase, Implieds can be generated and participate in the uncrossing as to maximise the matching quantity.
  - 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 Implieds 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.
  - Random uncrossing: the delay of the transition to continuous trading phase after an uncrossing, by a random period set between 0 and 30 seconds. This mechanism can be activated on contract level and is visible via the Trading Pattern.

Continuous trading is applied during the continuous phase. It follows the rules of the trading algorithms, logic and characteristics set up 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:

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

Each contract is assigned a single policy which 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 order 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 following 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' (outrights and strategies) individual order books of the contract. The resulting Indicative Matching Price (IMP) is calculated and disseminated upon any change in the order book that triggers recalculation, to inform clients of the value determined by the market for each instrument.

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
- a 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 maximised executable volume identified in the first step), then the Tradable Price range is the price, or set of prices, which minimise 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 minimises that imbalance.
- from the Tradable Price range, a unique IMP is then determined and disseminated as the mid-point of the limits of this Tradable Price range.

Transition to Uncrossing is what happens at the instant when the contract scheduled status switches to Uncrossing phase, or after the random period if Random Uncrossing is enabled on the Uncrossing Phase of the contract. 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. It consists of executions of book uncrossing on all order books belonging to the contract. Uncrossing at individual book level involves the following:

- the effective uncrossing price is first checked against the dynamic collars. In the case of breaches of trading safeguards (see section "Trade Price Validation"), the book is Reserved, and no trade is executed.
- if the 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.

4.4 CONTINUOUS TRADING FOR OUTRIGHTS WITHOUT IMPLIEDS

Continuous Trading processing applies to any instruments with a 'Scheduled' status 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 which is configured at contract level.

A Matching Policy is a means 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 and subsequent price levels.

4.4.1 Price Explicit Time (PET)

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 called 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 based on 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. If 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. The minimum pro-rata threshold applies only if the identified pro-rated quantity is between 0 and 1 lots. Any orders allocated quantity of 1 or more lots is rounded up, and the minimum pro-rata threshold does not apply.

The minimum pro-rata threshold is communicated in Euronext Standing data and today is:

- 0.2 for the Paris market;
- 0.5 for the Amsterdam market.

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).

It is worth noting that for those contracts with PRR as matching policy:

- "cancel resting" is the only STP type accepted (i.e., any attempt to submit an order with "cancel incoming" or "cancel both orders" will result in order message being rejected)
- STP mechanism is not available for FOK and Minimum Quantity orders, since "cancel resting" and "cancel both orders" are not allowed for FOK and Minimum quantity orders.

The Matching policies setup per Asset class and Market are indicated in the table below. For exact details on a contract level, clients should refer to the Annex 1 of the Trading procedures.

Asset Class by Market	Matching Policy
Amsterdam Equity & ETF Options (Standard, Mini, Weeklies)	Pro-Rata
Amsterdam Index Options, Futures, Power Derivatives	*Price/Time*
Brussels Equity Options	Pro-Rata
Brussels Futures & Index Options	*Price/Time*
Lisbon Equity Options	Pro-Rata
Lisbon Futures	*Price/Time*
Milan Equity and Index Options & Futures	*Price/Time*
Paris Equity Options	Pro-Rata
Paris Futures, Index Options, Commodities Futures & Options	*Price/Time*
Oslo Futures and Options	*Price/Time*

Example for PET

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

Tick = 1 / Collars = (96; 101)

Time	Qty	Bid Price	Offer Price	Qty	Time
T1	*100*	*99*	*99*	*140*	*T4*
T2	*100*	*99*			
T3	*200*	*99*			

An aggressing sell 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)

Constituents 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 (without Minimum threshold Triggered)

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

Tick = 1 / Collars = (96; 101)					
Time	Qty	Bid Price	Offer Price	Qty	Time
T1	100	99	99	140	T4
T2	100	99			
T3	200	99			

Also assuming that minimum pro-rata threshold is 0.2, however it is not triggered in this example.

An aggressing sell 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 is allocated to T3
  - T3 is partially executed for 70 lots
- 25% of the volume of the incoming order is allocated to T1
  - T1 is partially executed for 35 lots
- 25% of the volume of the incoming order is allocated to T2
  - T2 is partially executed for 35 lots

Example for PPR (with Minimum threshold Triggered in calculations)

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

Tick = 1 / Collars = (3; 7)					
Time	Qty	Bid Price	Offer Price	Qty	Time
			5	12	T1
			5	5	T2
			5	1	T3
			5	1	T4
			5	1	T5

Pro-rata minimum threshold is set to 0.9 for this example.

An aggressing sell order is entered at 5 for 17 lots.

The total volume of the incoming order is less than or equal to the cumulative remaining volume of selected orders (17≤20):

- The incoming order is fully executed for its total volume
- The Offer side has only one aggregate of order of 20 lots at 5

Matching of Aggregates

The sole aggregate on the Offer side cannot be fully matched

Matching of Individual Orders (via PPR)

Constituent T1, T2, T3, T4, T5 are sorted in proportion to their resting volume

- T1 represents 60% of the aggregate volume
- T2 represents 25% of the aggregate volume
- T3 represents 5% of the aggregate volume
- T4 represents 5% of the aggregate volume
- T5 represents 5% of the aggregate volume

The list is never re-sorted again.

Minimum threshold and rounding is applied to the quantity of T1, T2, T3, T4, T5. Allocation is done in the order of % of volume, and incoming volume allocation is distributed among these orders in proportion to their resting volume.

- T1: 17 x 12/20 – results in 10.2. Result is rounded to 11
- T1: 17 x 5/20 – results in 4.25. Result is rounded to 5
- T3: 17 x 1/20 – results in 0.85. Result is rounded to 0 as it is less than 0.9 ('Pro Rata Threshold' value)
- T4: 17 x 1/20 – results in 0.85. Result is rounded to 0 as it is less than 0.9
- T5: 17 x 1/20 – results in 0.85. Result is rounded to 0 as it is less than 0.9

The remaining quantity (17 – 11 – 5 = 1) is then re-assigned and give to T1 as first order of highest resting volume.

Total assigned quantities are:

- T1: 12 (11 + 1)
- T2: 5
- T3: 0
- T4: 0
- T5: 0

4.5 TRADING ON STRATEGIES WITHOUT IMPLIEDS

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

- Outright: unitary component of a contract. For futures contracts, an Outright is an expiry, while for options it 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: structured product built over a linear combination of Outrights. A strategy is defined by its formula, which indicates its structure:
  - identification of each component's Outrights by its Symbol Index, referred to as the strategy legs
    - a leg ratio (a multiplier which is necessarily a positive integer) for each Outright leg
    - a side for each leg
    - a side for the whole strategy

Note: Within Optiq® it is possible to have Strategies within the same Contract, so each outright leg belonging to the same Contracts, but also Strategies where the outright legs originate from different contracts, the so-called Inter-Contracts-Strategies (ICS). Please note that if not defined otherwise the kinematics for ICS follows the same logic as for Standard Strategies.

Example: a Calendar Spread on a futures contract is a strategy defined as a product allowing to buy the "near expiry" (Leg 1 identified by Symbol Index 1 and ratio = 1) and sell simultaneously the following "back expiry" (Leg 2 identified by Symbol Index 2 and ratio = 1).

The strategy formula is: [Leg1 (Symbol Index 1;B;1) ; Leg2 (Symbol Index 2;S;1)].

Example

A Calendar Spread on a Futures 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-recognised strategies and their related structure, please refer to "Annex Two – Recognised Strategies" of the Euronext Derivatives Markets Trading Procedures.

A strategy has its own order book and is defined by its unique Symbol Index, like an Outright instrument. Trading a strategy allows to simultaneously trade all legs at the same time under the exact same market conditions. Trading mechanisms of strategies (including ICS) without Implieds uses the same principles as those defined for the Outrights.

Market Mechanisms:

- Price Discovery: applicable in the same way 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 Outrights and are applied at the contract level[10].

[10] The Dynamic Collars applied to strategies are covered in a dedicated section.

Matching Policies:

- Strategies follow the same matching policies that are set on the associated contract. Unless it is individually reserved, any strategy inherits the most restrictive state of its legs, with the following logic from the most to the least restrictive: i) Halted, ii) Suspended, iii) Reserved, iv) Call, v) Continuous (see 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 a dedicated private message. Types of strategy available are provided at contract level in the Standing Data. Each strategy type is referred to by a dedicated strategy 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 which 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 the system.

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

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

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

An 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 is still present in this strategy book for the following trading day.

When submitting a complex transaction using a strategy (e.g. LIS strategy for wholesale), the provided list of Symbol Indexes must match the strategy structure exactly, in symbol indexes and their orders, to the strategy indicated by the strategy code submitted. Optiq® uses the same rules for such validation as those used 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, it is not deleted from the Optiq® system. In case a trader wants to trade a previously de-activated EDS again in the future, then upon the new creation request, the Matching Engine will return the same EDS Symbol Index as the one originally used.

GTC / GTD orders cannot be entered in delta-neutral / volatility trades.

Every morning at the start of the trading session, Optiq® automatically generates a maximum of nine (9) strategies for Futures only, based on the configuration set at Contract level.

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 entering a strategy ABC order book with a best buy limit of €10 (resting price) 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 buy side, $n_i < 0$ if on the sell side.

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

- determination of authorised Leg Price ranges
- assignment of Initial Leg Price
- calculation of the strategy price
- adjustment of Leg Prices to match the trade price.

The pricing algorithm is processed twice. The first pass tries to keep leg prices within the BBO; if this is not possible, a second attempt is run extending the leg price authorised 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 authorised price ranges, the incoming orders that triggered the trade cause Reservation of the Strategy instrument and follow the procedure for TPV.

4.6 IMPLIED MECHANISMS

Optiq® is built to provide clients with 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 on the same transaction as a single product, without having to ensure that a single counterpart is present for all legs to ensure the transaction.

Outright trading consists 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 counterparts) or vice versa.

4.6.1 Strategy and Component Implied prices

The transfer of liquidity between various order books is made possible by Optiq® using Implied prices in strategy and outright order books:

- 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 is generated per side (buy/sell).
- 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.

It is worth noting that 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 also takes as time priority the newest timestamp of its constituent.

In a nutshell, an Implied has two properties on which trading relies:

- 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.
- The creation time of the related strategy.

4.6.2 SIM and EDIM Implied Matching Models

Dynamic behaviour of 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),
- No Implied.

At contract level, the standing data will indicate if Implied prices are active for the instruments belonging to that contract, including strategies. If Implied prices are deactivated, both Strategy Implieds and Component Implieds will not be generated.

These market mechanisms govern how Implied prices are:

- Generated
- Included in 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.

Therefore, three uncrossing sequences are defined:

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

It is worth noting that:

- Explicit order prices that are outside the dynamic collars are not used to generate Implied prices.
- Each Implied price is checked against the dynamic collars of the related instrument and will not be generated if outside it.

4.6.3 Implied Trading Policy

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

- Matching first occurs at the aggregated price level, then

- For each aggregate at individual constituent level.

An individual outright instrument may be a leg of several strategies, and a Component Implied price may be generated for such an instrument using any or all of the strategies for which it is a leg. Consequently, when implied volume is to be generated in an individual Outright instrument, there may be multiple ways available to do this, which result in equally good prices.

Each possible way of generating an implied price is termed a **Route**. Implied trading is implemented in Optiq® using one Implied Order Aggregate per route available (through a single strategy). This technique generates Implied Order Aggregates rather than individual Implied Orders.

An Implied Aggregate represents a grouping of all the volume available in a book at a single price level generated by the Matching Engine through Implieds (based on the SIM or EDIM models). One Implied Aggregate may be generated per route and so at the same price level, several Implied Aggregates may co-exist alongside explicit orders.

- 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.

- Allocation at Aggregate level: each price level is filled in price priority, until the remaining quantity of the incoming order does not allow the last price level to be matched fully. At the last price level, Explicit orders and Implied Aggregates are allocated depending on the Matching Policy (Price-Time or Price Pro Rata policy) whatever the Implied Matching Model (no prioritisation of Explicit orders over Implied Aggregates)
- Allocation at Constituent level: once the incoming volume has been allocated amongst the Implied Aggregates and Explicit orders, Explicit orders constituting Implied Aggregates are then allocated depending on the Matching Policy.

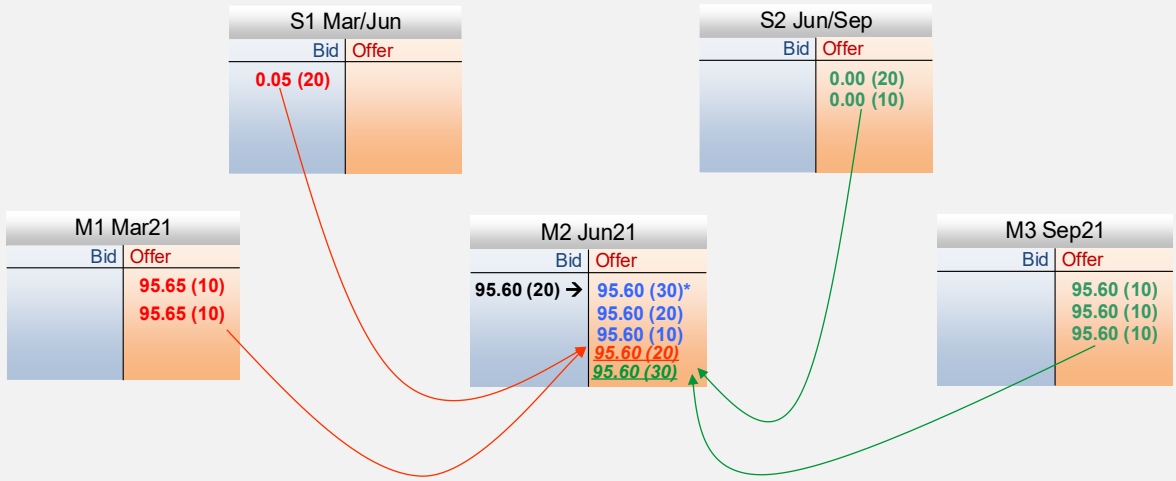
The timestamp of an Explicit Aggregate is always equal to the timestamp of the **oldest** order at the aggregate price level in the market and does not depend on the Implied Matching Model configured.

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

It should be noted that:

- All explicit and implied volume is aggregated for the BBO of the Outrights / individual legs in Market Data feed. Clients must process the last value for BBO from the Market Update message
- Price Pro Rata Matching Policy cannot be configured for Contracts with an Implied Matching Model SIM.

Example: Implied Orders Aggregate



- *Underlined records are Implied Aggregates*
- *Records not underlined are Individual Explicit orders*
- *Red records not underlined represent parent order of red Implied Aggregate*
- *Green records not underlined represent parent order of green Implied Aggregate*
- *Black record is an incoming Individual Explicit order*

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.

Only Strategy Implied prices are allowed; therefore:

- Interactions between the client and the system are handled by the strategy order book
- Once requested to the strategy, the strategy order book combines the prices of 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 Market Data feed.

The "Event" referred to in the EDIM model is the client's 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: the client and the strategy order book. 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 during Reservation or Suspension, all instruments (both Outrights and Strategies) collect orders and Implieds are never generated.

At the Uncrossing time, the Contract status switches to Uncrossing phase and the EDIM Uncrossing Sequence immediately starts.

EDIM Uncrossing Sequence consists of the following three steps:

- **Step 1:** Executions of Book Uncrossing on all the Instruments (Outright and Strategies) belonging to the Contract (i.e. using Standard Uncrossing Sequence)
- **Step 2:** To ensure that Strategy and Outright markets are also uncrossed at the end of the sequence, each Strategy order book triggers sequentially generation of the best Implied on each side from its legs, 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 prioritise 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 first step of the EDIM Uncrossing sequence deals without Implieds. During this step, individual books are uncrossed following the standard auction rules of the Uncrossing algorithm (computation and dissemination of a single Uncrossing Price being the last Indicative Matching Price of the Call phase, allocation of the potential crossed quantity to all trades being executed at the Uncrossing Price).

The second step of the EDIM Uncrossing sequence deals with the individual EDIM **Strategy Book Uncrossing** (SBU).

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.

Since Outright leg order books have been 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, execution 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 as 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. 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. The trade price is always equal to the Implied price on the strategy, and the order price on each Outright leg.

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 trading, 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. Therefore, they can be crossed.

The two events that can trigger automatic generation of Implieds are:

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

  When a client observes a trading opportunity identified by a Strategy order book that is crossed with its Outright legs, the 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, the client cannot request generation of the Implied in the Strategy order book without participating in it but can do so 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 the case of an invalid attempt the request is rejected by Optiq®.

  Uncrossing will attempt to use the best possible price for matching, even if the client that issued the RFIE had an order that was not at the best limit. Allocation rules in the 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.

  To trigger an EDIM Uncrossing in a Strategy book, the Priority Order must enter the Strategy book. EDIM does not trigger generation of Implieds upon receipt of a Priority order on any Outright order book.

  EDIM prioritises the allocation of the newly entered liquidity to the Outright markets over Strategies, meaning generation of Strategy Implied prices occurs before processing the incoming Priority Order. 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.

  Optiq® generates Strategy Implieds (at multiple price levels) to attempt matching against the Priority Order. Since Outright leg order books are uncrossed, Strategy Implied prices generated may always uncross one single side of the Strategy instrument (Buy or Sell).

> **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 books, even if it does not trigger calculation of Implieds.

A Priority Order received on a strategy in EDIM always checks first against the Implied price available on the opposite side. After generation of potential Strategy Implied prices on the opposite side, the Priority Order matches against crossed Implied Aggregates and Explicit orders according to standard Price-Time or Price Pro Rata priority rules (no priority of Implied Aggregates over Explicit Strategy orders or vice versa).

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 Offer Order 5@285 on Strategy A-B

The order improves the BBO in A-B.

Optiq® generates Strategy Implieds to attempt matching against the Priority Order:

Best Implied Bid is 5@290

Best Implied Offer is 10@350

The incoming Priority Order trades against the Strategy Implied bid and both Strategy legs:

- *Strategy A-B Trade 5@290*
- *Outright A Trade 5@450*
- *Outright B Trade 5@160*

Event 2: New Outright Priority Offer Order 10@440 on Outright A

Priority Order on an Outright does not trigger anything and the incoming order is booked.

The order books are now as follows:

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

Event 3: Requests For Implied Execution (RFIE) submitted by Client X

Client X submits an RFIE as this client has an individual order in the Strategy book.

Optiq® generates Strategy Implieds and perform a Strategy Book Uncrossing:

Best Implied Bid is 5@270 (not tradeable)

Best Implied Offer is 10@320

The Best Implied Offer is executed against the Strategy Explicit Bid Order and the following trades are generated:

- *Strategy A-B Trade 10@320*
- *Outright A Trade 10@440*
- *Outright B Trade 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 best Implied Offer 10@350.

The Strategy book is uncrossed against its legs, calculated Implied can no longer match and the RFIE process 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 versus 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

The Spontaneous Implied Matching (SIM) model computes Implied prices on a continuous basis, to be considered 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[11].

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 a low liquidity environment, this exhaustive approach is needed to display all trading opportunities.

4.8.2 Price Discovery with SIM

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

During the Call phase, or during Reservation or Suspension, all instruments (both Outright and strategies) collect orders and Implieds are never generated.

At the time of the Uncrossing, the Contract status switches to Uncrossing phase and the SIM Uncrossing Sequence immediately starts.

SIM Uncrossing Sequence consists of the following three steps:

[11] Clients should note that it is possible to only activate Strategy Implieds on SIM.

- **Step 1:** Executions of Book Uncrossing on all the Instruments (Outright and Strategies) belonging to the Contract (i.e. using Standard Uncrossing Sequence)
- **Step 2:** To ensure that Strategy and Outright markets are also uncrossed at the end of the sequence, each Strategy order book triggers sequentially generation of the best Implied on each side from its legs, matches the relevant strategy explicit order against it, and re-generates the next best Implied until it is not fully matched. The Sequence to prioritise the strategies is the same as the one for EDIM.
- **Step 3:** Sequentially, each of the Outrights belonging to the Contract generates the Component Implied prices from all strategies and associated legs' price levels not matched in Step 2 and Step 1, includes them in its own order book and executes the Book a second time. The sequence in which Outrights are prioritised is the following:
    1) Time to Expiry of the nearest leg.
    2) At the Money, then distance to the money (delta) (options only).
    3) Option type: Call first then Put.

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 creates 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 Aggregates and Explicit orders with associated prices and volumes. At each price level of the order book, individual Explicit orders and one to multiple Implied Aggregates may be defined:

- None to Multiple Explicit orders.
- None to Multiple Implied Aggregates (one per route).
    - Only one Aggregate 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 and 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. The SIM mechanism is critical when:**
  - Order book does not 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 a balance between Implied and real liquidity, the 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 Best Bid and Offer which is provided via the Market Update message (1001).**
- **Implied Best Bid and Offer will no longer be provided and will be decommissioned from Market Update message (1001).**

4.9 OPTIQ® TICK TABLE MECHANISM

Optiq® uses the **Tick Table** to provide the rules applied on a given instrument for the order entry.

Each Tick Table contains:

- A pre-defined set of price ranges with the related tick size.
- 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 a finer tick to be applied to these expiries, if required. 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 except for specific rules that may be set for the Front Month, applies to all instruments within the Contract.

All Tick Tables are provided to clients through a single dedicated daily referential file, within which each Tick Table is identified by an ID. In the Standing Data each instrument specifies the ID of its applicable Tick Table.

A single Tick Table may be used by multiple Contracts and the supported exchange market mechanisms (i.e. Central Order Book, Wholesale, Request For Cross). As such, the price ranges and tick sizes provided are designed to cover the necessary granularity for several Contracts and functionalities.

Clients should be aware that the ticks defined are used by Optiq® for order entry checks only. **Matching and trade prices are allowed at different granularity of ticks, which is the case for 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 Tick Table n°12. Contract C is associated with Tick Table n°8. Trading currency is defined for each Tick Table at Contract level. Ticks are expressed as units of 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 follows:*
  - *Front month ratio: 5*
  - *Price > 0: tick = 0.005*
  - *Price > 25: tick = 0.05*
  - *Price > 75: tick = 0.1*

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 to 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 are not aligned with the tick value for the price range.

The cases where this occurs are:

1. Pricing of an Outright, following a Strategy versus Strategy trade without Implied pricing.
2. Pricing of an Outright, following a Strategy trade with Implied pricing.

In both these cases, Optiq® first checks that the 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 can be filtered out of the market data feed.

This calculation does not apply to Outright versus Outright trades.

Example

Example of a Strategy versus Strategy trade on a Index Future that results in two Strategy Leg (Outright) trades

For this example, a Calendar Spread strategy is used. This results in two Strategy Leg trades, i.e. trades built by Optiq® on instrument legs (Outright).

Strategy Order Book:

- *The two original orders that matched were in a Strategy Order Book*
- *The two orders had a price of 4.5 (at tick of 50 cents)*

Outright book data was:

- *BBO of leg 1 is 388.00 and 388.75*
- *BBO of leg 2 is 383.75 and 384.00*

To match the strategy price of 4.5, the trades are created on leg 1 and leg 2 to match the spread of 4.5 and be within the Collars and BBO of the Outrights (by Optiq® Leg Price Algorithms).

- *.388.25 on leg 1 within BBO*
- *383.75 on leg 2 within BBO*

And - 388.25 – 383.75= 4.5

***Note**: above example is not applicable for strategies on Commodities as on Commodities prices are rounded to the nearest 0.25 tick (power derivatives 0.01 tick applies)*

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 tick sizes are used consistently for various strikes, e.g. with larger ticks applied for deep-in-the-money strikes.
- Provides a harmonised approach for applying the 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.**

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 Derivatives markets, updates of Market Data are provided at price level only, not for individual orders. Each price update 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 only for the Best Bid and Offer (BBO) price level. Implied prices are not considered as orders and so when an Implied price contributes to the BBO limits, the volume available on the market at BBO prices increases without incrementing the number of orders. This logic allows client to distinguish volumes of Implied prices versus those of Explicit orders.

Note: Implied prices are displayed on the market only if they contribute to the Best Limits. As such it is possible to have a Best Limit displayed and communicated 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 the case of a matching event: Market Update with total quantity and last matched price of the event
2. Update of the Order Book
3. Update of the Best Limits
4. In the 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 made on an instrument without involving explicit orders on that instrument (e.g. trades disseminated at leg level in the 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 Optiq® document *OEG MDG - Kinematics Specification - Euronext Derivatives Markets*.

4.10.2 Private Data (OEG) Feed Instruction Processing

On the Cash Markets (including on the Warrants and 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 order identifier (*ClientOrderId*).

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

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 action 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 action.

The table below identifies the unitary actions on Derivatives (and Cash) markets that are guaranteed 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 Short code)**	
Instrument Granularity	Cash Instrument	Derivative Instrument	Cash Trading Group	Derivatives Contract	Cash or Derivatives Instrument	Derivatives Contract
Unitary	**No**	**Yes**	**No**	**Yes**	**Der: Yes** **Cash: NA**	**Der: Yes** **Cash: NA**

ClientOrderId is used in Mass Cancel only as identifier of the submitted message. This instruction cannot 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 cannot rely on the ClientOrderId as the identifier of the orders.

4.11 PASSIVE LIQUIDITY PROTECTION (PLP)

The **Passive Liquidity Protection (PLP)** is a mechanism designed to **delay *aggressive*** orders for a pre-defined configurable period. An order is considered ***aggressive*** when it would immediately match an existing order or quote in the Central Order Book (COB) generating a trade. For contracts where PLP is enabled, aggressive quotes are rejected.

In volatile market conditions, market makers providing liquidity on Euronext markets may face challenges in updating their quotes rapidly enough to match market conditions. This can potentially lead to stale prices and an increased risk of being executed against by aggressive orders at prices that deviate significantly from the market price. As a consequence, market makers may act to protect themselves by pulling their quotes, reducing quote size, or widening their spreads - all of which can reduce liquidity and market quality for all participants on Euronext markets.

By introducing a short, pre-defined delay on aggressive orders, PLP aims to provide market makers and liquidity providers with additional time to update their quotes. Quoting at correct prices would thereby support improvement in the market quality with tighter spreads and increased order book depth.

PLP aims to give market makers an additional level of protection to quote in the Central Order Book, while reducing the defensive behaviours described above. This supports improved market quality overall — through tighter spreads and increased order book depth — for the benefit of all market participants.

Sections below explain in more detail how PLP works, with Aggressive Quotes, New Orders, Order Updates, Order Cancellations (single, mass and in case of emergency events), which contracts it applies to and which PLP delay will be set up. Explanations below also cover the interaction of PLP with the Market Maker Protection (MMP), Ownership Request, Open Order Request, Euronext RiskGuard Derivatives commands, transition between trading phases and the technical details of messages, fields and error codes.

4.11.1 How the PLP Works

All behaviours attributed to PLP, and in its interaction with other features, will apply to the contracts, and all their associated instruments (outrights and strategies), only if PLP is enabled for that contract.

For Contracts where PLP is enabled, PLP will apply to all aggressive orders, on both outrights and strategies, submitted by all market participants, without exception.

For Contracts where PLP does not apply, the PLP behaviours described below do NOT apply.

PLP applies only to the Central Order Book (COB) orders and messages (EMM 1).

Rejection of aggressive quotes:

For Contracts where PLP is enabled, any aggressive quote will be rejected by the system.

- Quotes are considered as aggressive when they would remove liquidity from the market. If either the bid or the offer side of a quote is identified as aggressive from the Matching Engine (i.e. matching against the best opposite limit), the aggressive side is rejected with a dedicated error code, while the non-aggressive side is accepted and enters the COB;
- The only matching combinations allowed with PLP enabled are:
    - Passive quote vs. aggressive order
    - Passive order vs. aggressive order (even if flagged with account type of Market Maker)

For Contracts where PLP does not apply, quotes will not be subject to rejection due to being aggressive.

New Orders & PLP

If an incoming "New order" is identified as aggressive by the Matching Engine (ME), it will be placed in the PLP queue. The delay would be included in the interval between the timestamps *Book IN Time/BookINTime [21002]* (timestamp # 4) and *Book Out Time/BookOUTTime [21003]* (timestamp # 5)[12] and this pre-defined PLP delay is listed in the table below.

[12] For more details about the Timestamps please refer to the section "2.2.1 Latency Monitoring and Timestamps" of the SBE and FIX specifications.

An aggressive order subject to a PLP Delay retains the time-price priority assigned upon receipt by the Trading Platform and the PLP Delay does not alter such priority.

While the aggressive order is in the PLP queue, no private or public messages are sent either to OEG or MDG for orders held in the PLP queue.

When the delayed order exits the PLP queue, the Matching Engine applies the standard functional checks.

- If the order passes the standard ME checks, and is accepted:
  - A standard private acknowledgement message is sent via OEG, and in parallel, a message about the order is published via MDG.
  - To ensure that clients are aware if an order was held in the PLP queue, the private acknowledgement message will include a flag informing that order was delayed. This field is optional. For orders that were not held in the PLP queue, the flag will not be set.
  - If there is still quantity allowing, matching the order will match to the possible quantity, and the associated private and public messages will be sent via OEG and MDG. If multiple orders are present one after the other, in the PLP queue, at the same price, they will be matched in their time priority.
  - If there is no quantity left on the opposite side of the book and no immediate match could occur:
    - Provided the order does NOT have validity of IOC/FOK and does not receive a cancellation instruction while held in the PLP queue, the order enters the book as a resting order.
    - If the order has validity of IOC/FOK or receives a cancellation instruction while held in the PLP queue, the remaining quantity is cancelled.

    This behaviour applies for the full quantity of the "New order", or in case there is the partial quantity left after initial matching.

  Time priority vs. pro-rata

  - *The time priority is maintained for the order exiting the PLP queue. PLP queue is at the Contract level, and any orders for any instruments within the contract are managed in the order they arrive in the PLP queue. If multiple orders are in the PLP queue for the same instrument, they would all be processed one by one. As the orders exit out of the PLP queue one-by-one in order of original arrival in the PLP queue, only one entering order can be aggressive for the instrument at a time.*
  - *The aggressive order, while maintaining its own time priority, may match against multiple orders already in the Central Order Book. If the contract is set to use the pro-rata matching algorithm, the matching against these resting orders will apply the pro-rata algorithm to allocation of quantity.*

- If the order fails any of the checks done by the ME, it will be rejected, and a private "Reject" message will be sent to the client, with a flag indicating that the order was held in the PLP queue. This would not result in any messages in the MDG.

In the ME the PLP queue functionally spans the scope of a Contract. Any order messages for any instruments associated to the Contract will enter the PLP queue in the order they were received and will be processed out in the same order. No "re-ordering" of orders occurs within the PLP queue or in other ME processes.

When the incoming order is passive - that is, *not* identified as aggressive/does not result in an immediate match - then this new order does not enter the PLP queue. It is processed immediately by the ME, in line with the standard behaviour.

Please note, while in private messages sent via OEG there is a flag indicating that the order was held in the PLP queue, no fields or values are communicated via public message in MDG related to PLP mechanism, setup or actions.

Order Updates with PLP

For Contracts where PLP is enabled:

- If an order update for a resting order results in that order becoming Aggressive (e.g. modifies the Price of the order) it will enter the PLP queue and will be held in the queue for the duration of PLP delay defined for the Contract. Upon exiting the PLP queue it will go through similar steps as for a new order that is aggressive.
- If an order update is received, while the original order, or another update for that order, is already in the PLP queue, the update will also enter the PLP queue and will be held there for the duration of the PLP delay. This is true even if the update makes the order non-aggressive.
- If there are multiple updates, in the PLP queue at the same time, each one will be held for the duration of the PLP delay and will be processed in the ME upon exit of the PLP queue.
- To ensure that clients are aware if an order update was held in the PLP queue, the private acknowledgement or rejection messages of such an update will include a flag indicating that order update was delayed. This field is optional. For order updates that were not held in the PLP queue, the flag will not be set.
- No "re-ordering" of sequence of order update messages occurs within the PLP queue nor in other ME processes.
- Besides the PLP delay, all other processing of updates will be subject to existing rules and checks currently present on Optiq.

Single Order Cancellation with PLP

For any resting order, that doesn't have any order updates in progress of being held in the PLP queue, individual order cancellation will be processed without any additional delay.

In case a new order, or its update, are in the PLP queue at the time when the order cancellation is received, these orders will be flagged for specific processing.

- A New Order or its update will be held in the PLP queue for the duration of the PLP delay. No changes in this concept due to cancellation.
- Cancellation will flag new orders or order updates, for "IOC-like" handling upon their exit out of the PLP queue. This means:
    - upon exit out of the PLP queue the order will be matched for the quantity available in the order book;
    - any remaining unmatched quantity will be cancelled.

This behaviour should help balance client attempts to avoid the PLP queue using order cancellation in rapid succession to the submission of the order, with the normal processing of order cancellation, as it would normally arrive in the order book.

Mass Cancel interaction with PLP

Behaviour for cancellation of individual orders also applies to Mass cancel. However, as the scope of a mass cancellation is broader, below provides details of the different applicable cases.

Case 1: In case all orders in scope of Mass cancel are only in the Central Order Book:

- Mass cancel submission is processed without the PLP delay.
- The initial Mass Cancel Ack is sent with value -1
- Followed by cancellation of individual orders identified by the ME in scope of the Mass cancel. For each cancelled ordered a Kill (05)/Execution Report (8) message is sent via OEG.
- The associated messages are sent to MDG updating the state of the order book.
- The final "end of processing" Mass Cancel Ack is sent with value of COB orders cancelled.

Case 2: In case all orders in scope of Mass cancel are only in the PLP queue:

- Mass cancel submission is processed without the PLP delay.
- The initial Mass Cancel Ack is sent with value -1
- For the purposes of this explanation, it is assumed that the PLP delay is longer than the average time for processing of the mass cancel request, so that the scope of orders in COB and PLP queue is unchanged for the whole case. As there are no orders in the COB that are in scope of the Mass cancel, and processing of the cancellation in PLP queue can start only after the PLP delay, processing in COB for Mass cancel ends.
- The final "end of processing" Mass Cancel Ack is sent with indication that zero (0) COB orders were cancelled.
- Following this, all the orders that were in scope of Mass cancel and were in the PLP queue, exit the PLP queue, and are checked by ME if they have possible matching quantity on the opposite site of the book. The orders will match up to the maximum availability quantity, if any.
    - If there is no quantity available for that order to match – the order will be cancelled, with the Kill (05)/Execution Report (8) message sent via OEG.
    - If the order matches fully, only a Fill (04)/Execution Report (8) message is sent, to inform the client of the transaction.
    - If there is partial quantity available for that order to match, it will match for the partial quantity and the remaining quantity will be cancelled, with OEG messages sent as indicated above.
- For the events that require it, the associated messages are sent to MDG.

Case 3: In case some orders in scope of Mass cancel are in the Central Order Book and some are in the PLP queue:

- Mass cancel submission is processed without the PLP delay.
- The initial Mass cancel Ack is sent with value -1
- For any orders in scope of the mass cancel that are in the COB, cancellations will be processed as described above in Case 1, with private messages being sent to OEG, and the associated messages are sent to MDG updating the state of the order book.
- The final "end of processing" Mass cancel Ack is sent with value of COB orders cancelled.
- Following this, any orders in scope of the Mass cancel that are in PLP queue will be cancelled and processed as described above in Case 2.

PLP Interaction with Market Maker Protection (MMP)

The general functionality of Market Maker Protection is not impacted by the PLP mechanism. However, there is one adjustment in the process if MMP protection limit is breached.

If a client chooses the MMP action of "**Pull**", in this case, upon breach of the limit:

- As usual - all quotes and Market makers orders that are already in the book are pulled
- As usual - any incoming New order, Update or Cancellation are rejected
- Any orders, order updates or cancellations that are held in PLP queue will be rejected upon exiting the PLP queue. Each message in scope of the MMP breach and held in the PLP queue will be sent a private rejection message, with a flag and error code indicating that the order was held in the PLP queue.

If a client chooses the MMP Option of "**Ignore**", orders in the PLP queue are not rejected. They follow the standard behaviour applied to any aggressive order exiting the PLP queue.

Emergency cancellation events

This section applies to Mass cancellation or orders, applied in Emergency cases (1) Order cancellation triggered by the Market operations due to incidents, (2) High-availability (HA) or Disaster Recovery (DR) event (3) Cancel on Disconnect enabled.

In case of any of the events/actions listed above, order management in interaction with PLP will be as follows:

- Any orders in scope of an emergency cancellation command that are in COB, and are not in the PLP queue, are immediately cancelled.
- Any orders that are held in the PLP queue when the emergency cancellation commands are processed, will be immediately rejected. Processing of rejections will be done in the sequence the orders entered the PLP queue.
- Any updates or cancellations of orders in scope of the emergency cancellation, that are held in the PLP queue, are also rejected.

PLP and Ownership Request

Ownership Request could be sent for an individual order, or for all orders belonging to a Logical access. For individual order requests, the only two possible cases exist: the order is in the COB, or the order is pending in the PLP queue. If an ownership request is sent for a broad scope, some orders may be in the COB, and some may be in the PLP queue.

- In all cases, Ownership Request is first answered by The Ownership Request Ack (SBE 17/FIX U29) with the *Total Affected Orders (TotalAffectedOrders (533))* set to -1, following this:
- For orders in scope of an Ownership request that are in the COB, existing processing will follow without any interaction with the PLP, including
    - the normal sending of the Ownership Request Ack (SBE 17 / FIX U29) message, covering only the number of orders that are already in the COB, and
    - the Ack / Reject messages that would be generated by the ME on processing of the order/update/cancellation, to the Logical Access that requested the ownership.
- In case the ownership request covers the scope of orders/updates/cancellations that are both already in the COB and those held in the PLP queue, then:
    - Any orders that are in the COB will be processed as above, without any specific interaction with PLP.
    - The Ownership Request Ack (SBE 17/ FIX U29) messages would be sent containing only the orders in scope of the Ownership request that was in the COB.

  - For any orders (or modification or cancellation of orders) that are in the PLP queue, the change of ownership will be applied after the order/update/cancellation exits the PLP queue. In this case, upon exit of PLP queue, the acknowledgment or rejection for the order/update/cancellation will be directly forwarded to the Logical Access that requested the ownership. No additional Ownership Request Ack (SBE 17/FIX U29) messages will be sent for the orders that were held in the PLP queue.
- In case the Ownership request is sent, and all orders in the scope of this change are only in the PLP queue, as none of these orders are in the COB yet:
  - For any orders (or modification or cancellation of orders) that are in the PLP queue, the change of ownership will be applied after the order/update/cancellation exits the PLP queue. In this case, upon exit of PLP queue, the Ack or rejection for the order/update/cancellation will be directly forwarded to the Logical Access that requested the ownership.
  - In this specific case, as none of the orders are in the COB the Ownership Request Ack (SBE 17/FIX U29) will be sent with the *Total Affected Orders (TotalAffectedOrders (533))* set to 0.

PLP and Open Order Request

- In case the Open Order request is received for an order that is in the PLP queue, as this order is not yet in the COB, the open order request will be rejected with status of "Unknown order".
- In case the Open order request is received for an order that is in the COB, even if it has updates or cancellations that are in the PLP queue, the request follows standard behaviour and replies to the client with the current status of the order in the COB.

Transition between trading phases

- Order status, when it exits the PLP queue, will be evaluated for the status of the book, and will follow the standard behaviour of the phase at that moment.
- When switching to Call mode (including for regular call, reservation, halt, etc.) the PLP queue will be emptied out.
- During the Call phase, orders are NOT added to the PLP queue.
- In the Continuous phase, the PLP queue is managed as described in the sections above.

Interaction with Euronext RiskGuard Derivatives Commands

- Suspend (Kill switch) and Block commands:
  - In case RiskGuard Suspend or Block command is submitted with the Pull option (cancellation of orders), or equivalent commands executed by Market operations "on behalf" of the clients:
    - Any order that is already present in the COB and matching the RiskGuard scope must be cancelled immediately, following the standard RiskGuard process;
    - Any orders held in the PLP queue will be immediately rejected upon execution of these commands;
  - In case the RiskGuard Suspend or Block command is submitted without the Pull option (without cancellation of orders), any messages that are held in the PLP

queue will be processed, as they exit the PLP queue, without Suspend or Block being considered. Please note that this does mean that new orders, order modifications or cancellations may be processed into the order book after the rest of the Block or Suspend commands are executed, and OEG may receive the associated Acknowledgement messages.

- For Maximum Exposure Position (MEP), the CEP is updated only once the order exits the PLP queue and reaches the COB;
- For Order Size Limit (OSL), order validation is performed in the OEG before the order enters the PLP queue;
- The answer to the processing of the RiskGuard command may result in different error codes, depending on the case:
    - 2582 = Suspended by Risk Manager
        - Existing error code already in use, that will be used when orders/order modifications are not in the PLP queue.
    - 2284 = ERG Command triggered while in PLP Queue
        - New error code triggered when RiskGuard command is received when orders/order modifications are in the PLP queue.

PLP does not apply to:

- Wholesale orders (single or dual-sided), as this is a dedicated order book that is subject to its own rules and not subject to low-latency trading.
- Request for Cross orders, as this is a dedicated order book that is subject to its own rules and not subject to low-latency trading.
- Stop orders. PLP delay does not apply to entrance or triggering of Stop orders. Stop orders are triggered by a trade at trigger price, and are not subject to "race" conditions targeted by the PLP mechanism
- Implied prices calculated by Optiq. If the individual outright orders that could participate in the calculation of Implied prices is aggressive, that order will be held in the PLP queue. During that time, no calculation of implied prices, that would have been triggered by that order, will occur. Upon exit of the aggressive order out of the PLP queue, it may trigger calculation of implied prices.
- PLP does not affect any existing collar breach mechanisms.

4.11.2 Applicability of PLP and PLP Delay

On Optiq, Passive Liquidity Protection (PLP) will be enabled for all Option contracts on the Index and Equity Derivatives segments.

PLP is being rolled out gradually. The table below indicates the scheduled time of its activation, and the associated PLP delay.

Activation Date	Scope of Contracts	PLP Delay *(in milliseconds)*
10 December 2026	▪ Brussels Equity Options ▪ Brussels Index Options ▪ Lisbon Equity Options ▪ Lisbon Index Options	3
27 January 2027	▪ Milan Equity Options ▪ Oslo Equity Options	3
24 February 2027	▪ Paris Equity & ETF Options	3
30 March 2027	▪ Milan Index Options ▪ Oslo Index Options	3
29 April 2027	▪ Amsterdam Equity & ETF Options (including all European Expansion SSO)	3
2 June 2027	▪ Paris Index Options	3
6 September 2027	▪ Amsterdam Index Options	3

4.11.3 Technical Details of PLP Flag and the Error Codes

PLP uses the following fields and OEG messages to flag orders/updates that were held in the PLP queue:

- The field *OrderQualifiersExtension* (OrderQualifiersExtension (21826)) in the Ack (SBE 03/FIX 8) and Kill (SBE 05/FIX 8) messages of orders provides information when the associated message was held in the PLP queue. The field is provided in bitmap format, and will contain a specific bit "PLP queued" which will be set to 1 (True);
    - In other cases, in SBE this bit will be set to 0 (False), and in FIX the field will not be provided.
- The field *RejectionOrigin* (RejectionOrigin (21828)) will be added in Reject (SBE 07/FIX 8) and OrderCancelReject (FIX 9) messages, providing information that the order/order update that is being rejected was held in the PLP queue. The field will be set to 1 = PLP Queue when the order rejected is in the PLP Queue.
    - If the order is not subject to the PLP queue, bit *PLP Queued* in OrderQualifiersExtension *(OrderQualifiersExtension (21826))* is set to 0 and RejectionOrigin is set to SBE Null Value, while in FIX the equivalent tag (RejectionOrigin (21828)) is not provided.
- Where existing error codes already cover cases, they will be re-used. To cover new cases, the following error codes related to the rejection of Aggressive quotes have been added to the system:

- 2281 = Cancel On Disconnect triggered while in PLP Queue
  - Orders, order modifications, order cancellations rejected because the Cancel On Disconnect mechanism was triggered, for eligible orders, while those related messages are still on the PLP queue
- 2282 = Failover occurred while in PLP Queue
  - Orders, order modifications, order cancellations rejected because a failover happened and there were requests on the PLP queue
- 2283 = Market Operations command triggered while in PLP Queue
  - Orders, order modifications, order cancellations requests rejected because of a command triggered by the Exchange (EMS) while those requests are still on the PLP queue
- 2284 = ERG Command triggered while in PLP Queue
  - Orders, order modifications, order cancellations requests rejected because of a RiskGuard command triggered by the Risk Manager or the Exchange (EMS) on behalf of the Risk manager
- 2285 = Aggressive quotes are not allowed
  - Aggressive quotes are not allowed. Quotes must provide liquidity and not immediately match against existing orders or quotes in the Central Order Book (COB)

As stated above, no fields or values are communicated via public message in MDG related to the PLP mechanism, setup or actions.

4.12 MASS CANCEL OPTIMISATION

Mass cancel optimisation allows trading participants to **optionally** activate the choice of not receiving the individual Kill messages (for orders already in the COB) in case of a Mass Cancel request.

The standard two acknowledgment messages (the first on receipt of Mass Cancel and the second on completion of execution with the count of affected orders) in OEG will always be sent, independently from the selection of the client for the individual Kill messages.

An optional field is provided in the Mass Cancel (13)/OrderMassCancelRequest (q) message that allows users to deactivate the sending of individual Kill messages in OEG related to the Mass Cancel request. This optional field is in active use only for the Derivatives markets.

This Mass Cancel optimisation is enabled on the following Optiq segments only for COB (not applicable for Wholesales and RFC):

Optiq Segment	COB
Equity Derivatives	Enabled
Index Derivatives	Enabled
Commodities	Enabled

Note in Interaction with PLP:

A Mass cancel request with the Mass cancel optimisation enabled may arrive, while some orders in its scope are in the COB and some are in the PLP queue. In this case, for the orders exiting

the PLP queue, individual Kill messages would still be sent, independent of the setting for the field request to suppress individual Kill messages.

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. They serve as a limit, constraining the instantaneous order price fluctuation, to protect the market from aberrant order prices and trades. On order entry and upon matching, prices of orders and potential trades are checked against the Collars. For Derivatives markets, prices are checked 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 instrument: the **Dynamic Collars Reference Price** (DCRP). The DCRP is subject to changes throughout the trading day depending on both the Derivatives markets and the underlying markets. Rules to determine the DCRP are described below.

Depending on the product type and the conditions of the market, 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 and can vary for one contract depending on the trading mechanism (Price Discovery, Continuous trading or trading interruption). This information is indicated to clients through referential data.

Optiq® uses the concept of **Market Quality Spread** (MQS) or **Reference Spread**, to define Dynamic Collars, which are tightly coupled with Market Maker obligations. While the Reference Spreads are dynamically calculated, they remain unaffected by market conditions.

Actual Quality Spread (AQS) is used by the system in case of specific market conditions that may have an impact on quoting obligations. An increase in the AQS multiplier results in a widening of quoting obligations. In such a case the Reference Spread remains unchanged, and the Exchange provides adjustments by increasing the AQS multiplier. The AQS does not directly impact dynamic collars; however, it is used as a parameter for the rules of determining DCRP, namely, to determine what would be the maximum spread to use the Mid-BBO as a pricing reference.

While independent from each other, in general, when the AQS is widened, Dynamic Collars are also widened.

The multipliers used in these calculations are made available in a referential data file called **Reference Spreads**, and any intraday changes are published via real-time market data (MDG).

The close relationship between the Collars and Market Maker presence is achieved by defining MM obligation spread based on 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 detailed below.

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.

If the value needs to 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 Euronext's Internal Pricing System.

This system 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

If 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, Fair Value is used.

While the set-up of this Reference Price Origin on a per product basis is static (provided through the 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 uses the Mid-BBO of the order book.
- If the market is not considered liquid enough, the DCRP uses Fair Value.

Determination of the quality of the order book is made by comparison of the BBO spread to the Actual Quality Spread. If the BBO is tighter than the AQS, then the Exchange considers the price provided by market participants as suitable to be used as reference, hence Mid-BBO is used. If the BBO is larger than the AQS, the Exchange will then rely on its own pricing system to determine the 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 considers Last Traded Price, Best Bid and Offer.
- For all other maturities we can have 2 different methodologies:
  - FMP of the most liquid maturity combined with the value of applicable Inter-Month Spread.
  - FMP independent from the Blue Month

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

- **For a Blue Month Instrument**

The Future Market Price for the most liquid maturity (Blue Month) considers 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. On the resting side, the Best limit remains unchanged, or the next level becomes the Best limit.
2. On the aggressive side, Best limit remains unchanged, or a new Best limit is created based on the aggressive order price and residual volume.

- On entry of a new order, or 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 the previous DCRP then the new DCRP is set to the Bid Price
    - if not, 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 does not change;
  - If there is no last traded price:
    - if there is no BBO, then DCRP does not 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 kept as the last known DCRP in the case of Future Market Price pricing style or varies with the theoretical price in the case of Fair Value pricing style.

- **For an instrument is using FMP combined with IMS**

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:

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

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

Inter-Month Spreads (IMSs) 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 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 does not change intraday; however, clients should incorporate standing data daily 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 shows the target set-up. To obtain the actual set-up for each individual Contract clients should use the values 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)[13]	Last known FMP or Blue month IMP[14]
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
Commodities (COM)			
Commodities Futures[15]	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 the Call phase, the DCRP Rule applied does not change.

If a trade interruption occurs during the Continuous phase, the DCRP 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 all limits explicitly. This approach allows the provision of a predictable model to the market without overloading the real-time Market Data flow.

[13] If the future is deemed to be illiquid, Fair Value can be used instead.

[14] 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 the DCRP is the last known Future Market Price (FMP) identified before the interruption.

[15] For some CMO futures the Reference Price Origin available in the standing data will mention Fair Value, however in practice these futures are on FMP independent from Blue Month.

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 the Exchange's standard for liquidity: the **Market Quality Spread** (MQS), or **Reference Spread**. This is used as a reference value regardless of any specific market conditions. Depending on the market conditions a multiplier is applied to the Reference Spread to obtain the actual value that can be used.
2) Using the Reference Spread, and associated multipliers, clients can determine in real time the collars applied by the system for each individual instrument. Collars are expressed as a multiple of the Reference Spread 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 decimalised multiple of the Reference Spread. Without any multiplier applied, AQS is equal to 1 and the quality spread is equal to the Reference Spread.
   - 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 the daily referential, Euronext provides the parameters needed to compute the intraday DCRP, as well as AQS and Collars expressed as decimalised multiples of the Reference Spread. Multiplier parameters are provided as dedicated referential data in the **Reference Spread** file.
5) In the case of exceptional market conditions these parameters may be adjusted. If adjustments are made, an update is provided through real-time Market Data messages.

All spread parameters defined above are provided by Optiq® through a referential file, including a **Reference Spread** table, to allow clients to compute all associated derived values dynamically.

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

Each Reference Spread table is identified by an ID. In the standing data the ID of the applicable Reference Spread table is specified for each Contract.

Each Reference Spread table is built on a '**Time to Expiry'** basis defining multiple configurations 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	Reference Spread	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.	Reference 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 per cent.	Allows to determine the AQS by applying this multiplier to the Reference Spread.	Allows to determine the effective Collars by applying this multiplier to the Reference Spread.

5.4 STEP FOR DYNAMIC COLLAR DETERMINATION

1) To obtain the logic to calculate the **Dynamic Collar Reference Price (DCRP)**, 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) to identify which of the assigned logic applies during the current phase
3) Determine the **DCRP** that applies for a set logic:

- **Opening Call Price**

	Official Market Close price Known	Official Market Close price 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 table
b. Calculate Actual Quality Spread (AQS) using the formula:

$$AQS = AQS\ Multiplier \times Reference\ Spread$$

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:

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

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

Within the Reference Spread table, AQS and Collar multipliers are already defined. These should be applied as standard to obtain the correct AQS and Collars values.

If there are additional multipliers published via real-time Market Data, these have a compound effect. For instance, if the Collar Expansion Factor is set in the standing data at 6, and there is a message published via real-time market data with Collar Multiplier = 2, the original collar spread is doubled, so 6 x 2 = 12 times the Reference Spread. The same applies for the AQS Expansion Factor.

Example

The following table provides the data clients can 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 and Outright Standing Data

Contract Standing Data Field	Contract Symbol Index	Reference Spread ID	Tick Table 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 indicates the range of bids from 8.33 to 49.9; and*
- *the last row with Bid Price Range of 50 indicates the range of bids from 50 to infinity.*

From Tick table 34

Tick table Fields	Front Month Ratio	0 =< price < 10	10 =< price < 100
Values	10	10 cents*	50 cents*

** The unit is indicated to simplify example's readability. 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 Bid price from real-time data (57.5), identify values from Reference Spread table:*
  - *Reference Spread = 3*

    AQS multiplier = 1.2
  - *Collars Multiplier = 5*
- *Calculate the BBO & AQS spreads as:*
  - *BBO spread is 60.5 – 57.5 = 3*
  - *AQS Spread:* $AQS\ Spread = AQS_{\ multiplier} \times Reference\ Spread$

    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:*
  - $Lower\ Collar\ (LC) = DCRP - Collar\ Multiplier \times (\frac{1}{2} \times Reference\ Spread)$

    Lower Collar = 59 – 5 x (.5 x 3) = 51.5
  - $Upper\ Collar\ (UC) = DCRP + Collar\ Multiplier \times (\frac{1}{2} \times Reference\ Spread)$

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

5.5 DYNAMIC COLLARS FOR STRATEGIES

The Dynamic Collar Reference Price of a Strategy (including ICS) 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 the Reference Spread (APF) table (like the Outrights order book) to determine the Collars.

The Strategy always takes the Reference Spread record that corresponds to its leg with the longest Time to Maturity and applies that spread to the DCRP of the strategy to calculate the Dynamic Collars.

Note: Although ICS strategies will have their own Reference Spread (APF), the calculation of the DCRP will follow that of Standard Strategies as described above.

IN SUMMARY: TRADING SAFEGUARDS

Advantages of the Dynamic Collars approach:

- Collar mechanism protects investors from the impact of erroneous orders, by:
  - reducing possibility of fat finger errors
  - maintaining a fair and orderly market by preventing temporary disorderly price fluctuations
  - decreasing number of trading halts
- Reduced number of units and multipliers, and harmonisation of values used in most calculations
- Provides harmonised approach and naming convention for Price Limits, and management of orders outside of such limits, across markets running **Optiq®**.

Clients should:

- Incorporate the Reference Price Origin and associated rules into their system.

Clients are strongly encouraged to retrieve the referential data provided for this purpose.

6. AUTOMATED TRADE CONFIRMATION

6.1 TRADE PRICE VALIDATION (TPV)

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

The main steps in processing TPVs are:

1. Instrument enters a Reserved state;
2. A Request for Quote (RFQ) message is sent via real-time market data message;
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 instrument is Reserved, order entry, modification and cancellation in the Reserved 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 are attempted a defined maximum number of times. If random uncrossing is active on the contract, the timer considers an extra random period of thirty (30) seconds;
7. After the maximum number of re-openings is exhausted, if the situation persists, the orders participating in the uncrossing and breaching the collars are either:
   - in the case of Options: automatically pulled by the Matching Engine to allow opening of the Contract;
   - in the case of Futures: kept in the order book and there is no further attempt to re-open

   If the instrument re-opens before the maximum number of re-openings is exhausted, but then is reserved again, there are two possible scenarios:
   a. If the new tentative trade price is equal to the old tentative trade price, the system will not reset the previous counter of attempts;
   b. If the new tentative trade price is different to the old tentative trade price, the system will reset the counter of attempts and start again.

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

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

During the 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) because of a new price reference following price movements of the underlying.

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

6.1.2 Trade Price Validation for Strategies

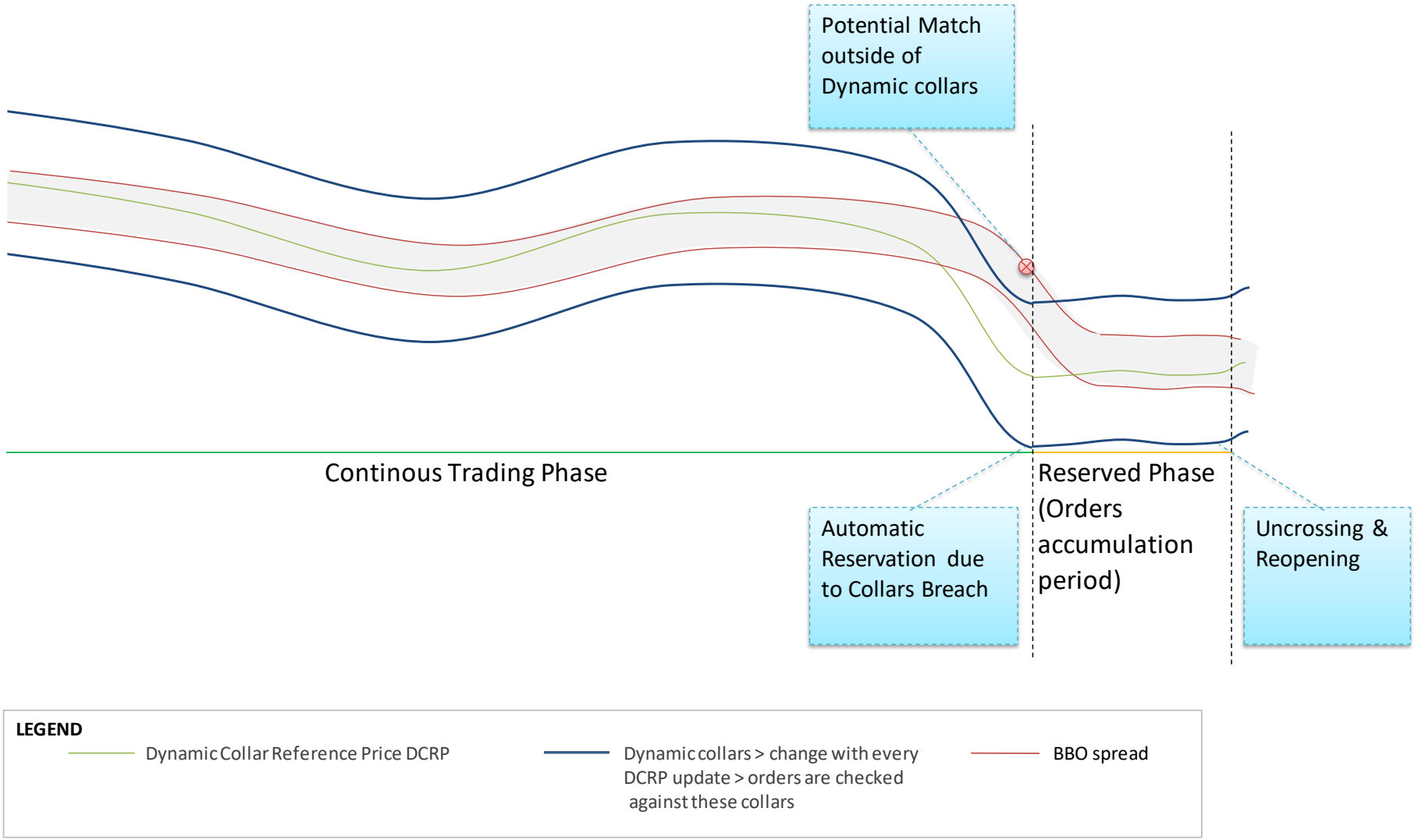
As soon as one of the component legs of a strategy (Outright) is in Reserved state, the strategy book automatically moves into Reserved state. The strategy book will stay Reserved until all component legs are in Continuous state.

Three scenarios apply in the case that 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 either within the component leg BBOs or using their respective Dynamic Collars, the incoming orders that triggered the trade cause the Reservation of the strategy instrument, which then follows the procedure for TPV.
2. Implieds are not generated outside of dynamic collars, nor from orders outside the dynamic collars of their respective order book. However, as collars are dynamic, they can move without already existing Implieds or their constituent orders being checked against new boundaries. If there is a potential trade between such an Implied and an aggressive order, the order book to which the Implied belongs 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).

Note: above mentioned kinematics are also applicable for the ICS strategies.

Example (note: time intervals and values provided here are indicative and provided as an example only)



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.

Futures 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 if 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 for the futures markets from extreme price movements within a short timeframe (e.g. in the case of a Flash Crash). While protecting the markets from an extreme price slide, it allows clients to continue trading safely in such volatile conditions within reasonable price limits, which are adjusted in response to market conditions, and are based on Blue Month prices. FSP can be enabled/disabled at Contract level.

The FSP functionality uses the following concepts:

- FSP Reference Price: reference value taken by the Matching Engine
- FSP Spread: spread applied based on the reference value calculated
- FSP Period: time range between two updates of the FSP Reference Price
- FSP Lookback Period: length of timeframe used as reference for the FSP Reference Price Calculation

Whenever the expected trade price of a futures contract is outside 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 Blue 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, dynamic collars are doubled on the side opposite the breached side, and the collar on the breached side is capped to the value of the FSP boundary that was breached. (In the example below the trade breaches the lower FSP Spread limit, and collars are capped to that lower limit).

1. Trading continues for all instruments in the contract
2. Euronext only allows trade prices within/on this value range
3. No new FSP Reference Price will be generated
4. The FSP Spread will stay as it was at time of the breach
5. The DCRP will continue to move, and collars are capped by the breached FSP boundary.

The FSP Reference Price is calculated from the Blue Month, based on the snapshot of the computed sampling average at the end of the lookback period interval. This price is published via real-time market data (MDG) at the moment of its calculation.

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

- When an FSP Event is triggered, a Market Update message sent via MDG will indicate the event start time and instrument impacted.
- At the end of the FSP Cool Down Period, a Market Update message sent via MDG will indicate the new FSP Reference Price (which will be equal to the average of the DCRP in the Blue Month). This is indication that the FSP period has ended.

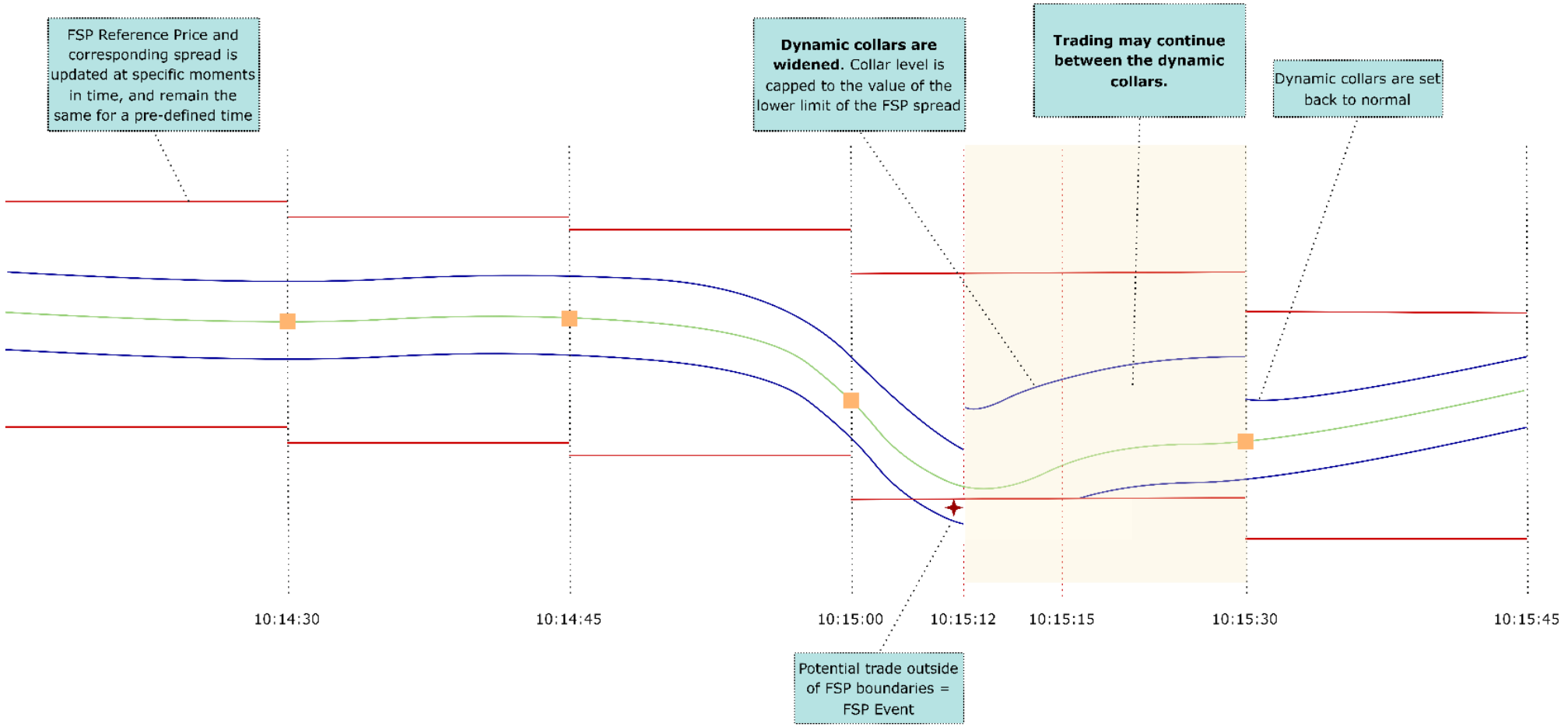
Private order entry messages are sent for any orders that are rejected (if the order had not yet been executed) or cancelled (after a partial execution) in the event that the residual volume would cause a potential trade outside the boundaries of the FSP Spread.

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

Advantages of the approach:

- Collar mechanisms for trades improve 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 limiting 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 FSP (note: time intervals and values provided here are indicative and provided as an example only):



Example Timeline

10:15:00 - FSP Value is calculated

10:15:12 - FSP Event triggered due to potential trade
Dynamic Collars are widened on the upper side and capped on the lower FSP boundary

10:15:15 - No update of the FSP Reference Price

10:15:30 - End of cooldown period
FSP Reference Price updated
Dynamic Collars back to normal
Normal conditions resume

Legend

- Dynamic Collar Reference Price
- Dynamic Collars
- FSP Boundary
- Potential Trade Breach
- FSP Reference Price Calculation

6.3 FUTURE LIMIT INTERRUPTION PROTECTION (FLIP)

The Future Limit Interruption Protection (FLIP) is a new protection mechanism, which is mutually exclusive with FSP.

This mechanism will be activated at contract level, on select future contracts, and is not limited to futures with Future Market Price pricing style.

FLIP works similarly to FSP with regards to its reference price calculation, but once triggered it will instead reserve the instrument on which the boundaries were breached.

The triggering of this mechanism will occur when there is a potential trade outside the FLIP high or low boundary.

The FLIP functionality uses the following concepts:

- FLIP Reference Price: reference value taken by the Matching Engine
- FLIP Spread: symmetric spread set around the FLIP Reference Price. It corresponds to the maximum price movement allowed for the instrument within one FLIP Period.
- FLIP Period: time range between two updates of the FLIP Reference Price
- FLIP Lookback Period: time window over which an average is sampled for the FLIP Reference Price Calculation

Whenever the expected trade price of a futures contract is outside the FLIP Spread within the pre-determined FLIP Period, a FLIP event is triggered, resulting in a FLIP Reservation period, defined as follows.

- FLIP Reservation Period: pre-determined time-period, during which the instrument on which the boundaries were breached cannot trade. Order entry is still allowed during this period, but the DCRP and order collars will remain static around this value. After the period has elapsed, there is an automatic reopening process.

  Clients should note that if FLIP is triggered on the Blue Month, then the DCRPs of the other maturities will also remain static until the Blue Month is no longer reserved and its DCRP is updating. If FLIP is triggered on a non-Blue-Month instrument, then that instrument will reserve, and the rest of the contract will continue to price based on the Blue Month's DCRP.

During the FLIP Reservation Period:

At the start of the FLIP Reservation Period, the Dynamic Collars remain the same, around the now static DCRP.

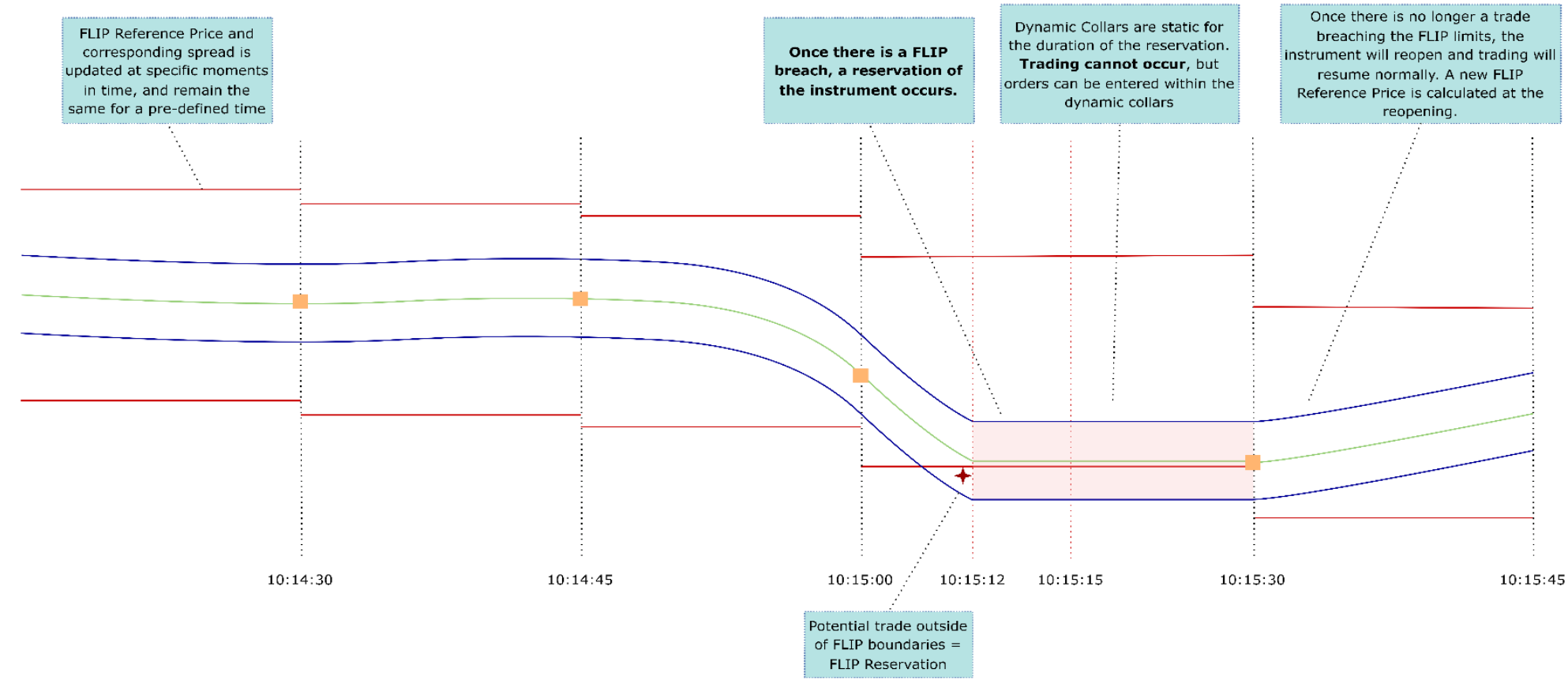
1. Trading continues for the related instruments within the same contract
2. Euronext only allows trade prices within/on this value range
3. No new FLIP Reference Price will be generated
4. The FLIP Spread will stay as it was at time of the breach, unless Euronext changes it
5. After the FLIP Reservation Period has elapsed, the system will attempt to uncross at a trade price within limits. If it is possible then the instrument will go to a continuous state, but if not, then the reservation is maintained for another FLIP Reservation Period. This iterative process will continue until there is a trade price within FLIP boundaries or an action is taken by the Exchange to change parameters.

The FLIP Reference Price is calculated from the Blue Month, based on the snapshot of the computed sampling average at the end of the lookback period interval.

Real-time market data messages are disseminated to inform the market of a FLIP event and its characteristics:

- When a FLIP Event is triggered, a message will include: event start time, event duration, static FLIP Reference Price and corresponding FLIP Spread (Lower and Upper limit).
- At the end of the FLIP Reservation, a message will indicate the end of the reservation and the uncrossing price (if any). After a lookback period the FLIP Reference price is updated. Clients should note that the end of the FLIP reservation period can be subject to a randomised uncrossing, if configured.

Example FLIP (note: time intervals and values provided here are indicative and provided as an example only):



Example Timeline
10:15:00 - FLIP Value is calculated

10:15:12 - FLIP Event triggered due to potential trade
Instrument enters a reservation, meaning no trading can happen but orders can be entered within Dynamic Collars

10:15:15 - No update of the FLIP Reference Price or Dynamic Collars during this period

10:15:30 - End of reservation
FLIP Reference Price updated
Trading can occur
Normal conditions resume

Legend

- Dynamic Collar Reference Price
- Dynamic Collars
- FLIP Boundary
- Potential Trade Breach
- FLIP Reference Price Calculation

6.4 STATIC COLLARS

Similarly to the Static Collars currently in place on Cash Markets, Static Collars will be made available for futures contracts that are listed on Derivatives Markets.

This protection, activated at contract level, will limit the price movement in both the upwards and downwards direction by either a percentage or absolute value, based on a reference price called the Static Collar Reference Price (SCRP). The spread value is typically static and remains the same during the day, but it is possible that the Exchange alters it intraday.

At start of day, the SCRP is equal to the Official Closing Price of the previous trading day, or, if there is no Official Closing Price present, the previous trading day's settlement price. Once the uncrossing occurs, the SCRP is updated once with either the first trade price if there is one at the uncrossing, or the DCRP calculated by the Exchange. After this point the SCRP is static for the remainder of the day, unless a decision is made by the Exchange to alter it.

Both the spread value and the spread expression (percentage or absolute) are present every day in the Derivatives Standing Data file. At start of day, and every time there is a change of either the spread or the static collar reference price, the values of the static high, static low and static collar reference price are disseminated via market data in the Market Update message so it is possible to determine at any moment in time what the boundaries are.

IN SUMMARY: AUTOMATED TRADE CONFIRMATION (TPV and 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.
- 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.
- Future Limit Interruption Protection diversifies the toolbox available to the Exchange to protect market participants, introducing a reservation for futures.
- Static Collars give the Exchange the possibility to control prolonged and persistent price movements if needed due to market conditions.

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7. TRADING FEATURES AND SERVICES

7.1 WHOLESALE FACILITIES

7.1.1 Wholesale trade types

Management of Wholesale trading is provided in Optiq® through a single approach that covers all available Wholesale trade types in a harmonised and streamlined manner. Wholesale and Large-in-Scale (LIS) facilities supported include:

- Against Actuals (AA): Trade allows futures contracts to be traded on the market that refer to a specific operation on the same underlying or on a similar underlying, to implement basis trading strategies with the aim of hedging or adjusting the position held on the related underlying.
- Exchange for Swap/Option (EFS / EOO) Trade: allows market participants to organise and execute a Futures transaction as an offset to an identifiable over-the-counter (OTC) swap transaction in a similar
  - underlying or in a product related to such underlying, for EFS, and
  - commodity or a direct product of such commodity, for EOO.

  to eliminate the execution risk.
- Large-in-Scale Transaction: allows clients to enter 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.

For more information on procedures, requirements and exchange and clients' responsibilities, please review Euronext Trading Procedure, section 4 "Off Order Book Transactions".

7.1.2 Wholesale trade submission

The Optiq® Wholesale facility allows the 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 transactions.

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

- Identifies a wholesale Trade Type as well as the contract identifier for the wholesale transaction.
- 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, the client must:
    - select the code of the applicable Exchange-recognised 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, the client must replace the contract identifier with 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, the 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[16] 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:

- Pre-Trade Validation: Optiq® validates the transaction structure and its eligibility to be 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, the client receives an acknowledgement, and is provided with a **Transaction ID.** The Transaction ID is a unique Exchange-assigned numeric code, unique per contract and transaction, across trading days.
- 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 broken down 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 the individual Execution 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 necessary additional incoming volume to complete the transaction – which may potentially[17] come from other counterparts: **reactors**.
    - Reactors are clients that must complete the pre-negotiated transaction with the initiator. Submitting a reaction uses the same Order Entry message and framework as used for initiating a reaction.

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 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 can be on all instruments of the strategy, or on part of the instruments belonging to the strategy. For Delta Neutral strategies however, the reaction can be on partial volume but must be on all instruments of the strategy. To ensure the reaction is properly sent, the reactor must:
    - Select the applicable Exchange-recognised 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.

[16] As an example, if a 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.

[17] The Wholesale facility allows transactions to be submitted via one or multiple messages.

- 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 for individual instruments of the strategy. Submission for a subset of instruments involved in the LIS Strategy for Wholesale is not allowed as a single reaction.

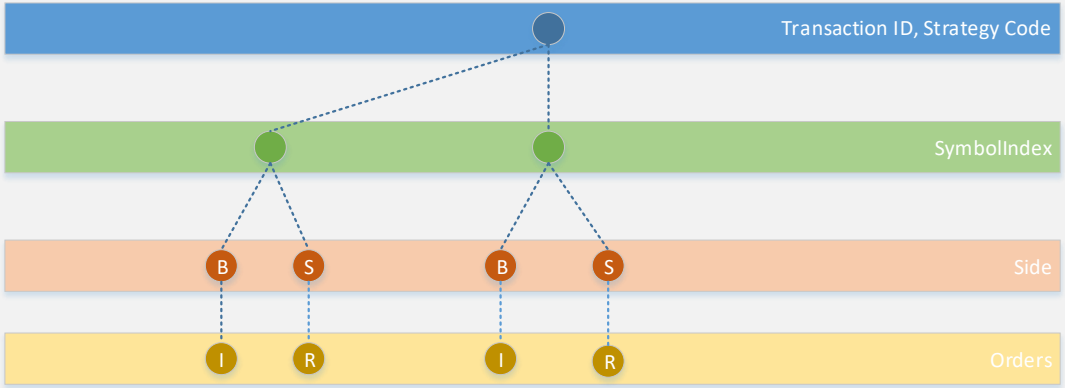
- Indicates the Symbol Index(es) of the traded instrument(s) on which the transaction relies.
  - For each indicated Symbol Index, the client provides the opposite side of the transaction compared to its leading side as defined when it was initiated – with associated price and volume (*Cf. section "Optiq®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

Examples of 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 is independent from the other.

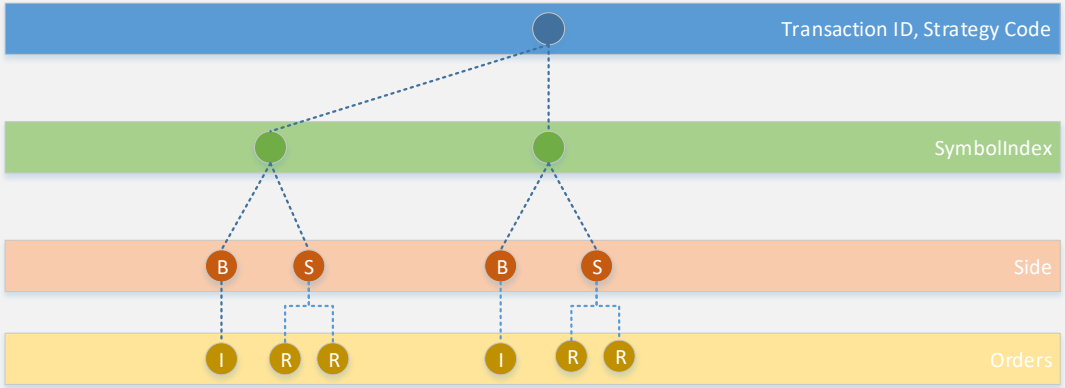
Possible reactor combination 1

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



Possible reactor combination 2

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



Any agreed Wholesale transaction, independent of the type, number of Reactors or any other conditions, must be reported to the market by submitting the 'New Wholesale Order' message to Optiq® as soon as agreed, and at the longest within 15 minutes of the agreement.

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. In the case that there are multiple reactors to one transaction, all reactors must respond correctly within the set timeframe defined for Reactor acceptance and validation, or the full transaction is cancelled.

After the Initiator's submission, a transaction cannot remain in a pending state beyond the End of the Trading session of the involved instrument(s). All pending wholesale transactions that have exceeded this 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 the Initiator.

For any Wholesale transaction that is not validated by the End of the Trading session of the involved instrument(s), there are no public messages sent in MDG.

In the case of a LIS strategy trade, Optiq® does not require the strategy to be created as a tradable instrument on the COB, except for Delta Neutral Strategies.

7.1.3 Optiq® Wholesale Facility Pre-Trade Validation

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

1. Against Actuals and 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. The volume of any LIS Transaction must be above the LIS threshold defined for each contract, which is available in the referential data. The volume for individual submissions participating in the transaction must meet the rules that apply depending on the liquidity category set by ESMA for the Contract and Strategy type. Annex Two "Exchange-Recognised Strategies" of the Trading Procedures identifies strategy types that are always treated as eligible for processing as an illiquid package, 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 instrument, no specific size conditions or checks apply.
    - If the Transaction is a LIS Strategy trade:
        - For a strategy type that is eligible to be processed as an illiquid package, at least one single leg of the transaction must be above the LIS threshold.
          For a strategy type that is not eligible for processing as an illiquid package, the 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 for a single need of liquidity in a single execution. For regular strategies, it is possible to submit partial reactions on a subset of the legs belonging to the strategy; however, for Delta Neutral strategies, although the reaction can be submitted on partial volume, the reaction must be on all instruments belonging to the strategy.

    For AA, EFS, EOO and other pre-negotiated trades, Annex One "Euronext Derivatives Markets: Annexe One of the Trading Procedures - Trading Arrangements" of the Euronext Trading

Procedures identifies times, price check conditions applied for the pre-negotiated transactions per Asset class and where application, the market.

Note: Euronext Derivatives trading members have the ability in Optiq® to aggregate small responses to meet a single need (whether offer or bid) above the LIS threshold, within the same single execution. This allows Euronext Derivatives clients to internalise matching of smaller orders from their own customers (identified through individual Client Within Firm MiFID II shortcodes) against a single LIS beneficiary on the Euronext Financial Derivatives (Index and Equity) Option markets. The execution is then processed on Euronext through the Optiq® LIS facility, in the same way as any listed derivatives wholesale trade, benefitting from the standard clearing and regulatory framework.

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, snapped at the time of the initiation.
    - Daily or lifetime[18] High/Low price recorded for each individual instrument on which the transaction relies, snapped at the time of the initiation.
    - In the 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® Wholesale 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, an 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, an initiated transaction cannot be updated once created, nor can Optiq determine the origin of the mismatch.
3. All prices submitted in a reaction must match the price submitted by the initiator.

7.1.5 Wholesale Referential Data and Optiq® Central Order Book

While the general mechanism / logic of trading patterns and timetables are the same as those for the Optiq® Central Order book, Wholesale submission follows 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:

- If an entire Contract in the Central Order Book enters a regulatory or trading condition (e.g. halt) that blocks submission of wholesale trades, and until this state is lifted, wholesale submissions on the affected Contract are rejected.

[18] Depending on the set-up for the instrument

- 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. The types of Wholesale 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 and tick table that is defined for wholesales set up 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 Wholesale facilities.

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

IN SUMMARY: WHOLESALES

- Wholesale facility is streamlined to use three (3) types of Wholesale 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 that exists within the Derivatives On-Exchange Off-Book Exchange Market Mechanism (EMM). It can be 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-execution requirement from MiFID II.

RFCs can be submitted on Outrights Contracts as well as on any type of Exchange-supported strategies, including delta-neutrals for Commodity Options.

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**, which lasts a predefined period (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.

Four different account types can be sent in the RFC message:

- Client
- House (considered as Non-Client)
- RO (considered as Client)
- LP (considered as Non-Client)

Please note, for the combinations of different account types allowed for Request for Cross, the combination of Client vs. Client is enabled only for Commodities.

For both algorithms a Contract may be set up 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 the COB (best execution).
- Other members 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 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 in the RFC Reactor order book at the moment the RFC Response Period ends. They will be part in the RFC uncrossing sequence and processed together with Reactor responses in the Price-Time logic.

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

The current target set-up[19] 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

[19] Please note that this set-up may be subject to change in the future.

Standard RFC algorithm:

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

- **Step 1: RFC Initiator Improvement**
  Reactor responses and COB orders that improve the RFC Initiator price match with the relevant side of the RFC at the Reactor/COB order's price.
- **Step 2: RFC Initiator Execution at the RFC price**
  Reactor responses and COB orders at the RFC Initiator price match with the relevant side of the RFC.

  Tradable quantity of Reactor responses and COB orders against the RFC can be limited by using a Pick-up Percentage setup at Contract level:

  Remaining Tradable RFC Quantity on side with biggest quantity left =
  Min (RFC Quantity left on each side) x Pick-up Percentage
  + (biggest quantity initiator left between both sides – smallest quantity initiator left between both sides)

  Remaining Tradable RFC Quantity on side with lowest quantity left =
  Min (RFC Quantity left on each side) x Pick-up Percentage

  The calculated Remaining Tradeable RFC quantity is rounded down in favour of RFC Initiator.
- **Step 3: Final Cross Execution**
  Remaining quantity for the RFC Initiator is executed as a cross trade. Unfilled quantity of the RFC Initiator is immediately cancelled.
- **Step 4: Uncrossing of Reactor Order Book**
  Remaining RFC responses with prices that are crossed are matched amongst themselves according to the Price-Time 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 that if there is still a remaining quantity from the COB order left, then that order is not cancelled but rather will continue to participate in the COB without losing its priority.

Client Priority RFC algorithm:

The RFC uncrossing for this algorithm applies priorities on the basis of Account Type. The uncrossing algorithm for RFC with Client Priority consists of six (6) distinct steps.

Case Client vs Client[20]

- **Step 1: RFC Initiator Client 1 improvement** (Client 1 being RFC Initiator Client side against which the Reactors have the smallest cumulative quantity at price greater or equal to RFC price).

  Reactors responses and COB orders (on Client 2 side) that improve the RFC Initiator price match with the Client 1 side of the RFC at the Reactor/COB order's price.
- **Step 2: RFC Initiator Client 1 execution at RFC Price**
  - Reactor responses and COB orders (on Client 2 side) at the RFC Initiator price match with the Client 1 side of the RFC without applying any Pick-up Percentage.
  - Quantity executed on RFC Client 1 side in step 1 and step 2 is called RFC Client 1 Traded Quantity.

[20] Please note, Client vs. Client is enabled only for Commodities, and covers all the following combinations: Client vs. Client; RO vs. Client; RO vs. RO.

- **Step 3: Cross Execution between RFC Initiator Client 1 vs RFC Initiator Client 2**

  If RFC Client 1 Traded Quantity is strictly less than the initial RFC quantity, remaining quantity left from the RFC Client 1 is executed as a cross trade with Client 2.

  At this stage, RFC Initiator Client 1 side quantity is always fully executed.

- **Step 4: RFC Initiator Client 2 improvement**

  Reactor responses and COB orders (on Client 1 side) that improve the RFC Initiator price match with the Client 2 side of the RFC at the Reactor/COB order's price.

- **Step 5: RFC Initiator Client 2 execution at RFC Price**

  If there is remaining quantity left from the RFC Client 2 side, Reactor responses and COB orders (on Client 1 side) at the RFC Initiator price match with the Client 2 side of the RFC up to RFC completion.

  Unfilled quantity of the RFC Initiator Client 2 side is cancelled.

- **Step 6: Uncrossing of Reactor Order Book**

  Remaining Reactor responses with prices that are crossed are matched amongst themselves according to the Price-Time algorithm. Any remaining response is cancelled. The latter does not apply to COB orders which are not fully executed, meaning that if there is still a remaining quantity from the COB order left, then that order is not cancelled but rather will continue to participate in the COB without losing its priority.

Case Client vs non-Client

- **Step 1: RFC Initiator Client improvement**

  Reactor responses and COB orders that improve the RFC Initiator price match with the Client side of the RFC at the Reactor/COB order's price.

- **Step 2: RFC Initiator Client Execution at the RFC price**
  - Reactor responses and COB orders at the RFC Initiator price match with the Client side of the RFC.
  - Tradable quantity of Reactor responses and COB orders against the RFC can be limited by using a Pick-up Percentage.

Remaining Tradable RFC Quantity = Remaining RFC Client quantity x Pick-up Percentage

- **Step 3: Cross Execution between RFC Initiator Client vs RFC Initiator Non-Client**

  Remaining quantity left from the RFC Client is executed as a cross trade with RFC Non-Client side.

  At this stage, RFC Initiator Client side quantity is fully executed.

- **Step 4: RFC Initiator Non-Client improvement**

  Reactor responses and COB orders that improve the RFC Initiator price match with the Non-Client side of the RFC at the Reactor/COB order's price.

- **Step 5: RFC Initiator Non-Client Execution at the RFC price**

  Reactor responses and COB orders at the RFC Initiator price match with the Non-Client side of the RFC.

  Unfilled quantity of the RFC Initiator Non-Client side is cancelled.

- **Step 6: Uncrossing of Reactor Order Book**

Remaining Reactor responses with prices that are crossed are matched amongst themselves according to the Price-Time algorithm. Any remaining response is cancelled. The latter does not apply to COB orders which are not fully executed, meaning that if there is still a remaining quantity from the COB order left,

then that order is not cancelled but rather will continue to participate in the COB without losing its priority.

Case Non-Client vs Non-Client

As Client Priority RFC algorithm is to be applied for cases involving a Client side. In this particular case, Standard RFC algorithm is applied.

7.2.2 RFC Process and Conditions

RFCs can only be submitted if the instrument is in Continuous phase. Only one RFC can be active for a given Outright 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 and quantity for the RFC Initiator and the RFC Reactor.

In terms of quantity checks, Optiq ensures that:

- RFC Initiator order is equal to or above the RFC Initiator Minimum Quantity parameter defined at Contract level;
- Reactor(s) RFC order(s) size is(are) equal to or above RFC Reactor Minimum Quantity parameter at Contract level;

Else, the incoming RFC order is rejected.

Additionally, Optiq performs the following price checks on the RFC orders submitted for Outrights and Strategies:

1. RFC price must be within the Dynamic collars.
2. The price submitted by the RFC Initiator is validated as follows:

For Financial Derivatives:

- RFC on Outrights and delta-neutral strategies are checked against Central Order Book best bid/offer. Prices lower than the Best Bid or higher than the Best Offer are rejected even if only one side is present in the book.
- For Strategies, the price is also validated against the BBO prices of the strategy in the Central Order Book but the prices of each leg are not validated against the BBO prices of the individual leg in the Central Order Book.

For Commodity Derivatives:

- RFC on Outrights and delta-neutral strategies are checked against Instrument Daily High/low. RFC prices that do not fall within the Daily High/Low are rejected. If there is no Daily High/Low, the system skips this validation.
- For Strategies, the price is also validated against the Daily High/Low prices of the strategy in the Central Order Book, but the prices of each leg are not validated against the Daily High / Low in the Central Order Book.

3. For Strategies, the initiator can submit the net price of the strategy and Optiq will automatically determine the price for each leg based on the strategy's net price, along with the legs' reference prices (DCRP). This feature is optional, allowing clients to still specify individual leg prices, which will then be validated accordingly.

4. For Delta Neutral, the prices of the individual legs must be within the DN DCRP Adjusted strategy leg that Euronext calculates each time it receives an RFC Delta Neutral order 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)]

   The DN leg collars are calculated 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 leg

   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", "RFC Reactor 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-trades. This results in the following behaviour per segment:

- **Commodities Derivatives segment:** RFC Responses are rejected if the ExecutionWithinFirmShortCode and FirmID are the same in the RFC Response and the RFC Submission sent by the Initiator.
- **Financial Derivatives segment:** RFC Responses are rejected if the FirmID is the same in the RFC Response and the RFC Submission sent by the Initiator.

In addition, 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 which RFC Response to cancel.

Publication in Market Data

RFC Publication is a parameter defined at the 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 the activation of an RFC order. If a RFC is received while another one is in progress, the newly received RFC is rejected. This means that, 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:** The price and the quantity of the original RFC order will be subject to different publication rules depending on the product type:
  - Financial Derivatives – when the RFC Initiator order quantity is below the LiS minimum volume of the Contract, the price and quantity of the RFC are published. Instead, if the RFC Initiator order quantity is equal to or above the LIS minimum volume, the RFC initiator prices and quantities are not published, benefiting from the LIS waiver that allows these orders to be exempt from market data pre-trade publication.
  - Commodity Derivatives – price and quantity will not be disclosed through market data gateway.

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 in the RFC matching for a Contract, the COB orders are not published at the end of the RFC Response Period (as individual RFC Responses), because they were already published when entering in the COB. Examples can be found in the Appendix A4.
- **Client Priority RFC algorithm**:
  - Financial Derivatives - when the RFC Initiator order quantity is below the LIS minimum volume of the Contract, all RFC responses are published aggregated by price. On the contrary, if RFC Initiator order quantity is equal to or above the LiS minimum volume threshold of the Contract, the RFC Initiator order and RFC Responses are not published. Examples can be found in Appendix A3.
  - Commodity Derivatives - RFC Initiator order, RFC responses and COB orders are always published aggregated by price.

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 an RFC Initiator and an RFC Reactor order or a COB order included in the Reactor's book. After the uncrossing of the RFC Reactor order book, all remaining Reactors' orders that are not fully executed are then removed from the uncross book. This results in 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) is also captured via dedicated Statistics (1009) message for each instrument. This means a statistics message is sent to the market each time:

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

7.2.3 RFC Autojoin functionality (available on Euronext Derivatives Amsterdam only)

The RFC Autojoin functionality gives RFC initiators the possibility to specify, upon submission of a Request For Cross, a max/min tolerable price the participant is willing to trade at.

It is configurable at Contract level, valid for Outrights and recognized Options Strategies, and is:

- optional (meaning that the initiator may choose whether to join the price improvement or not)
- authorised only when the RFC Algorithm is Client priority RFC
- applies only when Account Type combinations are:
  - Client (1) vs House (2)
  - RO (4) vs House (2).[21]

[21] Please note, Client vs. Client is enabled only for Commodities, and covers all the following combinations: Client vs. Client; RO vs. Client; RO vs. RO.

The RFC uncrossing for this algorithm applies priorities on the basis of Account Type and follows the described logic:

- Responses that improve the price at which the RFC was initiated match with the relevant side of the RFC Initiator in the following priority:
  - If 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 Non-Client, and the auto-join functionality is activated for the contract, the Client leg of the RFC Initiator is matched against (i) the RFC Reactors and (ii) the auto-join orders up to the Tolerable Price defined by the RFC Initiator:
      - First, the Client leg of the RFC Initiator is matched against the RFC Reactors' orders with prices that are better than the Tolerable price, by Price-Time priority
      - If there is any remaining quantity, the Client leg of the RFC Initiator is matched against orders at any price between the Tolerable price (included) and the RFC Price (excluded). At each price level, the same quantity is executed against the Reactor(s) and the auto-join orders from the RFC Initiator. If the quantity to be executed is an odd number of lots, the RFC Initiator will be allocated the spare lot.
- Any remaining responses having a price equal or worse than the RFC price will follow the Client vs Non-Client matching logic described above.

Autojoin is valid on both Outrights and recognized Option Strategies. For both Outrights and Option Strategies, the same trading and pricing rules apply for the Autojoin functionality. For strategies, the following specific validations apply:

- Validation of the Order Tolerable Price field on Cross Order messages results in rejection only for Delta Neutral strategies and Futures strategies (including ICS or RICS).
- A validation on leg quantities ensures that all legs in the Cross Order message have a size equal to or greater than the defined RFC Autojoin minimum quantity.

7.3 TOTAL RETURN FUTURES (TRF) SERVICE

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

This is accomplished as follows:

- One party, a Buyer holding a 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, the Buyer must pay the asset owner, i.e. the Seller holding the 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 for trades done in basis points.

TRFs use indices for their pricing and calculations. The TRF currently offered by Euronext is based on the returns of the CAC 40® Index, and the funding rate is based on ESTER.

Advantages offered by TRFs to market participants are:

- Provides a listed solution to the increased capital requirements arising from regulatory changes for trading OTC transactions.

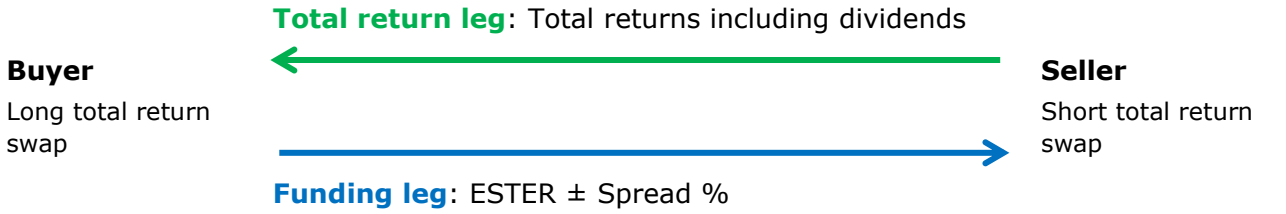
- Strong margin offsets when trading Euronext Futures. TRF allows investors to benefit from margin efficiencies while trading through the centralised order book.

The TRF is CCP cleared. 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 rate 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

The TRF 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.

The Synthetic Index price, which is publicly available[22], is calculated as follows:

$$\begin{aligned} &Synthetic\ Index\ Price \\ &= Underlying\ Index\ Level + Underlying\ Cumulative\ Dividend\ Index \\ &- Underlying\ Funding\ Index \end{aligned}$$

The 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 the calculation in points, values used in pricing may be positive, negative or zero.

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

TRF Trading Methods

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

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

The 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) e.g. 50 bps	Futures price in index points 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 CFTS:

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, DSP, 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:

Buyers →

TRF CAC40 Dec Expiry			
Bid		Offer	
Qty (lots)	Price	Price	Qty (lots)
300	50.0	50.0	300
420	49.5	50.5	250

← Seller

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

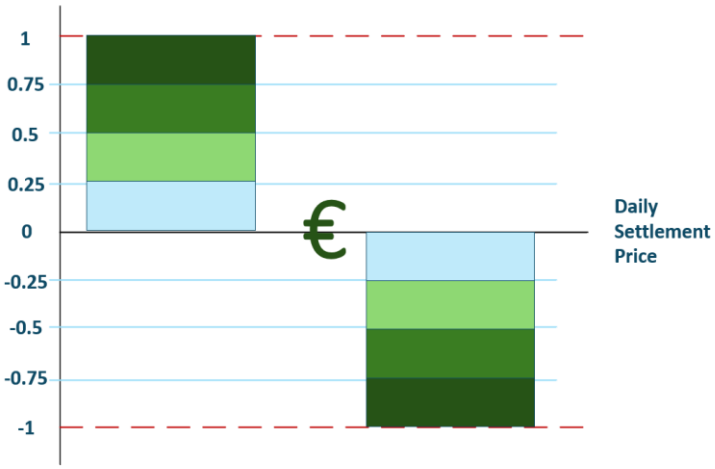
7.4 TRADING AT SETTLEMENT

Trading at Settlement (TAS) is a trading facility that allows market participants to buy or sell an eligible future contract during the trading date at a price that represents the spread compared to the Daily Settlement Price of the future contract.

This facility is made available to participants through dedicated TAS future contracts that are linked to the corresponding standard future contracts on Commodities (EBM, ECO and EMA) via *Linked Symbol Index* field.

The minimum price fluctuation (tick) for TAS orders is 0.25. Orders can be entered at the settlement price or at a differential of up to ±4 ticks. The number of ticks represent the spread in relation to the Daily Settlement Price.

For example:



During the Continuous Trading, TAS trades are disseminated as provisional trades with prices expressed in Spread.

At the end of trading, once the DSP is determined:

- Provisional TAS trades are converted into final trades and disseminated on the linked standard contract
- Final trade prices are expressed in monetary value
- Positions are transferred from the TAS Future contract to the corresponding linked standard contract

Final prices are calculated based on the following formula:

$$Final_{Price} = Trade_{PriceTick} + DSP_{StandardInstrument}$$

where:

- DSP = Daily Settlement Price of the Standard Linked Future

TAS orders are matched on first-in/first-out basis (FIFO). Supported order types are Limit and Market orders. Good-Till-Cancelled (GTC) and Good-Till-Date (GTD) are not permitted.

Trading is only allowed in the central order book (EMM = 1).

Calendar Spreads on TAS will be made available in the future.

8. MARKET MAKING

Market Makers (MMs) are required to maintain bid and offer prices in all individual order books of the contract for which they are obliged to provide liquidity, ensuring maximum trading opportunities are realised.

The Exchange can define different MM roles on a given contract, each characterised by a set of rules of presence that the MM must meet. Examples of MM roles in the Euronext Derivatives Markets are i) Market Maker Agreement (MMA), ii) Market Maker Scheme (MMS) and iii) Market Maker for Extended Hours (MME, on some index futures only).

A Euronext derivatives member (identified by a Member Firm ID) can either be MMA or MMS, on a given contract, during the daily session. For those contracts where the MME role is available, a MM can either be MMA or MME during the evening session.

MM registration is per Euronext member firm (FirmID) and per contract. As an example, a Firm (identified through its Firm ID) acting as MMS for contract A cannot be at the same time an MMA for Contract A, but it can be an MMA for contract B.

Optiq® identifies a MM desk within a Firm based on both the FirmID and an Executing Within Firm Short Code (EWFSC).

The 'MM Sign-In' message allows the MM to be identified as MM with its Execution Within Firm Short Codes (EWFSC), and thus allows it to use MM functionalities.

In addition, the 'Sign-In' message allows the MM 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. Like other MM messages, the Sign-In message cannot be sent cross-partition, but on different Logical Accesses of the same Firm. By specifying the same EWFSC it can replace, update, or get data.

MMs sign in before their trading session on Optiq®. The sign-in must be done after the technical log-in to the platform at session level, for each MM (FirmID / EWFSC), for the list of contracts on which the MM will provide liquidity during the session and on which it may want to activate MMP. Any attempt to sign in on a contract on which a MM (FirmID / EWFSC) does not have MM authorisation is individually rejected.

Practical Note:
Identification must be done after the technical log-in to 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 set up Market Maker Protection.

Any sign-in attempt on a contract on which the Firm does not have Market making authorisation will be individually rejected.

Firms registered as MM have the possibility to request dedicated MM Logical Accesses for the Optiq® Order Entry Gateway, allowing them to access the MM Order functionality. This functionality enables the submission of quote messages containing many two-sided orders in a single message.

8.1 MARKET MAKING SPREAD OBLIGATION FRAMEWORK

Market Quality Spread (MQS) is the widest spread between the bid and offer sides that MMs are obligated to maintain in each contract. The contract and associated presence obligations are specified by the Exchange in the relevant documentation. Market Quality Spread (MQS) is set with the values defined in the MM obligations (see section "Trading Safeguards").

8.1.1 Market Making Framework

Euronext introduces with Optiq® the granularity of the MM Key to support customers' market making activity. This granularity is defined as a sub layer under the customer's Member Firm ID.

The MM key designates the combination of the Firm ID and a declared EWFSC:

MM Key = (Firm ID + EWFSC)

In the MiFID II framework, an EWFSC designates any entity (e.g. trading strategy algorithm, individual trader) that submits orders to the market. From an Optiq® perspective, a key is such an entity.

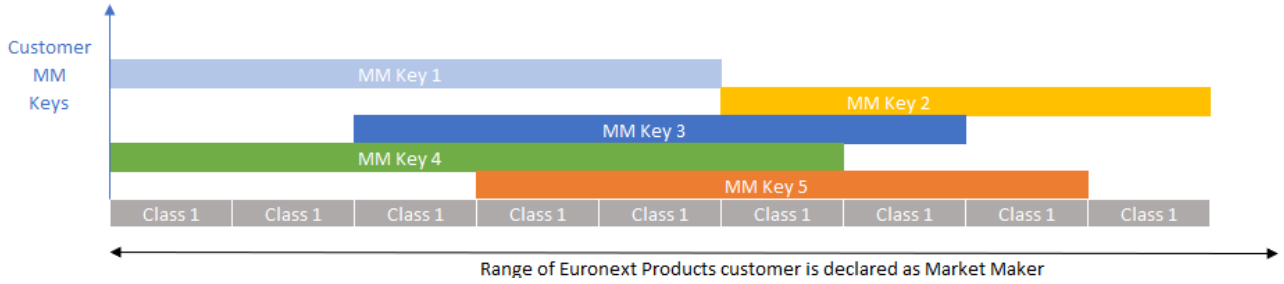
Euronext uses the MM Key to provide customers with the maximum granularity for their MM algorithms, as well as risk management. The purpose of this section is to illustrate how MMs can make the most benefit of the Optiq® MM framework.

Use of multiple MM Keys across range of contracts

Through the Optiq® Sign-In mechanism, a MM declares a key as active on a given contract. Optiq® registers this key and allows the submission of quotes and orders through a MM Logical Access. A key can use any MM Logical Access to support its quoting activity.

The MM Sign-In mechanism also allows this key to define, for a given product (class or contract), risk parameters for the Market Maker Protection (MMP) facility.

A MM can declare the same key across multiple contracts. This is illustrated in the following diagram:

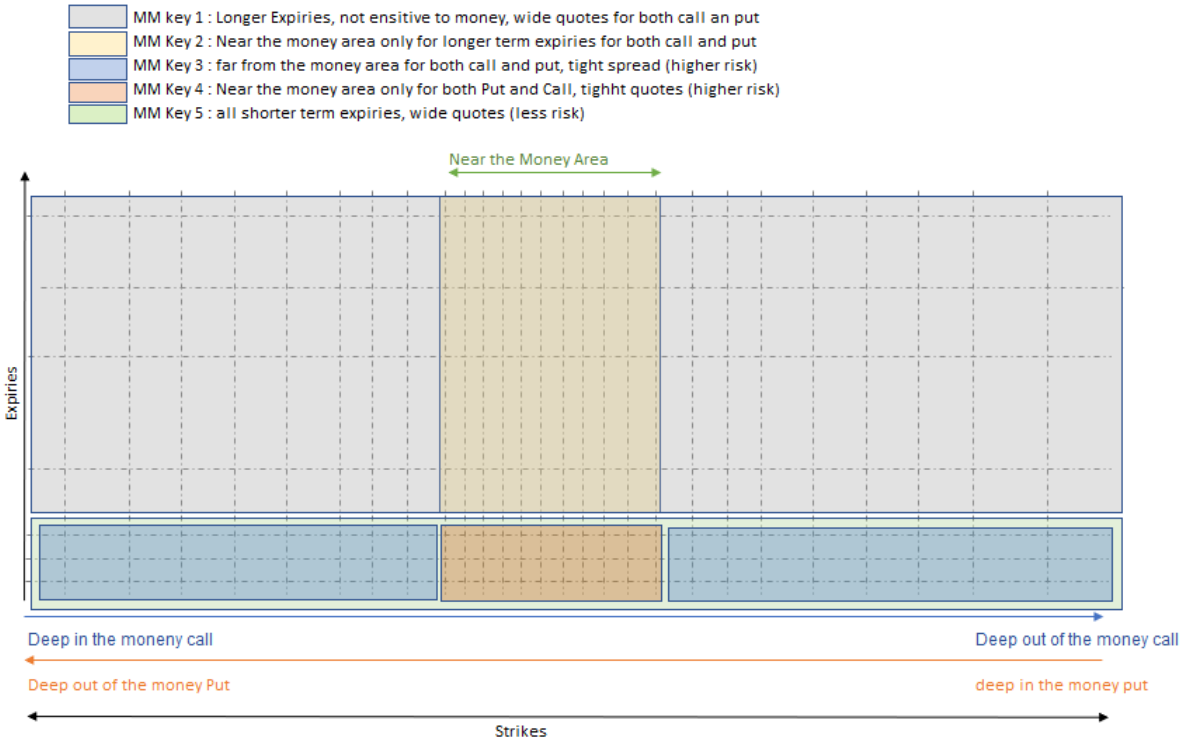


Use of multiple Keys for a given Product (Class)

A MM can take multiple parameters into account for its different trading strategies:

- Volatility
- Underlying Price versus 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 and orders. By using multiple MM keys – identifying a change in the decision – MM has 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 are simultaneously active:



As a reminder, Optiq® offers three complementary features with regards to such set-up:

- 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 do not trade against one another
- MMP at MM Key level
- Mass Cancellation at contract (Class) + Key level.

This allows to anticipate multiple scenarios as per the examples below (below keys refer to the example above):

- Volatility increases, even though MMP is not triggered: if the MM deems the strategy of MM Key 4 too risky, it can pull out MM Key 4 contribution on Near The Money (NTM) area for short maturities individually, through Mass Cancel at key level. This would not pull all quotes of other keys out, and the MM 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 has its orders and quotes pulled by Optiq®. This allows the MM to have a very granular risk management on the overall contract:
  - MM can aggregate all keys' MMP positions across the class to have an overall position.
  - MM can define a dedicated risk policy (delta/volume) for each individual key.
- With movements of the underlying prices, quoting activity adapts seamlessly: the NTM area moves and triggers start of quoting of the relevant keys. This contribution would add to the wide quoting contribution (i.e. fall-back strategies, MM keys 5 and 1).

Fall-back strategy is not mandatory if there is full coverage of strikes by other keys and it is not deemed necessary. All these trading keys act in parallel, but an individual key situation (e.g. MMP triggered) can be used by the MM as a trigger for a global action (Mass Cancel at Firm ID level).

Focus on Risk management

Through MMP at each key level, the MM benefits from alignment between its set-up and the Exchange. MMP follows the set-up MM decides to put in place. The MM can make the decision on how many keys

are used, the strategy it would define for each one, and declare them in Optiq®. Optiq® provides back to the MM the possibility to define a risk set-up on both delta and volume for each individual key.

Self-Trade Prevention (STP) 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. A MM with multiple desks that might interact can decide which key could match the others and decide the related Self-Trade Prevention set-up. As a reminder, STP is provided at each 'Quotes' or 'New Order' message.

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 comes with the use of MM Logical Accesses versus Trading Logical Accesses. Only MM Logical Accesses can submit MM-related messages:

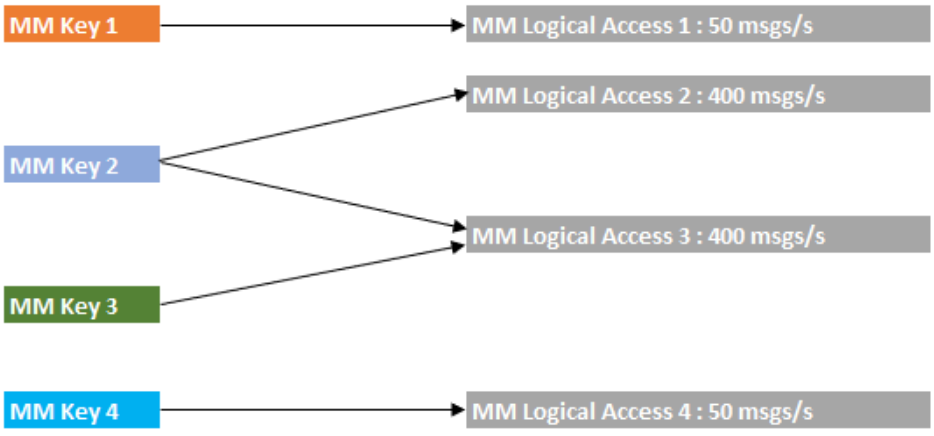
- MM Administrative messages:
  - MM Sign-In: declaration of a key on a product
  - MMP messages
- quotes messages.

Still, Trading Logical Accesses can submit orders flagged with account type 6 'Liquidity Provider' (LP) for contribution to the MM activity.

Each Logical Access ordered comes with a set capacity in terms of throughput (number of messages per second). MM have the possibility to freely allocate Logical Accesses – and therefore throughput capacity – to their MM 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 the diagram below:



MMs are completely free in the way they allocate their capacity to their different trading strategies without any constraint enforced by Optiq®. The only element to pay attention to is with regards to MMP unsolicited messages sent by Optiq® towards MM.

As a reminder, 'MMP Ack' messages can be sent by Optiq® in two scenarios described in the technical documentation:

- solicited messages: sent as a response to an action received from the MM (e.g. setting of protection, change of threshold)
- unsolicited messages: sent by Optiq® to update MM position versus thresholds upon trade.

If a key is using multiple Logical Accesses, Optiq® does not know up front to which Logical Access it should route the unsolicited messages. Therefore, Optiq® requires each key to indicate at Sign-In level the Logical Access to which to route messages. In any case, Optiq® will route the messages to the Logical Access provided by MM in the Sign-In message.

MM can choose to have multiple implementations to handle this:

- for each MM key, define a 'lead Logical Access' which is used for both quoting and administrative messages from this key (for example in the above, MM Key 2 would declare MM Logical Access 2 as lead).
- for all MM 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 supports independence of the different MM Keys, while the second supports centralisation and a dedicated process for risk management that does not interfere with quoting (no MMP messages in the quoting LAs queues, whether in submission or reception).

Note: MMP considers both quotes and orders flagged as LP to be submitted by MMs, whether the last are submitted via a Trading Logical Access or a MM Logical Access. MMs can define a 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

MMs should be aware that MM performance monitoring is not done at MM 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.

8.1.2 Market Quality Spread: Spread Obligation framework

Spread obligations are defined by the Exchange 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 price which may differ between expiries to distinguish obligations of presence for longer term instrument compared to shorter term ones. Each spread class definition provides bid values for several layers of Time To Expiry (TTE) defined in terms of months. Within each TTE, one or more expiries can be included, depending on the expiry cycle of the related contract.

For each TTE layer, 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 instrument prices to their low or high bounds (i.e. low-priced or high-priced instruments), this rule may not be applicable. As such, for each TTE layer, three sub-layers are defined based on price criteria (low bid, standard bid, high bid) to compare the bid price with:

- *low-priced instrument*: if the observed instrument's best bid price is lower than the low bid threshold, a fixed spread is applied;
- *standard instrument*: if the observed instrument's best bid price is higher than the low bid threshold but lower than the high bid threshold, a relative (%) value is applied;
- *high-priced instrument*: if the observed instrument's best bid is higher than the high bid threshold, a fixed spread is applied.

Example

Spread Class "X"			
TTE (expiries up to # of months)	**Bid up to (€)**	**Spread**	
9	8.33	0.25	*low-priced 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	*high-priced instrument (implying price range from 50 to infinity)*
18	8.33	0.5	*low-priced instrument*
	50	6%	*standard instrument*
	∞	3.00	*high-priced instrument*
∞	8.33	0.75	*low-priced instrument*
	50	9%	*standard instrument*
	∞	4.50	*high-priced instrument*

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 MMs 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 identified either as normal market operation (set to 1) or widening by the provided value in the real-time MDG message. Messages regarding AQS multiplier change are for informational purposes only. It is the responsibility of MMs to alter their quoted spreads as appropriate.

8.1.4 Reference Spreads: Static Daily Referential

As described in the dedicated section (see "Trading safeguards"), each day MMs are provided with a Reference Spread table identifying Authorised Price Fluctuation (APF). In the daily standing data files, for each contract MMs are provided the spread class to which it is associated.

The spread classes provided in the MM obligations are covered by the Authorised Price Fluctuation configurations. Compared to spread classes, Reference Spreads (APFs), for each configuration, provide information for each TTE. Per TTE and price threshold, this indicates:

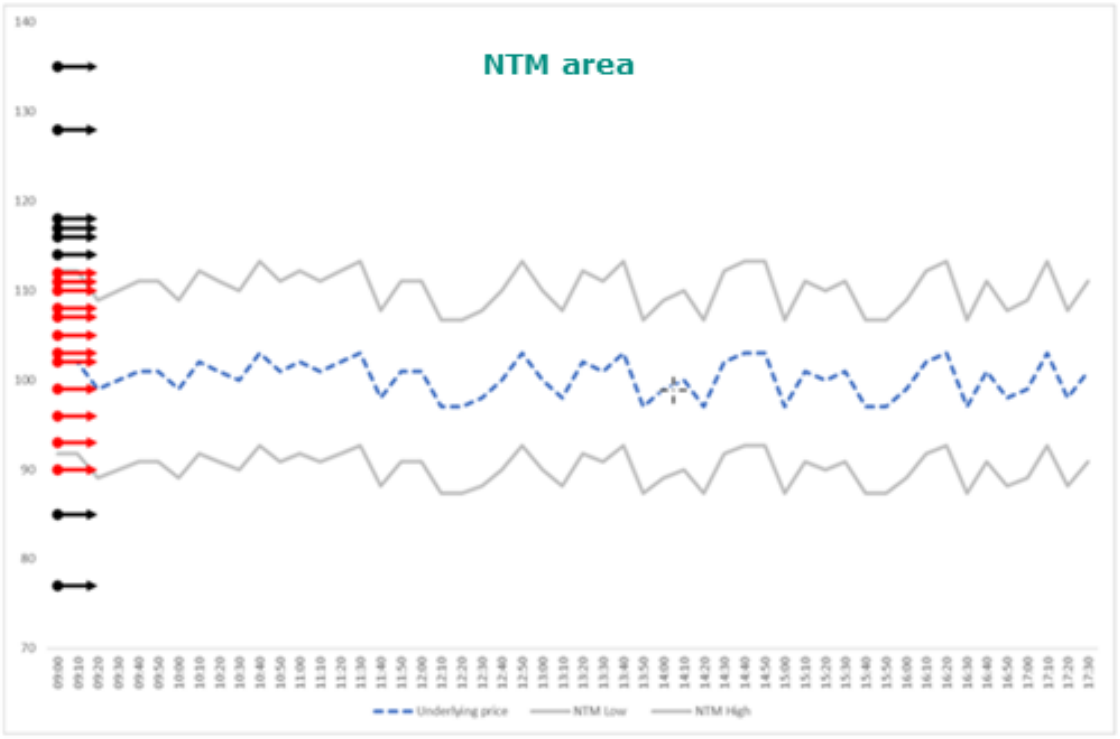
- The Market Quality Spread (MQS). If the Reference Spread (APF) configuration corresponds to a MM spread class, the MQS indicated in Reference Spread (APF) tables will match the spread indicated in MM obligations.
- The default Actual Quality Spread multiplier applicable for the day (see previous section on "Actual Quality Spread Multiplier").
- The Collars Multiplier (see section on "Trading safeguards").

The two multipliers should be applied to the MQS to get respectively the AQS and Collars spreads.

Note that there is no differentiation of applicable spread depending on market phases (Call versus Continuous) and associated trading mechanism (order collection period or open trading).

8.2 NEAR THE MONEY AREA (NTM) DEFINITION (OPTIONS ONLY)

At the beginning of the day, the Near The Money (NTM) area is defined as +/- 10% of the option's underlying previous day closing price[23]; afterwards, it is dynamically calculated during the trading day every time the underlying price changes (i.e. underlying's last traded price / last index value[24]).



The minimum number of series to be quoted by a MM each trading day and for each required expiry is defined as a % of the number of series available within the NTM area per each required expiry at market opening, rounded up to the nearest integer.

To meet MM obligations, the minimum number of series to be quoted by a MM per each required expiry of a given option contract must be within the NTM area dynamically updated throughout the trading date per each required expiry.

During the trading day, the minimum number of series to be quoted per each required expiry does not change. It may change from one trading day to another, depending on the NTM area calculation performed at market opening of each trading day.

Example

For a given option contract, at the market opening of day T, there are:

- 100 series available within the NTM area identified for the front expiry, and
- 50 series for the NTM area identified for the back expiry

(assuming MM obligation is on the front and back expiries only).

Per each required expiry, % of series to be quoted within the NTM area = 40%.

This implies that the minimum number of series to be quoted by a MM on day T is equal to:

- 40 series on the front expiries, and
- 20 series on the back expiry.

[23] Disseminated in the Standing Data file each morning.

[24] FTSE Indices values and updates are not disseminated by MDG.

MMs can choose the 40 series on the front expiry and the 20 series on the back expiry, provided that those series are within the NTM area dynamically updated throughout the trading day per each required expiry.

8.3 MARKET MAKER ORDERS: QUOTES

When a Firm 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. MM Logical Accesses must be requested explicitly with the functional access role of MM.

A MM 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 of one bid or one offer, while a double-sided quote (DSQ) consists of one bid and one offer. Therefore, each individual quote 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.

The maximum number of DSQs available in a single quote message is 30 (60 single sided orders) and allows the MM to update its quotes on up to 30 instruments in a single message.

8.3.1 Validation of Quotes

Within each contract, only Firms that are registered as MM for that contract are allowed to submit quotes messages. Firms registered to submit quotes messages can also enter any other order types in the COB using the same Logical Access. This means that for a Firm set up as MM, the same Logical Access set-up to submit quotes may also be used to submit order messages. However, a Logical Access with a functional access role set to Trading or RiskGuard is not allowed to submit quotes. Only registered MMs are allowed to request MM Logical Accesses.

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 as 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.

Quotes may be entered during Call, Reserved or Continuous book states and are also considered by the STP mechanism.

8.3.2 Processing of Quotes

Each Single-sided quote contained in the quotes message effectively acts as a limit order and has all the attributes of a limit order. When a SSQ or DSQ is submitted, it replaces any existing SSQ/DSQ of that MM (identified through the unicity of Member Firm ID and EWFSC) in that instrument 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.

The quantity provided in the update of a quote is used by Optiq® exactly as submitted (i.e. as displayed on screen). The total quantity (equal to the sum of the on-screen quantity and the previously matched quantity) is updated by Optiq® accordingly, i.e. increased or decreased on the delta between the previous on-screen quantity and the update. Handling of quantity updates for individual order messages works differently since for an individual order a modification of the quantity is submitted as delta, as for 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 quotes in the same Outright are submitted with altered account and posting information.

It is worth noting that SSQs/DSQs:

- are included in the calculation and trading of Implied prices in real time, like a standard explicit order;
- are validated against Dynamic Collars. 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 COB;
- do not persist in the COB if the originating MM logs out or is disconnected.

8.4 MARKET MAKER PROTECTION (MMP)

The MMP functionality implemented in Optiq® is designed to prevent too many simultaneous trade executions on quotes provided by a MM, 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 or for a contract, exceeds a set protection type limit, a pre-defined action is then taken.

MMP considers quotes and standard orders flagged with LP account type, and per single trading desk (identified under MiFID II by the couple [Firm ID, EWFSC].

MMP applies during Continuous Trading only (during Uncrossing all trades are executed by Optiq® at the same time, thus making this protection unapplicable).

MMP data are maintained for whole trading day, independent of the MM login sessions, therefore they can be updated only upon the MM sending a specific MMP reset instruction for the specific MM Key.

The TPV mechanism, which ensures fair participation of all order types, also i) guarantees MMs a fair protection of their quotes during any trading phase, and ii) limits the risk of breaching MMs' protections realised after the first trade following the Uncrossing.

8.4.1 Configuring MMP

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 MM on a contract can set up MMP for an individual MM desk (Firm ID, EWFSC).

At the beginning of each MM trading session, all protections are set to be inactive; Protection Limits and Protection Positions are both set to zero. Once signed in, a MM can activate MMP for each contract. If MMP is activated during the day, Protection Limits and Protection Positions are always zero at activation, irrespective of whether the MM has executed any trade in the contract before.

At the time of activation, the MM 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:

- Ignore: no check takes place, and any limit set is ignored (notification sent to MM but quotes not pulled);
- Pull: All MM quotes, and where applicable MM orders, submitted in the contract for the specific MM Key are pulled and further quotes submitted are rejected.

If the MM updates the limit by setting 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.

8.4.2 MMP Types

Optiq® supports the two following Market Maker Protection types:

- Delta Protection
- Volume Protection

Delta Protection is dedicated to Options products, while Volume protection is available for Options and Futures. 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.

8.4.3 Processing MMP

Whilst MMP is active for a specific protection type, every time there is a MMO trade (i.e. a Market Maker Quote), the following steps are applied:

- recalculate the new cumulative Protection Position for that contract
- compare the new calculated positions in absolute magnitude (i.e., ignoring any sign) to the MM configured Protection Limits
- if the Protection Limit is breached (one lot over the limit), trigger the Limit Breach Action
- send to the MM an Updated Position message including the following information:
  - The MM cumulative Position for that contract;
  - The MMP Limit for that contract;
  - Whether the MM DSQs in that class have now been pulled because 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, MMP does not prevent the limit from being breached.

Trades executed during the Uncrossing process update the Protection Positions of the MM, 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 trading, if a single incoming order results in multiple trades against the same MM's orders, it is possible for the MMP Limit to be breached by the first trade, but no limit checking will take place until after the last trade.

When an MMP 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 MM 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 have been processed.

Following the breach, any further quote messages submitted from that MM will not be accepted for that contract until the MM performs one of the following actions:

- Amends its 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 MM will not be accepted for that contract.

8.4.4 Calculating Cumulative Positions

The cumulative position can be calculated in the same way as for trades resulting from quotes. However, if a MM is not restricted to quotes, but is allowed to submit other standard order types, the cumulative position is calculated considering quotes and standard orders submitted, based on the LP account type.

Volume Position

Volume Protection monitors the MM cumulative traded volume of a contract. After each trade of a quote / MM standard order, Optiq® recalculates the cumulative Volume Position of the MM as follows:

$$NewV_{Position} = CurrentV_{Position} + VolumeTraded \times Unit\ of\ Trading$$

For Options: added "VolumeTraded x Unit of Trading[25]" 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

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 the Greek which indicates by how much money an option will increase or decrease in value with a €1 rise or drop in the underlying asset price, which also translates to the amount of profit or loss the MM will make when the underlying asset rises or drops.

The cumulative Delta Position allows a MM to assess the risk of taking certain option positions. The MM can then weigh the strength of its expectation against the risk implied in the option's delta value and select the options that best suit its expectations by setting appropriate Delta Protection Limits.

After each trade originated by a quote / MM standard order on an option, Optiq® recalculates the cumulative Delta Position of the MM as follows:

$$New\Delta_{Position} = Current\Delta_{Position} + (\Delta_{Option} \times OptionVolumeTraded) \times Unit\ of\ Trading$$

For example, a MM configures a Delta Protection Limit to 100. Trades executed during the uncrossing cause the MM 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.

[25] Unit of Trading in the contract specifications was previously referred to as Lot Size. In standing data this field is Trading Unit.

For delta neutral strategy trade, the Delta is assumed to be zero, therefore no delta position update is made.

For Futures:

A Delta protection for Futures works in the same way as volume protection but considering the side of the trade (buying or selling) to adjust the position (resp. increment or decrement). After each trade on a quote / MM 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.

9. RISK MANAGEMENT SERVICES

Optiq® offers risk management services which assist clients in reducing their daily operational and trading risks, including Euronext RiskGuard (ERG), Self-Trade Prevention (STP) and Cancel on Disconnect (CoD) mechanisms.

9.1 EURONEXT RISKGUARD

Euronext RiskGuard aims to provide Risk Managers (RMs) at Clearing Member firms and Trading Member firms with the ability to set pre-trade risk controls 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.

Euronext RiskGuard provides the Suspend and Block features to address MiFID II regulatory requirements and offers the extended risk control feature of Order Size Limit (OSL) and Maximum Exposure Position (MEP). This service extends to all asset classes traded via the Euronext Derivatives Central Order Book. In RiskGuard on Optiq®, 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 and Block

The Suspend and Block features provide Risk Managers at Clearing Member firms (GCMs) with a fast and efficient way to halt trading activity at the Exchange if a trading firm breaches its obligations to its clearer. The functionalities are similarly provided to Risk Managers at Trading Member firms (NCMs / ICMs) to halt trading activity for their trading firm, for one or more of the firm's Logical Accesses or for 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. The Block command has similar functionality but is executed for an individual Contract.

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, EWFSC or the Client Identification Short code, as well as the MiFID II DEA flag. This functionality allows the GCM to pull orders and stop an NCM's trading activity; it is also available to NCM/ICM members for their own trading firm.

9.1.2 Order Size Limit (OSL)

OSL 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.

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9.1.3 Maximum Exposure Position (MEP)

MEP provides Risk Managers with the ability to prevent the risk-monitored entity from trading beyond a financial limit. The Exposure must be set in quantity (standard contracts or, for equity derivatives, underlying shares) at a contract level and is valid for the day. It is computed considering open orders and quotes (where applicable), as well as executed trades (included wholesale transactions) on the contract during the current trading day.

When setting MEP at contract level, the RM:

- must specify the Long Exposure (MEP Long) and the Short Exposure (MEP Short) which are the MEP Limits, i.e. the maximum Long and/or Short acceptable values and can be set asymmetrically i.e. MEP Short can have a value different from the MEP Long, but both expressed as a positive integer number
- may optionally specify up to three MEP Thresholds, expressed as a percentage of the MEP Limit (always below 100%)
- must configure a specific Breach Actions to be triggered in case of breach of each of the preconfigured MEP Limits and MEP thresholds.

In particular, the available Breach Actions are:

- 0 = No Action, Alert Only: an alert is sent to RM indicating that a given limit (MEP Limit and/or MEP Thresholds) was just reached. This specific action does not impact the new inbound messages coming from the risk monitored entity neither the orders already in the book. It means that if a MEP Threshold is breached, orders are still accepted and only an alert is sent. In this case, as no action is triggered no notification is sent to the risk monitored, but only to the Risk Manager. No other restrictive action is trigger
- 1 = Accept Actions that Decrease Position Only: an alert is sent to RM and to the risk monitored entity indicating that a given limit (MEP Limit and/or MEP Thresholds) was breached and the Breach Action has been triggered. This specific action has an impact on the acceptance / rejection of the new inbound messages coming from the risk monitored entity, however no impact on the resting orders. Only inbound messages that will result in a decrease of the Exposure will be accepted.
- 2 = Block Only: an alert is sent to RM and to the risk monitored entity indicating that a given limit (MEP Limit and/or MEP Thresholds) was breached and the Breach Action has been triggered. This specific action has an impact on the acceptance / rejection of the new inbound messages coming from the risk monitored entity, however no impact on the resting orders. No inbound messages on the impacted contract will be accepted by Optiq® except “Mass Cancellations”. An action is required by RM to allow the risk monitored entity to restart its trading activity.
- 3 = Block and Pull All Orders: an alert is sent to RM and to the risk monitored entity indicating that a given limit (MEP Limit and/or MEP Thresholds) was breached and the Breach Action has been triggered. This specific action has an impact on the new inbound messages coming as well as on the orders already on the book regardless of the side of the breach. When this action is triggered, any new incoming message from the risk-controlled entity is rejected except for the “Mass Cancel”, and all open orders are deleted.

For more details on Euronext RiskGuard, please refer to the document "Euronext RiskGuard - How the service works”.

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 or quotes on the same instrument, from the same Member Firm (i.e. with the same Member Firm ID). The mechanism applies to orders and quotes that are submitted via OEG private messages, for a pre-defined sub-set of Account Types as defined below.

This functionality prevents the matching of two opposite orders or quotes that are about to match against each other and are eligible for the STP mechanism, by cancelling the resting order/quote or the incoming order/quote or both, depending on the STP Type chosen by the client:

- if STP Type chosen is "Cancel Resting", the resting order/quote is cancelled, while the incoming order/quote enters the order book.
- if STP Type chosen is "Cancel Incoming", no changes occur in the order book and the incoming order/quote is rejected.
- If STP Type chosen is "Cancel both orders", the incoming order/quote is rejected and the resting order/quote is cancelled.

To be eligible for the STP mechanism, both opposite orders/quotes must satisfy the following criteria:

1) Instrument: both orders/quotes are sent on the same instrument
2) Firm ID: both orders/quotes come from the same Member Firm ID
3) STP ID field: both orders/quotes are submitted by users or traders belonging to the same Group Identifier (i.e. same STP ID), which means that the value set in the STP ID field in the incoming order/quote side equals the one provided in the resting order/quote side
   - The STP ID is an optional field. In the case of potential matching between an incoming order/quote side and a resting order/quote side with STP ID value = "null", then the STP mechanism will be triggered if all the other criteria are satisfied.
4) STP Type: both orders/quotes have the same STP Type set
5) Account Type: both "MM" and "House" accounts are enabled. Thus, potential trades are checked when two matching orders/quotes are between:
   - two MM accounts
   - MM account versus House account
   - two House accounts.

If the Firm ID, Account Type and STP Type criteria are not satisfied, then the STP mechanism will not be triggered. If the STP ID field is not populated but everything else is respected, then the STP mechanism will be triggered.

The STP mechanism only applies:

- during the Continuous phase
- to orders/quotes in the COB, thus Wholesales or Derivatives On-Exchange Off-Book EMMs are not in scope of STP
- to individual explicit orders/quotes, i.e. it does not apply to Implieds and its scope covers orders/quotes within a single order book. In the case of strategies, STP will be triggered only in matches of strategy versus strategy orders.

For contracts set up with Price Pro Rata as the matching policy, only STP Type "Cancel Resting" is accepted. If orders/ quotes for such contracts are submitted with "Cancel Incoming" or "Cancel both orders", such messages will be rejected with a specific error code.

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.

STP Type "cancel resting" and "cancel both orders" are not allowed for FOK and Minimum Quantity orders.

9.3 CANCEL ON DISCONNECT

Cancel on Disconnect (CoD) is a mechanism which triggers an automatic cancellation of all non-persistent 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 the value populated by the client in that individual message. The dedicated field for CoD is mandatory, and by default its value is set with Cancel on Disconnect activated, which means that the order should not persist in the system after the 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 order message is checked for the Cancel on Disconnect setting. 'Quotes' messages do not have a field allowing the user to select whether to participate in CoD or not. When the 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 a 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 belonging to the corresponding OE Session that are not flagged to persist are cancelled for their remaining quantity, regardless of order type and validity type.

The scope of CoD only includes orders sent during the current day. Orders entered during a previous business day are not in the scope of CoD and remain in the system, without being cancelled, in case of disconnection.

10. ARCHITECTURE PRINCIPLES

10.1 MARKET SEGMENTATION

Market segmentation in Optiq® reflects the main architectural principles of parallelisation, targeted use of system resources and increased granularity of processing to deliver the advantages Optiq® offers, including high systems performance, capacity and throughput, reduced impact to clients in the case of Exchange technical updates, and rapid time to market. The segmentation that allows this to be achieved also drives technical features of Optiq®, 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 daily 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 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:

Instrument Types	Equity Derivatives (EQD)	Index Derivatives (IDD)	Commodity Derivatives (CMO)
	✓ Individual Equity Options ✓ Single Stock Futures ✓ Single Stock Dividend Futures	✓ Index Futures ✓ Index Dividend Futures ✓ Index Options ✓ Fixed Income Futures ✓ Total Return Futures	✓ Commodities Futures ✓ Commodities Options ✓ Power Futures

10.2 ACCESS MODEL AND CAPACITY

In Optiq®, clients can connect to each of the Optiq® segments with dedicated Logical Accesses. The connectivity model is the same for Euronext Cash and Derivatives Markets.

Individual Optiq® Segments may comprise from one to ten **Optiq® Partitions**. An Optiq® Partition is a technical subdivision of an Optiq® Segment. Each Partition relies on an optimised technical environment, physically independent from each other, but connected.

Access to Optiq® Partitions is managed through Order Entry Sessions. For each Logical Access, an OE Session is set up per Partition.

Example

If a client orders a Logical Access for the EQD segment, with two partitions, they will automatically be assigned two OE Sessions (one per partition).

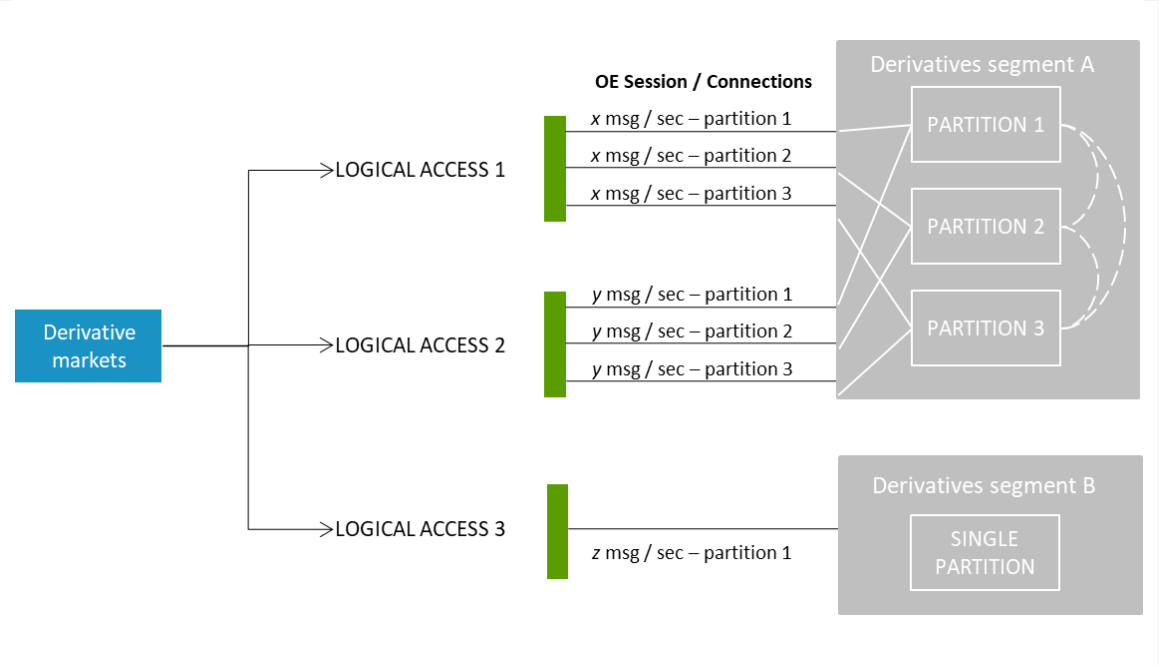
Since a Logical Access allows trading on the whole Optiq® Segment, two technical paths are possible for a market participant to reach an instrument order book:

- 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 efficient way based on their trading rights and trading activity.

Optiq® is scaled as detailed below for the Go-Live of the platform:

Equity Derivatives (EQD)	Index Derivatives (IDD)	Commodity Derivatives (CMO)
3 Partitions	1 Partition	1 Partition

Please note that this infrastructure can be upgraded to add additional partitions for a given segment if this is assessed by Euronext to be a market need. In such a case, any change will be announced to the market, and will require minimal development on the Client side, as it will only update the Partition IP target of the contracts provided in daily referential files.

10.3 DIRECT ELECTRONIC ACCESS (DEA)

Management of Direct Electronic Access in Optiq® differentiates between order entry for Sponsored Access and Direct Market Access (DMA):

- DMA orders may be submitted through a client's existing Logical Access, as a "mutualised" feed of data
- Sponsored Access requires one of several dedicated Logical Access(es) to be set up under the Sponsoring Member Firm ID.

Orders entered through either access type are required to be correctly flagged as DEA and must be populated with the required associated MiFID II short codes.

10.4 THROTTLING

The Optiq® platform provide clients with a predictable and flexible throttling mechanism, which applies at 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 log-on, the client can choose whether to enable the queuing service or use the default rejection mechanism for the messages over the limit.

The main concepts of the throttling mechanism already available for the Euronext Cash markets are also used for the Derivatives markets, ensuring harmonisation and a 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 document *Euronext Cash and Derivatives Markets – Optiq OEG Service – Interface Specification*.

10.5 DROP COPY

Drop Copy is a service that provides near real-time copies of trade reports and order messages, generally used for risk management and by back-office and compliance teams.

Clients require one (or several) dedicated Drop Copy Logical Access(es) to receive Drop Copy messages, which can be set up with different possible configurations that fit 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 trading or 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 set up 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, it is provided separately to allow for:

- the use of 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 MEMBERSHIP MODEL CHANGE

10.6.1 Firm ID

The 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. Firms are assigned this ID during the process of becoming a participant of the Euronext markets.

The Firm ID replaces the MNE used on the Italian derivatives markets and is used for the set-up of connections to Optiq®, to manage authorisation 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, the Firm ID is a numeric ID.

All existing active Euronext clients already have a Firm ID.

As a Firm ID represents one firm, it is expected to reduce the number of MNEs currently in use. This means that different authorisations previously managed for individual MNEs will all be combined under a single Firm ID.

In addition to rationalisation of connections and improvement of administration and management of partition information, this also simplifies the associated market maker set-up with the clearing partners.

If clients require to differentiate access further, they may obtain additional Firm IDs.

For further information on set-up of authorisation in Optiq® as well on how to obtain new Firm IDs, clients should contact the Euronext MCC team.

10.6.2 Use of MiFID II Short Codes

On the Optiq® platform, use of Member Firm IDs in place of MNEs re-groups rights, authorisation, and other operational set-up at a broader level. The granularity of any actions on behalf of individual traders, 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 (EWFSC): 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: optional field, which is not checked by the system for completion. While it is available in order entry messages for reporting purposes, it is not 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 of their firm, with the additional granularity required.

10.7 CONTRACTS WITH SHORT-TERM MATURITIES

Contracts that represent maturities that are shorter than one month 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 expands to cover daily, weekly, and monthly expiries in one unique set-up. 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 of Exchange-recognised 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 to use this information for trading.

More details on the how migration of expiries will be implemented will be provided later with the overall details of the migration strategy.

10.8 MARKET DATA CHANGES

While all attempts are made to maintain the Derivatives specific logic implemented in Phase 1 of the Optiq® implementation, some changes will be inevitable with the full migration of Derivatives markets to Optiq®. An updated version of market data and file specifications will be published with the 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 specifications when they are published.

11. MODIFIED AND DECOMMISSIONED FUNCTIONALITIES

The 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®.

11.1 DERIVATIVE INSTRUMENT TRADING CODE (PREVIOUSLY AMR)

Optiq® uses the Symbol Index as the unique identifier of all tradeable instruments. As such, the Derivatives Instrument Trading Code as the core contract and tradeable instrument identifier for trading is replaced by the Symbol Index.

Derivatives Instrument Trading Code remains available in the standing data.

To ensure consistency with the overall Optiq® set-up, and limitations brought about due to merger of contracts with maturities shorter than a month, active use of the Derivatives Instrument Trading Code as a key for trading is decommissioned.

As is 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 Derivatives Instrument Trading Code 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 with the upcoming Borsa Italiana Migration, due to the need to retain the availability of 4 decimals in the strike price as well as a variable strike price number of decimals in a single contract.

Today, the Derivatives Instrument Trading Code can be decoded to obtain several key parameters that describe the instrument, namely the product code, expiry full date, strike price and type of product (future, put, call).

This will continue to be the case in the future, but the expiry day will be encoded in base 36, starting from numbers 1-9 and then letters in the alphabet A…Z.

This leaves one digit that will be used for a new parameter, Strike Price Number of Decimals, which will allow members to determine the strike price for that specific instrument, especially in contracts where the number of decimals in the strike price can vary.

Example

Instrument	In Optiq® today	In Optiq® after change
	AMR	AMR
A.F.AA8 – Dec 24	AFAA8_24122000000F	AFAA8_2212K000000F
A.O.ABCD – Dec 24 Put Option Strike 21.35	AOABCD24122002135P	AOABCD2412K202135P

Note: Clients should note that all the information present in the AMR is already available in other fields in the standing data, and Euronext encourages the use of these fields instead of the decoding of the AMR.

A. APPENDICES

A.1. EXCHANGE-RECOGNISED STRATEGIES

Euronext maintains an Annex in its Trading Procedures with the list of Exchange-recognised strategies: "Euronext Derivatives Markets: Trading Procedures Annexe Two – Recognised Strategies on the Euronext Trading Platform".

The 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.

A.2. ORDER ENTRY MODEL BY PRODUCT

Types of Order Entry Model						
Product	**Orders**	**Orders without Stops**	**Orders and Quotes**	**Orders without Stops and Quotes**	**Priced-only Orders**	**Priced-only Orders and Quotes**
Euronext Derivatives Milan						
FTSE MIB futures	**x**					
FTSE MIB Mini futures	**x**					
FTSE MIB Micro futures	**x**					
FTSE MIB options			**x**			
FTSE MIB Dividend futures			**x**			
FTSE Italia PIR PMI TR index futures			**x**			
Stock options			**x**			
Stock futures			**x**			
Stock dividend futures			**x**			
Euronext Derivatives Paris, Amsterdam, Brussels, Oslo, Lisbon						
Options				**x**		
Futures		**x**				

Note: these configurations are subject to change, Clients will be informed accordingly.

A.3. RFC 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 stamp**
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 stamp**
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 stamp
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 stamp
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: RFC Initiator Client Execution at the RFC price

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 stamp
01	MBR1 **(C)**	340	1.00	1.00	1000	MBR1 **(NC)**	01

Bid				Ask			
Time stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamp
04	MBR4	200	1.10	1.00	490	MBR5	05
06	MBR6	850	1.00				
02	MBR2	100	0.90				

Step 3: Cross Execution between RFC Initiator Client vs RFC Initiator Non-Client

- 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 stamp
01	MBR1 **(C)**	0	1.00	1.00	660	MBR1 **(NC)**	01

Bid				Ask			
Time stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamp
04	MBR4	200	1.10	1.00	490	MBR5	05
06	MBR6	850	1.00				
02	MBR2	100	0.90				

Step 4: RFC Initiator Non-Client Improvement

- Fourth trade of 200 lots MBR4 @ €1.10 with MBR1 (Non-Client). Market Update sent with update type= 56 (with price and qty)
- Fourth 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 stamp
01	MBR1 **(C)**		1.00	1.00		MBR1 **(NC)**	01

Bid				Ask			
Time stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamp
04	MBR4	0	1.10	1.00	490	MBR5	05
06	MBR6	390	1.00				
02	MBR2	100	0.90				

Step 5: RFC Initiator Non-Client Execution at the RFC price

Not applicable.

Step 6: 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 stamp
06	MBR6	0	1.00	1.00	100	MBR5	05
02	MBR2	100	0.90				

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 stamp
~~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 stamp
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 400lots @ €0.90 No Market Data Sent
- 2nd response n°02 of MBR4 (Time stamp 03): Buy 100 lots @ €1.10 No Market Data Sent
- 3rd response n°03 of MBR5 (Time stamp 04): Sell 600 lots @ €1.00 No Market Data Sent
- 4th response n°04 of MBR6 (Time stamp 05): Buy 1200 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	100	1
3 = New Bid	1.00	1200	1
4 = New Offer	0.90	400	1
4 = New Offer	1.00	600	1

Step 1: RFC Initiator Client 1 Improvement

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

Bid				Ask			
Time stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamp
03	MBR4	100	1.10	0.90	400	MBR3	02
05	MBR6	1200	1.00	1.00	600	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 400 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 stamp
01	MBR1 (Client 1)	600	1.00	1.00	1000	MBR1 (Client 2)	01

Bid				Ask			
Time stamp	Firm	Quantity	Price	Price	Quantity	Firm	Time stamp
03	MBR4	100	1.10	0.90	0	MBR3	02
05	MBR6	1200	1.00	1.00	600	MBR5	04

Step 2: RFC Initiator Client 1 execution at RFC Price

We do not apply any pick up percentage so we fully match MBR1 (Client 1)

The following transaction is executed:

- Second trade of 600 lots MBR5 @ €1.00 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 stamp
01	MBR1 (Client 1)	0	1.00	1.00	1000	MBR1 (Client 2)	01

			Bid	Ask			
Timestamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamp**
03	MBR4	100	1.10	0.90	0	MBR3	02
05	MBR6	1200	1.00	1.00	0	MBR5	04

Step 3: Cross Execution between RFC Initiator Client 1 vs RFC Initiator Client 2

Not applicable

Step 4: RFC Initiator Client 2 Improvement

- Third trade of 100 lots MBR4 @ €1.10 with MBR1 Client 2. Market Update sent with update type= 56 (with price and qty)
- Fourth trade of 900 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 stamp**
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 stamp**
03	MBR4	0	1.10				
05	MBR6	300	1.00				

Step 5: RFC Initiator Client 2 execution at RFC Price

Non applicable

Step 6: 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.

Cancellation of remaining orders

The following orders are cancelled:

- Order of 300 lots MBR5 @ €1.00

			Bid	Ask			
Time stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamp**
~~05~~	~~MBR6~~	~~300~~	~~1.00~~				

Market Update sent with update type = 254 Clear Book.

Example 3: Non-Client versus Non-Client

- RFC pick up percentage: 60%.
- 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 are 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 stamp
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 500 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 500 lots @ €1.00 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	500	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	1.00	500	1

Step 1: RFC Initiator Improvement

Once 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 stamp
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	500	1.00	1.00	500	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 stamp**
01	MBR1	600			450	MBR1	01
04	MBR4	500	1.00	1.00	500	MBR7	07

Step 2: RFC Initiator Execution at the RFC price

The following transaction is executed:

- Seventh trade of 270 lots MBR4 @ €1.00. Market Update sent with update type= 56 (with price and qty).
- Eighth trade of 420 lots MBR7 @ €1.00. Market Update sent with update type= 56 (with price and qty).

Where Pick up quantity Sell Side = min(600,450) * 60% =270

Where Pick up quantity Buy Side = min(600,450) * 60% + (600-450) = 420

Bid				Ask			
Time stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamp**
01	MBR1	180			180	MBR1	01
04	MBR4	230	1.00	1.00	80	MBR7	07

Step 3: Final Cross Execution

The following transaction is executed with the cross:

- Ninth trade of 180 lots @ €1.00. Market Update sent with update type= 56 (with price and qty).

Step 4: Uncrossing of the RFC Reactor book

The following transaction is executed with the cross:

- Tenth trade of 80 lots @ €1.00. Market Update sent with update type= 56 (with price and qty).

Cancellation of remaining reactors responses

The following order is cancelled.

- Order of 150 lots MBR4 @ €1.00

Market Update Sent with Update Type = 254 Clear Book.

A.3.1. RFC Autojoin with Price Improvement

- Autojoin enabled
- RFC Algorithm: Client Best Execution RFC
- RFC Pickup Percentage: 60%
- RFC Autojoin Min Quantity: 0
- Order Actor Type: Initiator
- Price: €2.00
- Order Tolerable Price: €2.10
- Quantity: 100
- Account Type Buy: House
- Account Type Sell: Client

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

				Bid	Ask			
Time Stamp	**Firm**	**Quantity**	**Price**	**Tolerable Price**	**Price**	**Quantity**	**Firm**	**Time stamp**
01	MBR1 (**Non Client**)	100	2.00	2.10	2.00	100	MBR1 (**Client**)	01

Once the RFC Response Period is finished, the following order book is built based on accepted reactors responses:

			Bid	Ask			
Time stamp	**Firm**	**Quantity**	**Price**	**Price**	**Quantity**	**Firm**	**Time stamp**
04	MBR4	10	2.11	2.00	100	MBR1	01
01	MBR1	35	2.10				
02	MBR2	35	2.10				
01	MBR1	5	2.05				
03	MBR3	5	2.05				
01	MBR1	100	2.00				

Note: Autojoin orders highlighted in dark blue.

At the end of the RFC Response time, the following transactions are executed:

- Trade Number 1: [10@2.11], MBR4 vs MBR1, Client vs Reactor. It is not an autojoin trade, as the price is better than the tolerable price;
- Trade Number 2: [35@2.10], MBR1 vs MBR1, Client vs House; it is an autojoin trade;
- Trade Number 3: [35@2.10], MBR2 vs MBR1, Client vs Reactor. It is not an autojoin trade, as it is between a Client and Reactor;
- Trade Number 4: [5@2.05], MBR1 vs MBR1, Client vs House; it is an autojoin trade;
- Trade Number 5: [5@2.05], MBR3 vs MBR1, Client vs Reactor. It is not an autojoin trade, as it is between a Client and Reactor;
- Trade Number 6: [10@2.00], MBR1 vs MBR1. In case of no further reactors' quantity, the remaining Client quantity is allocated to the Initiator;
- The remaining House quantity is cancelled.

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A.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 stamp**
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 stamp**
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 stamp**
04	MBR4	100	1.00	1.05	250	MBR7	07

Step 2: RFC Initiator Execution at the 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 stamp**
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 case RFC Reactor book is crossed. In this example, RFC Reactor book is uncrossed.

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 stamp**
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 stamp**
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 stamp**
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: RFC Initiator Execution at the RFC price

No trade to be executed since RFC Initiator residual quantity after all price improvements have been executed is equal to 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 stamp**
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 stamp**
06	MBR6	50	1.05				
05	MBR5	200	1.02				
04	MBR4	100	1.00				

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.

DOCUMENT REVISION HISTORY

DOCUMENT VERSION	DATE	CHANGE DESCRIPTION
5.8.2	16 November 2026	• In section 4.11 "Passive Liquidity Protection (PLP)" removed reference to "pending regulatory approval" for PLP.
5.8.1	30 October 2026	• Section 4.1.2 "Stop orders" – added Commodity Futures Paris Wheat, Corn and Rapeseed contracts
5.8	7 October 2026	• Section 4.1.2 "Stop orders" clarified the trigger price • Section 4.4.2 "Price Pro Rata (PPR)" updated with clarification of the use of minimum pro-rata threshold and added example that uses quantities that trigger use of minimum pro-rata threshold. • Added new section 4.11 "Passive Liquidity Protection (PLP)". • Added new section 4.12 "Mass Cancel Optimisation". • Section 7.1 "Wholesale Facility" added clarification on what can be traded for Against Actuals, Exchange for Swaps / Options. Added references to trading procedures for more details on the configuration, and processes for AA, EFS, and other pre-negotiated trades. • Section 7.2.1 "RFC Algorithm" – updated with the list of allowed account combinations (i.e. client vs. client)
5.7	08 June 2026	• Section 4.4.2 "Matching policies" added summary table of matching policy assigned per asset class and market. • Section 7.1.2 "Wholesale trade submission" – Extended the length for completion of a wholesale transaction to be end of the trading session. • Section 7.2.2 "RFC Process and Conditions" – Added new price validation for Commodity Derivatives and change on RFC price, quantity and book transparency mechanism for Commodities • Section 8.4.1 "Configuring MMP" – Added clarification of MM orders for the Pull action, where such MM orders are applicable.
5.6	30 March 2026	• Added Trading at Settlement feature for Commodity Derivatives Future contracts. Section 7.4 • Section 7.1 "WHOLESALE FACILITIES" - Corrected length for completion of a wholesale transaction to 15 minutes.
5.5	23 June 2025	Added reference to the automatic leg prices for RFCs on strategies to section 7.2.2 RFC Process and Conditions
5.4	20 January 2025	Amendments related to Power Derivatives and introduction of Inter Contract Spread Functional, across the whole document.
5.2	20 October 2023	Amendments related to BITA Optiq migration - Phase 3 in general, across the whole document: • Removal of old references to UTP • Removal and correction of Glossary items and related documents • Clarification of RFC and Derivatives on-Exchange off-book. RFC refers to the Request for Cross functionality, whereas the Derivatives on-Exchange off-book refers to the Exchange Market Mechanism • Added Appendix. In Chapter 2: • In Section 2.1 "Trading Instrument & Expiry Management", clarified the concept of weekly and daily expiry belonging to their own contracts and not being part of the monthly contract • Added Lot Multiplier and Corporate Action Counter description. In Chapter 3: • In Section 3.2.1 "Trading Phases Characteristics", added Phase Qualifier Random Uncrossing and clarified the Scheduled Event Expiry

DOCUMENT VERSION	DATE	CHANGE DESCRIPTION
		• Moved advantages of current Optiq Trading Patterns logic section from 3.2.2 "Intraday Changes for Patters" to section 3.2.1 "Trading Phases Characteristics". In Chapter 4: • Added description of market order and stop order • Added Section 4.1.3 Order Entry Model • Gave more precise details on some behaviour relating to implied orders. In Chapters 5 and 6: • Adjusted Section 6.1 Trade Price Validation (TPV) with functional changes developed as part of the Borsa Italiana Phase 3 Migration • Adjusted Section 6.2 Future Spike Protection (FSP) with functional changes developed as part of the Borsa Italiana Phase 3 Migration and clarifications to the description of current behaviour • Added Section 6.3 Future Limit Interruption Protection (FLIP) • Added Section 6.4 Static Collars. In Chapter 7: • Moved paragraph 7.2.3 and 7.2.4 (example for RFC) to a dedicated Appendix • Removed section Market on Close (MOC) as this feature will not be developed on short notice. In Chapter 8: Added paragraph 8.2. (NTM area definition). In Chapter 9: Added paragraph 9.1.3 (MEP). In Chapter 11: • Added description for changes to Derivative Instrument Trading Code (previously AMR). In Appendix: • Added references for list of Exchange Defined Strategies available for trading • Added table detailing OEM per Euronext derivatives products • Added examples on RFC.
5.1	7 April 2022	Amendments related to: • enhancements to STP functionality (section 9.2) interaction between Implied orders and Collars (section 4.6)
5.0	7 July 2021	Update of the document containing the following changes: • In section 5.2.4 "Future Market Price" updated the Reference Price Origin from 'Future Market Price' to 'Fair Value'. • In section 7.2 Request For Cross (RFC) updated with the inclusion of RFC and COB book interaction • 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 and Conditions.
4.0	14 April 2020	Final clarifications for the document following go live of Optiq.
3.1	2 December 2019	Clarification of the document containing the following changes: • 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. • In section 4.5 "Trading on Strategies Without Implieds" - In Summary clarified the note on rounding rules that apply to Collar calculation for strategies • In section 4.9 "Optiq Tick Table Mechanism" - added clarification for the strategy leg trades • In section 7.2.1 "RFC Algorithms" corrected the table to flag COB inclusion as Not Enabled for Commodities • Added section 8.1.1 "Market Making Framework"

DOCUMENT VERSION	DATE	CHANGE DESCRIPTION
		• In section 12 "Automated Market Reference (AMR)" clarified for use of the Last trading date in the AMR
3.0	6 September 2019	Update of the document containing the following changes: • In section 1.2 "Glossary" - Request for Execution (RFE) adjusted to be Request for Implied Execution (RFIE). • In section 1.3 "RELATED DOCUMENTS" updated URL of the Optiq page, added associated documents. • 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. • In section 4 "Trading on Optiq" - Throughout sub-section - clarified references to Implieds, as Implied prices. • In section 4.1 added a note that maximum lifetime of GTC and GTD orders is one year. • 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". • 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. • 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. • In section 4.5 "TRADING ON STRATEGIES WITHOUT IMPLIEDS" – added reference to the Annex 2 for the Exchange-Recognised Strategies. • 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. • In section 4.6.3 "Implied Trading Policy" – graph of Implieds adjusted to indicate generic Outright and Strategy codes. • 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). • 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. • In section 4.7.4 "Throttling Considerations for RFIE in EDIM" - Request for Execution (RFE) adjusted to be Request for Implied Execution (RFIE). • In section 4.8 "Spontaneous Implied Matching (SIM) Model" - Clarified (i) behaviour for instruments during the Call Phase with a simpler rule, (ii) steps of the SIM Uncrossing Sequence, (iii) description of Aggregates in SIM. • 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. • 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.

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		• In section 5.3 "TRADING SAFEGUARD MANAGEMENT MODEL" – adjusted explanation of AQS from being in "tick", to be "absolute value". • 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. • In section 6.2 "Future Spike Protection (FSP)" – renamed FSP Freeze Period to be FSP Cool Down period • 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. • In section 8.1.1 updated Example, to clarify use of the bid up to price range. • In section 8.3 "MARKET MAKER PROTECTION (MMP)" – removed references to Sign-out. Reset to be done by MMP instruction. In section 8.3.3 "Processing Market Maker Protection" – corrected for the processing during Uncrossing and Continuous phases. • 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. • In section 9.2 "Self-Trade Prevention (STP)" – note added on system rejecting messages in case of selection of Cancel Incoming for contract set-up with Price Pro Rata matching policy • In section 10.4 "THROTTLING" replaced reference to the dedicated Throttling document by Euronext Markets – Optiq OEG Connectivity Specifications document. • In section 11.1.2 "Use of MiFID II Short Codes" renamed RiskGuard services from Kill switch to Suspend and Block. • In section 12 "Modified and Decommissioned functionalities" – Added "account authorisation for clearing" • Appendix A added as "Annexes of How the Market Works", which includes notes on A.1 Exchange Recognised strategies. • Document Revision History moved to Appendix B (previously Appendix A)
2.0	28 February 2019	First update of the document containing the following changes: • Spelling, formatting corrections throughout the document • Added definitions of "Spread Class" and "Time to Expiry" in glossary • In section 2.1 "TRADING INSTRUMENT and 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" • 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 • Added section 3.1.3 "Trading Interruptions" • Chapter 4 "Trading on Optiq": ○ In section 4.1 "Order Management Functionalities" – added clarifications on available and activated order types, validity types, and their use. ○ In section 4.3 "Price Discovery for Outrights without Implieds" ▪ All references to Executable Price Range changed to Tradable Price Range ▪ 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 ▪ 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

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		▪ Added clarification on checks of potential trades and dynamic collars for strategies ▪ In section 4.5 "TRADING ON STRATEGIES WITHOUT IMPLIEDS" – adjusted reference to strategy trading to be Trading mechanisms. ○ In sections 4.6.1 "Strategy and Component Implieds" & 4.6.2 "SIM and EDIM Implied Matching Models" – add a clarification that Implieds won't be generated if Implied prices are outside of Collars, and Implieds cannot be traded if they are outside of Collars ○ In section 4.7.2 "Price Discovery with EDIM" removed box "ABOUT UNCROSSING STRATEGIES AND THEIR LEGS IN EDIM" ○ In section 4.8.2 "Price Discovery with SIM" removed box "ABOUT UNCROSSING STRATEGIES AND THEIR LEGS IN SIM" ○ Post section 4.8 in Summary: "IMPLIED MECHANISMS (EDIM AND SIM)" – content re-arranged and clarified ○ 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) ○ Added section 4.10 "Processing of Data for Products in Optiq" covering granularity of processing in public (MDG) and private (OEG) feeds. • 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. ○ 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 ○ Section 5.2 renamed to "DYNAMIC COLLARS REFERENCE PRICE ORIGIN" and adjusted with adjustment of naming convention and clarification of rules. ○ Content of section 5.4 "DETERMINING THE SPREADS: AUTHORIZED PRICE FLUCTUATION (APF)" is redistributed into the other sections within this chapter ○ In Section 5.3 ▪ Fields for Dynamic Collar Logic in standing data are renamed to *Reference Price Origin in Opening Call* and *Reference Price Origin in Continuous* ▪ 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 ▪ Added field "Units of Spread" to indicate if table for Spread is provided in percent of tick ○ Section "STEP FOR DYNAMIC COLLAR DETERMINATION" changed from 5.5 to 5.4; with following content updates: ▪ Rules for calculating Collars are simplified ▪ In section 5.4 "Step for Dynamic Collar Determination" – removed step 5 "Apply rounding rules" in explanation and example ▪ Added Dynamic Collar price rule / logic used during Trade Interruptions ▪ 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. ▪ Examples for Options and Futures are combined, as single method is now used following simplification. Example updated to reflect simplification in rules. ○ Section "DYNAMIC COLLARS FOR STRATEGIES" changed from 5.6 to 5.5; with content modified with further simplification of rules. • Section 6.1 "TRADE PRICE VALIDATION (TPV)"

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		○ Added a note on check of prices against only one side of collars, and added the graphical example of TPV event and replaced reference to Request for Quote (RFQ) with one for Request for Price (RFP) ○ Mechanism clarified and rationalised to work in the same manner at Uncrossing and Continuous ○ Section 6.1.1 renamed to "Triggering of Trade Price Validation" ○ 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. • 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 • 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. • 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. • Section 8 "MARKET MAKING" and its subsections with large number of modifications: ○ 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 organisation of data. Added information on MM Sign-on. ○ Most reference to Market Maker Orders and MMO replaced to be Double Sided Quotes and DSQ respectively ○ Section 8.1 introduced providing detailed views of the Optiq Spread Obligation Framework ○ 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 set-up to submit quotes ○ 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 ○ In section 8.3 "MARKET MAKER PROTECTION (MMP)" ▪ Removed reference to set-up 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. ▪ In section 8.3.1 "Configuring Market Maker Protection" - Configuration at Firm ID level removed, as only Firm ID + Shortcut combination level will be used, - Removed "Protection period" as it will not be supported, - From the list of available in Limit Breach Actions: "Warning" and "Warning and Pull" are removed ▪ 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. ▪ 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 • Section 10.1 "MARKET SEGMENTATION" – removed mention of "Equity Total Return Futures" under Equity Derivatives segment

DOCUMENT VERSION	DATE	CHANGE DESCRIPTION
		• 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 • In Section 11.3 "MARKET MARKER PROTECTION SERVICE IMPROVEMENT" - management of MMP set-up based on a protection period (sliding time window) basis removed; adjusted reference to granularity by Member Firm ID adjusted to include the Shortcode • 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. • Section 12 updated with: ○ Automated Market Reference (AMR) – text clarified on merger of contracts with shorter maturities ○ Added "Stock order routing" to the list of decommissioned services
1.0	16 October 2018	Initial version for migration of Euronext Derivatives markets to Optiq