T7 Release 15.0

Market Model Continuous Auction

Version 1

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1 Introduction

Frankfurter Wertpapierbörse (FWB; Frankfurt Stock Exchange) operates two separate venues for cash market trading, including, among others, equities, Exchange Traded Funds (ETFs), Exchange Traded Products (ETPs)[1], mutual funds, bonds, warrants, certificates and subscription rights: Deutsche Börse Xetra (MIC[2]: XETR) and Deutsche Börse Frankfurt (MIC: XFRA). For the separate trading venues and different asset classes various trading models may be applied.

The purpose of this document is to describe electronic trading of instruments in the Continuous Auction trading models. Documentation on electronic trading of instruments in the trading models 'Continuous Trading in Connection with Auctions', 'Xetra Midpoint' as well as 'Auction' are available in a separate document.

The market model defines the principles of order matching and price determination as implemented in the trading system. This includes the available trading models, the prioritization of orders, the different order types and the transparency, i.e. the type and the extent of information available to market participants during trading hours.

The ultimate and legally binding terms for trading at the Frankfurter Wertpapierbörse are laid down in the Rules and Regulations of the exchange, especially the Exchange Rules (Börsenordnung) and the Terms and Conditions for Transactions (Bedingungen für Geschäfte). The market model serves as a basis for the Rules and Regulations which, nevertheless, may contain additional terms and in particular may exclude or restrict the use of order and quote types described in this market model.

1.1 Definitions

TERM	EXPLANATIONS / DEFINITIONS / SYNONYMS
Instrument	An instrument is a security that is set up in one of the Continuous Auction trading models for trading.
Tick Size	A tick size represents a limit price / range step.
Executable order book situation	An executable order book situation is an order book situation in which a crossed order book occurs within the spread of the quote or without generating a partial execution of an order executable at the quote.
Potentially executable order book situation	A potentially executable order book situation is an order book situation in which a crossed order book or a market order exists without an available quote.
Potentially executable volume	The potentially executable volume is defined as the surplus at the potentially executable price, excluding the volume of the quote.
Fully open order book	All orders (incl. stop orders and orders in the locked stock) on single order basis including their originator are distributed (only for Specialists).
Open order book	All limit and market orders with their respective volume are displayed with the order book depth assigned to the security. The orders are accumulated by their limits and the number of orders per limit is displayed. Both the Market Maker quote and the Specialist quote will be displayed as part of the order book.
Partially closed order book	Depending on the trading model and the trading phase only the Specialist or Market Maker quote is displayed.
Closed order book	No pre-trade information is displayed. Only post-trade information are available.

[1] Exchange Traded Products (ETPs) include Exchange Traded Commodities (ETCs) and Exchange Traded Notes (ETNs).

[2] MIC = market identifier code according to ISO 10383

TERM	EXPLANATIONS / DEFINITIONS / SYNONYMS
Minimum tradable unit/lot size	The minimum tradable unit/lot size is the minimum quantity that an order in the T7 system can have. Only orders with quantities equal to multiples of the minimum tradable unit/lot size are accepted by the system.
Consolidated Exchange Feed	CEF: Central information distribution system of the Deutsche Börse AG
Quote	Depending on the trading model and quote type binding or non-binding information of the Specialist or Market Maker quote about the bid and ask side.
Quote request order	The quote request order is an order submitted upon a quote response in the model Direct Exchange Trading (Quote Request Driven Trading).

2 Fundamental Principles of the Market Model

The following fundamental principles for trading in the Continuous Auction trading models were determined in the process of designing the market model:

1. Securities can either be traded in the trading model 'Continuous Auction with Market Maker' or 'Continuous Auction with Specialist'.
2. Trading is anonymous, i.e., market participants cannot identify which market participant entered an order pre-execution. Only the Specialist is able to identify the originator of an order.
3. All order sizes can be traded in both trading models.
4. Stop limit and stop market orders are supported. Furthermore, Trailing-Stop Orders and One-cancels-other Orders are supported.
5. In trading models 'Continuous Auction with Specialist' and 'Continuous Auction with Market Maker' trading participants can enter quote requests which will in turn be answered by the Specialist or Market Maker with a response. Sender of the quote request may answer this response by entering an order.
6. Depending on the trading model there is exactly one Specialist or one Market Maker per instrument, that provides quotes to the market throughout the main trading phase.
7. Order book transparency can vary for particular groups of securities and furthermore depends on the respective trading phase or auction phase. For market participants the order book can be partially closed or open.
8. In instruments assigned to the Specialist, the Specialist is able to enter orders (and quotes) on own behalf and – given the existence of an instruction – orders on behalf of other trading participants.
9. Depending on the trading model prices are determined only within or at the Specialist/Market Maker quote according to the modified principle of highest executable volume.
10. Price determination: If there are several possible execution prices with the same surplus on the bid and the ask side or with no surplus on hand, the midpoint of the possible prices is taken into account as an additional criterion.
11. Orders in the order book are executed according to price/time priority.
12. After price determination or termination of the call phase the Specialist or Market Maker matching quote is deleted.
13. During post-trading phase the order book is closed for market participants.
14. The accounting cut off is carried out daily subsequent to the post-trading phase.

3 Trading Participants

A trading participant in a Continuous Auction Model must meet the requirements for participating in exchange trading according to the Rules and Regulations of the Frankfurt Stock Exchange. It must also be guaranteed that transactions are settled properly by the trading participant or a clearing member has been commissioned to settle the trades of the trading participant.

The users of the system can be divided into several categories:

- Traders
  Traders are individuals admitted for exchange trading. A trader can act as agent trader (account “A”), riskless principal trader (account “R“) or as proprietary trader (account “P”). Orders will be flagged accordingly.
- Market Makers
  In the trading model ‘Continuous Auction with Market Maker’, the Market Makers are admitted to exchange trading. In addition to traders the Market Makers participate as liquidity providers by entering quotes into the system (“Market Maker”, account “M”).
- Specialists
  In the trading model ‘Continuous Auction with Specialist’, the Specialists are admitted for exchange trading and participate as information and liquidity providers by entering quotes into the system (“Specialist”, account “I”). These quotes are based on the current order book situation and might in addition be based on the defined reference markets (if available). In addition, the Specialist is able to enter orders on behalf of other trading participants in instruments assigned to the Specialist.
- Other Users
  Administrators are users which are not admitted or authorized for trading (they assign and maintain authorization rights for the participant’s personnel). This category also includes personnel in settlement, operation and supervision as well as information users.

4 Orders and Quotes

All order sizes can be traded which have a determined minimum lot size for the specific security.

An order modification leads to a new time priority if either the limit is changed or the order modification has a negative impact on the priority of the execution of other orders in the order book (e.g. increase of the volume of an existing order). However, if the volume of an existing order is decreased, the currently valid time priority will remain.

4.1 Basic Order Types

Two basic order types are admitted for price determination during Continuous Auction:

- *Market orders* are unlimited bid/ask orders. They are to be executed at the next price determined.
- *Limit orders* are bid/ask orders, which are to be executed at their specified limit or better.

Order types can be specified further through additional trading restrictions and validity constraints.

4.2 Trading Restriction Special Auction

In the trading model 'Continuous Auction with Specialist' the Specialist has to conduct one 'special auction' per trading day for specific securities determined by the Exchange. In this auction besides unrestricted orders also orders with the trading restriction 'special auction' are considered for price determination.

Orders with this trading restriction will only be considered for price determination in the Special Auction. These orders will not participate in other auctions conducted throughout the trading day.

A special auction is not conducted at fixed point in time but will be triggered by the Specialist within a time period during the main trading phase set by the Exchange. The price determined in the special auction is flagged accordingly.

Further execution restrictions or trading restrictions are not available in the Continuous Auction trading models.

4.3 Validity Constraints

The validity of orders can be determined by means of further constraints. To this effect, the market model offers the following variations:

- *Good-for-day (GFD):* Order only valid for the current exchange trading day.
- *Good-till-date (GTD):* Order only valid until an exchange trading day specified by the order submitter.
- *Good-till-cancelled (GTC):* Order only valid until it is either executed or deleted by the originator or the system.

4.4 Stop Orders

In order to support trading strategies, two stop order types can be used, the execution of which will be possible after reaching a predefined price level (stop limit). In contrast to other T7 trading models stop orders are not triggered by a price determination but by Specialist/Market Maker quotes:

Stop Market Order: When the stop limit is reached (or exceeded for stop buy orders or fallen below for stop sell orders), the stop order is automatically placed in the order book as a market order and might be executed immediately.

Stop Limit Order: When the stop limit is reached (or exceeded for stop buy orders or fallen below for stop sell orders), the stop order is automatically placed in the order book as a limit order and might be executed immediately.

A stop loss order is triggered if the stop limit equals or exceeds the bid limit of the Specialist/Market Maker matching quote or of any resting Market Maker quote at the end of the call phase. A stop buy order is triggered if the stop limit is equal to or below the ask limit of the Specialist/Market Maker matching quote or of any resting Market Maker quote at the end of the call phase. The triggering of stop orders always leads to a new time priority for these orders. The limit and market orders resulting from triggered stop limit or stop market orders will be considered for execution in the current auction and might be executed immediately.

4.5 Additional Order Types

Furthermore, the following order types are supported in Continuous Auction:

Trailing Stop Order: A trailing stop order corresponds to a stop market order with a dynamic stop limit that is adapted according to a reference. As dynamic stop limit an initial stop limit along with an absolute or relative (%) distance to the reference can be entered. From the time of the entry of the order into the order book, the trading system continually checks the dynamic stop limit against the reference.

In Continuous Auction trading models, the *reference for adapting* trailing stop sell (buy) orders is the bid (ask) side of the Specialist's/Market Maker's standard, indicative or matching quote.

If the reference increases - in case of a sell trailing stop order -, the trading system automatically adjusts the dynamic stop limit to fit the requirements. If the reference decreases, the dynamic stop limit remains unchanged. If the reference reaches or falls below the dynamic stop limit, the trailing stop order is triggered.

If the reference decreases - in case of a buy trailing stop order -, the trading system automatically adjusts the dynamic stop limit to fit the requirements. If the reference increases, the dynamic stop limit remains unchanged. If the reference reaches or exceeds the dynamic stop limit, the trailing stop order is triggered.

Reference for triggering trailing stop orders is like for regular stop orders the matching quote of the Specialist/Market Maker or any resting Market Maker quote at the end of the call phase.

One-cancels-other Order: A one-cancels-other order is an order that combines a limit order and a stop market order. If the limit order is fully executed or the stop market order is triggered, the respectively other order will be deleted. If the limit order is partially executed, the limit order remains in the order book and the stop market order will be modified to match the remaining volume of the limit order.

4.6 Quote Request

During pre-trading and main trading phase in the trading model 'Continuous Auction with Specialist', trading participants can ask the respective Specialist to post a quote by entering a quote request. The originator can optionally specify the volume that shall be traded and whether there is buy or sell interest. The existence of a quote request is only transparent to the Specialist and can be answered by submitting an appropriate standard quote.

4.7 Direct Exchange Trading (Quote Request Driven Trading)

During main trading phase for 'Continuous Auction with Market Maker' and 'Continuous Auction with Specialist' Direct Exchange Trading is possible. Within the model Direct Exchange Trading a participant's request (Quote Request), the quote answer of the Market Maker or Specialist and the order based upon that answer refer to each other and can be related to each other via the QuoteID. The QuoteID will be set by the participant in the Quote Request and has to be unique per business unit and instrument during the business day.

Trading participants can ask for an indicative quote submitting the ISIN, the quantity they would like to trade and optionally the side (buy or sell) they intend to trade. This request is being answered by the Market Maker or Specialist either with a quote response containing an adequate bid/ask with the available quantity or with an error message in case no current and adequate quote e.g. in terms of quantity is available.

In case a valid quote is available the Market Maker or Specialist answers by submitting a quote response that contains the values ISIN, QuoteID, bid limit, ask limit, quantity bid and quantity ask.

Having received an adequate answer, the participant may submit a limit order based on the quote response, which will be referred to as quote request order. The order is marked with a timestamp. The Market Maker or Specialist must fulfil his obligations and enter a matching quote if the order is executable (pls. refer to chapter 6.1/6.2). Quote request orders will always need to be executed fully or not at all.

The quote request order is validated against the QuoteID and the time component. A valid order is executed according to the matching rules of the market model (pls. refer to chapter 6.1.3/6.2.3). If no execution of the order takes place within the respective timeframe, the order is automatically deleted by the system.

Both quote request and quote request order outdate after a certain period and are then rejected. Quote requests may be rejected and returned with a respective error message in case of unsupported ISINs (e.g. instruments in subscription) or in case there is no adequate quote available (e.g. in terms of quantity).

4.8 Quotes

Different types of Specialist/Market Maker quotes are supported:

Standard Quote: Standard quotes must be entered double sided (exceptions see 4.9). A standard quote can be entered with a volume greater or equal zero on the bid and ask side. This quote can be entered during pre-trading and pre-call phase.

Indicative Quote: Indicative quotes must be entered double sided with non-zero volume on the bid side and a volume greater or equal zero on the ask side, the volume serves the purpose of providing information. This quote can be entered during pre-trading and pre-call phase.

Matching Quote: A matching quote is a double-sided quote with a non-zero volume on the bid. Matching quotes terminate the call/freeze phase. Matching quotes can be entered during pre-trading[3], pre-call and call/freeze phase.

Price Without Turnover Quote (PWT):

To update reference prices, the Market Maker/Specialist has to determine a PWT at regular intervals. Therefore, a PWT quote must be entered double sided with a zero volume. A PWT quote can only be entered during pre-call.

4.8.1 Quotes in Continuous Auction with Specialist

The following quote types are supported in the trading model Continuous Auction with Specialist:

- standard quotes (non-binding),
- matching quotes (binding), dedicated to terminate a freeze phase and
- price without turnover quotes, dedicated to determine a price without turnover.

In general, these quotes have to be entered double sided. They can be entered with a zero volume on both sides or on one side only, either on the bid side or on the ask side or with non-zero volume on both sides.

The Specialist is obliged to provide quotes throughout the trading day for information purposes and for the provision of liquidity. In his quotation the Specialist is obliged to take the current order book situation and if defined the respective reference markets into account. If defined the Specialist must quote for at least a minimum guaranteed size and with a maximum spread in all assigned instruments.

For trading in securities whose settlement currency differs from the trading currency, the Specialist can enter an exchange rate together with his matching quote. Conversion of the actual amount into the settlement currency is made using this exchange rate.

4.8.2 Quotes in Continuous Auction with Market Maker

The following quote types are supported in the trading model Continuous Auction with Market Maker:

- standard quotes (binding) – not supported for the trading venue Deutsche Börse Frankfurt (MIC: XFRA),
- indicative quotes (non-binding),
- matching quotes (binding), dedicated to terminate a call phase and
- price without turnover quotes, dedicated to determine a price without turnover.

In general, these quotes have to be entered double sided. They can be entered with a zero volume on the ask side or a non-zero volume on both sides.

The Market Maker is obliged to provide quotes throughout the trading day, for the purpose of providing information. If defined the Market Maker must quote for at least a minimum guaranteed size and with a maximum spread in all assigned instruments.

[3] Only in Continuous Auction with Market Maker

4.9 Handling of Orders and Quotes in Case of an Exceptional Trading Situation (incl. Knock-Outs)

The exchange can interrupt or suspend trading in the event of extraordinary events affecting prices (e.g. company news). In case of suspension, orders existing in the system are deleted.

Orders in the order book are deleted in the event of profits or a corporate action and/or an exchange at the end of the last trading day on which such security was last traded including the claim (cum-day) or, at the latest, at the start of trading on the trading day on which such security is traded excluding the claim (ex-day).

Structured products with a knock-out event or violation of barrier limit are temporarily suspended after the event occurs. The duration of the suspension has to be coordinated with the respective Issuer. If the instrument gets unsuspended only the entry of sell orders is possible for Order Flow Providers until the respective instrument is delisted or the maturity date of the respective instrument is reached. Only single-sided quotes for repurchasing of orders are allowed.

5 Trading Phases

Trading takes place all day and begins with the pre-trading phase followed by the main trading phase and the post-trading phase. The system is not available for trading between the post-trading and pre-trading phase.

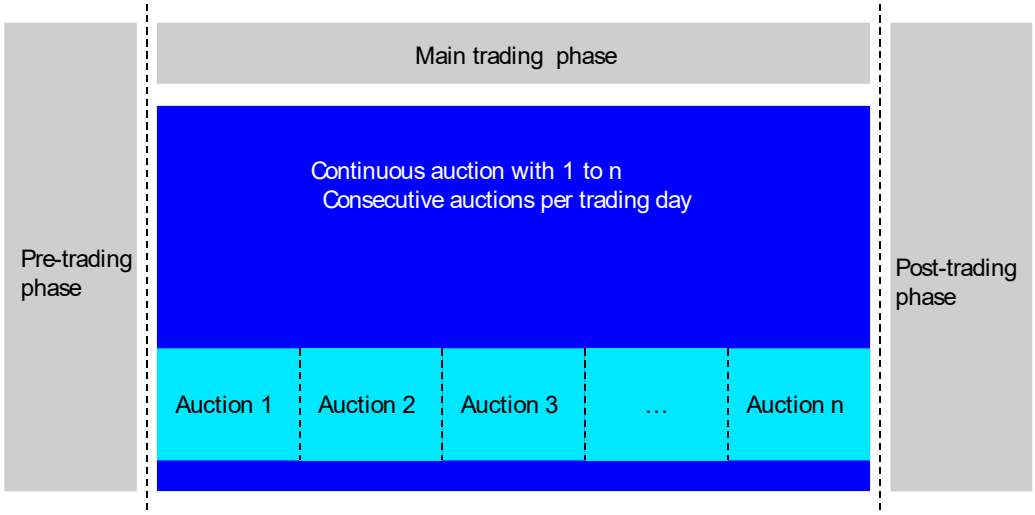


Figure 1: Flow of trading

5.1 Pre-Trading Phase

The pre-trading phase initiates the trading day. All trading participants can enter orders and Specialists/Market Makers can enter quotes or orders to prepare the actual trading day and modify or delete their existing orders or quotes.

The exchange confirms the trading participant's order entry and maintenance by order confirmation.

For trading participants (incl. Market Makers) the order book is partially closed. Only the Specialist receives an overview of the order book situation. Depending on the trading model only the Specialist quote or the best bid and best ask limit including the Market Maker quote are displayed to the market. In addition, the last price fixed of the previous day is displayed.

5.2 Main Trading Phase

The main trading phase starts time triggered after the pre-trading phase.

Matching takes place in auctions. In general, an auction consists of two phases ('Continuous Auction with Market Maker': a pre-call phase and an optional call phase; 'Continuous Auction with Specialist': a pre-call phase and a freeze phase) and the price determination.

Trading model ‘Continuous Auction with Market Maker’:
During the pre-call phase and call phase, all trading participants can enter, modify, or delete orders as well as enter quote requests. In addition, Market Makers can enter or delete quotes.

Trading model ‘Continuous Auction with Specialist’:
During the pre-call phase all trading participants can enter, modify, or delete orders as well as enter quote requests. In addition, Specialists can enter, modify, or delete quotes and orders on own behalf or on behalf of other trading participants. During the freeze phase the order book is locked by the Specialist. Order entries, modifications or deletions are not considered during the freeze phase. Such instructions are stored (locked stock/Vorhaltebestand) and enter the order book immediately after it gets unlocked. The Specialist is still able to enter, modify, or delete quotes or orders on own behalf or on behalf of other trading participants during the order book freeze and these are applied directly in the order book.

5.3 Post-Trading Phase

The post-trading phase starts time triggered after the main trading phase. If at this point in time an auction is still running, the auction can still be regularly ended, i.e. either by unfreeze, by price determination or by elapse of the maximum duration of the call/freeze phase.

In the post-trading phase, new orders can be entered, and existing orders can be modified or deleted. New order entries are taken into consideration in the respective trading form on the following trading day depending on possible validity constraints.

Specialist/Market Maker quotes cannot be entered during the post-trading phase and will be deleted by the system during the end of day processing.

In this phase the order book is closed. Neither trading participants nor the Specialist/Market Maker receive an overview of the market situation. Only the last price fixed of the current day is displayed.

6 Trading Models

The market model “Continuous Auction” contains two trading models, ‘Continuous Auction with Market Maker’ and ‘Continuous Auction with Specialist’.

6.1 Continuous Auction with Market Maker

In ‘Continuous Auction with Market Maker’ all order sizes can be traded which have a determined minimum lot size for the specific security. In each case, only the minimum lot size can be traded or any integer multiple thereof. The minimum lot size may be one so that any integer multiple thereof is tradable. By taking into consideration all existing orders at the time of the auction as well as the Market Maker quote of an instrument, the auction will concentrate liquidity. The auction price will be determined pursuant to the modified principle of highest executable volume within or exactly at the bid or ask limit of the Market Maker quote. Orders will be executed according to the price/time priority (taking into account the Market Maker quote).

An auction in the trading model ‘Continuous Auction with Market Maker’ consists of a pre-call phase, an optional call phase and the price determination. The optional call phase is applied to avoid partial order executions and supports stop order processing.

The main trading phase consists of succeeding auctions. The number of succeeding auctions as well as the time between auctions or the duration of the pre-call phase respectively is substantially determined by the Market Maker, i.e. the quality of the quotes (provided quote volume and spreads) and the reaction time during the call phase. Furthermore, the defined maximum duration of the call phase and the order book liquidity are relevant.

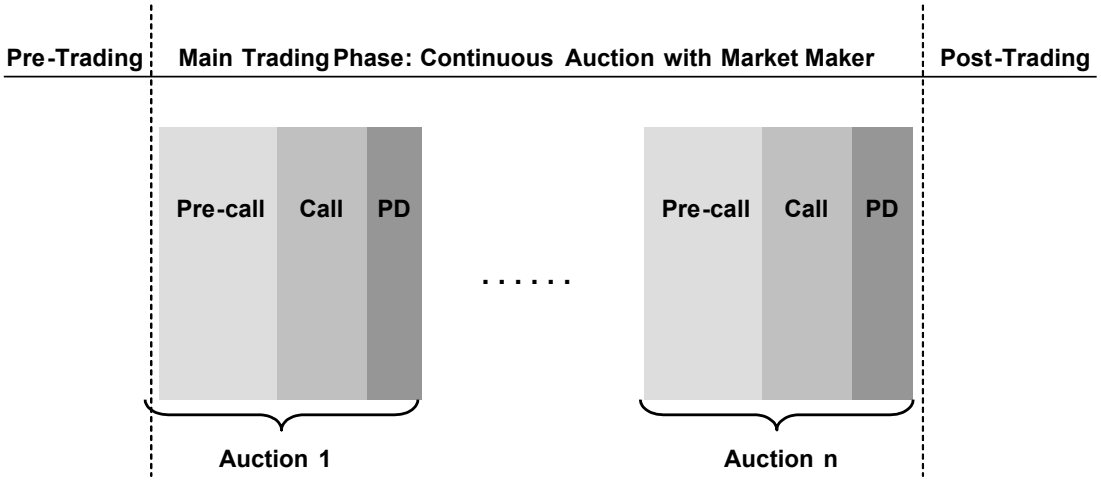


Figure 2: Change of trading phases and price determination – Continuous auction with Market Maker

6.1.1 Pre-Call Phase

During the pre-call phase orders may be entered, modified or deleted by trading participants or the Market Maker. Additionally, quote requests can be entered. Besides, the Market Maker may enter or delete quotes pursuant to the Rules and Regulations.

During this pre-call phase the order book is open with a depth of 1, thus displaying all limit and market orders as well as the quote with the accumulated volumes of the best bid and best ask limit and the number of orders in the book at these limits. Apart from incoming quote requests (see section 4.7) explicitly visible only to the Market Maker, trading participants and Market Makers receive the same information.

An immediate price determination is triggered by:

- a standard quote in the order book and an order executable at that quote, without generating a partial execution.
- an executable order book situation in terms of a crossed order book within the spread of the Market Maker quote (standard, indicative or PWT) in case there are no quote request orders involved in the price determination.

A phase change from pre-call to call is triggered:

- if the volume of the executable orders at the Market Maker quote exceeds the quote volume (including the volume of executable opposing orders) or a stop limit is reached by the Market Maker quote.
- by an indicative quote in the order book and an order executable at that quote (excluding the case of a buy only order in a sold-out situation).
- by an executable order, meaning a market order (excluding the case of a buy only order in a sold-out situation) or crossed order book without a Market Maker quote (excluding the case of crossed order book without a Market Maker quote in a sold-out situation).
- if a stop limit is reached by the Market Maker quote. (In case of a stop loss order if the stop limit equals or exceeds the bid limit of the Market Maker quote. In case of a stop buy order, if the stop limit is equal or below the ask limit of the Market Maker quote.)
- by any incoming quote request order (see section 4.7).

There is no maximum duration for the pre-call phase defined. If there is no order in a specific instrument the pre-call phase will not change during the complete main trading phase.

6.1.2 Call Phase

During the call phase orders may be entered, modified or deleted by trading participants or the Market Maker. Additionally, quote requests can be entered. Besides, the Market Maker may enter or delete quotes pursuant to the Rules and Regulations.

During the auction's call phase, the order book is open with a depth of 1, thus displaying all limit and market orders as well as the quote with the accumulated volumes of the best bid and best ask limit and the number of orders in the book at these limits. In case of an executable order book the potential executable volume, indicative price and side imbalance for the auction is displayed to the respective Market Maker. Incoming quote requests are visible only to the Market Maker. The duration of the call phase has no predetermined minimum period and can be varied depending on the reaction time of the Market Maker and the instruments liquidity. The call phase has a maximum period and no random end (but might be terminated by the respective Market Maker before the end of the maximum duration).

From the call phase a price determination or a phase change to the pre-call phase is possible.

In general, for the transition from call to price determination a Market Maker quote is required. A price will be determined if a matching quote has been entered and an executable order book situation exists, the defined maximum duration of the call phase has passed, or a full execution of the executable orders is possible. If the entered matching quote leads to the partial execution of a quote request order, it will be rejected, with the previous Market Maker quote being reinstated, and the instrument will stay in the call phase.

A phase change from the call to the pre-call takes place if there is no executable order book situation and there are no quote request orders anymore due to order modifications or a quote update, or quote request order timer expiry, or because of the deletion of the existing Market Maker quote during the call phase.

6.1.3 Price Determination

Price determination takes place if the order book is crossed within the Market Maker quote or at the bid or ask limit of this quote based on the fixed order book situation at the end of the pre-call or call phase. The binding Market Maker quote and all orders, which are in the order book at the time of price determination, are considered in the price determination. Price determination follows the modified principle of highest executable volume: the auction price is the price with the highest executable order volume and the lowest surplus for each potential limit step in the order book at or within the current Market Maker quote. Price/time priority ensures that a maximum of one order is executed only partially. Further criteria for determination of the auction price are considered if the order book situation is not clear, i.e. there is more than one eligible limit step with the same executable volume (see: chapter 8 Price Determination Process). After price determination any remaining parts of the Market Maker's matching quote and all not executed quote request orders are deleted.

6.1.4 Sold-out Situation

The state of an instrument can be set to sold-out by the Market Maker, creating a sold-out situation. In case of a sold-out situation, market and limit buy orders as well as executable opposing orders in case of a crossed orderbook situation without a Market Maker quote do not trigger a phase change from pre-call to call. If an instrument is flagged as sold-out then any buy side quote request will be rejected.

6.2 Continuous Auction with Specialist

In general, the trading model ‘Continuous Auction with Specialist’ equals the trading model ‘Continuous Auction with Market Maker’. The differences are based on the role of the Specialist. There are differences especially in the transparency, the workflow of an auction and special functionalities.

In ‘Continuous Auction with Specialist’ all order sizes can be traded which have a determined minimum lot size for the specific security. In each case, only the minimum lot size can be traded or any integer multiple thereof. The minimum lot size may be one so that any integer multiple thereof is tradable. Orders will be executed according to the price/time priority.

An auction in the trading model ’Continuous Auction with Specialist’ consists of a pre-call phase, a freeze phase and the price determination. The freeze phase supports the Specialist to provide liquidity in the instruments he is assigned to.

The Specialist is obliged to use an adequate Limit Control System (LCS), which immediately displays executable orders including stop orders.

The main trading phase consists of succeeding auctions. The number of succeeding auctions as well as the time between auctions or the duration of the pre-call phase respectively as well as the duration of the freeze phase is substantially determined by the Specialist, i.e. the quality of the quotes (provided quote volume and spreads) and the reaction time during the pre-call phase and the freeze phase. Furthermore, the defined maximum duration of the freeze phase and the order book liquidity are relevant.

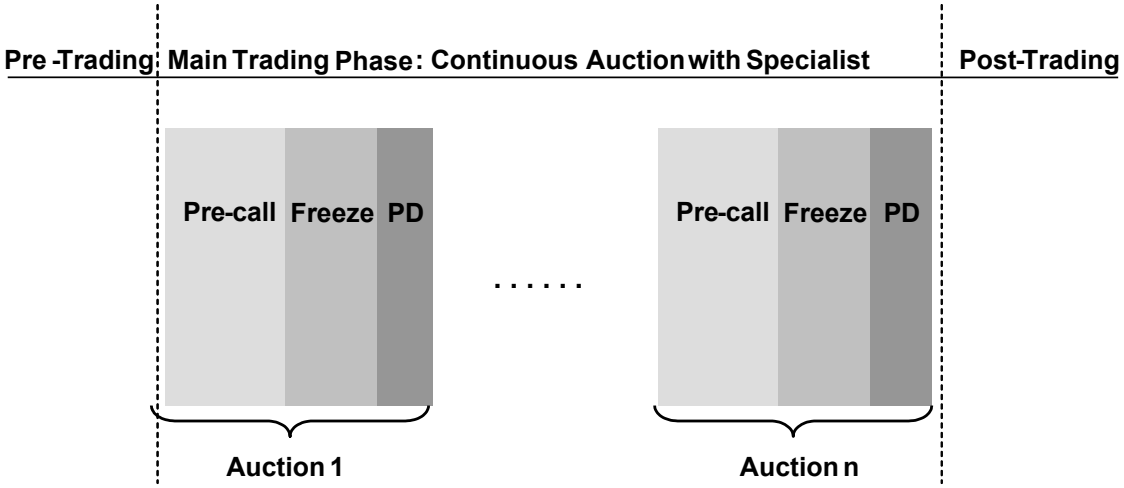


Figure 3: Change of trading phases – Continuous Auction with Specialist

6.2.1 Pre-Call Phase

During the pre-call phase orders may be entered, modified, or deleted by trading participants. Additionally, quote requests can be entered. The Specialist is able to enter, modify, or delete orders on own behalf. In addition, the Specialist is able to enter orders on behalf of other trading participants. These orders can also be deleted by the Specialist. Besides, the Specialist may enter, modify, or delete quotes pursuant to the Rules and Regulations.

During this pre-call phase the order book is fully open for the Specialist only, i.e. the Specialist is able to see each order and quote request as well as its originator. For trading participants the order book is partially closed, i.e. only the Specialist quote is displayed.

From the pre-call phase only a change to the freeze phase is possible. This phase change is triggered by the respective Specialist.

There is no maximum duration for the pre-call phase defined. If there is no trigger by the respective Specialist in a specific instrument the pre-call phase will not change during the whole trading day (i.e. main trading phase).

6.2.2 Freeze Phase

During the freeze phase the order book is locked. In general trading participants cannot enter, modify, or delete orders in the order book. Such instructions are stored in the locked stock and enter the order book immediately only after it gets unlocked by the Specialist. An exception are orders that are submitted upon a quote response (see section 4.7). In case the Specialist is not able to execute such an order within a dedicated time frame the order is deleted automatically even if the order book is locked or the order is in the locked stock.

In the freeze phase the Specialist is able to enter, modify, or delete orders on own behalf. In addition, the Specialist is able to enter orders on behalf of other trading participants. These orders can also be deleted by the Specialist. Besides, the Specialist may enter, modify, or delete quotes pursuant to the Rules and Regulations.

During the auction’s freeze phase the order book transparency for trading participants is equal to the transparency of the pre-call phase, i.e. partially closed.

The duration of the freeze phase has no predetermined minimum period and can vary depending on the reaction time of the Specialist. The freeze phase has a maximum period and no random end. The freeze phase can be terminated before expiration of the maximum duration by the respective Specialists.

From the freeze phase a transition to the price determination or to the pre-call phase is possible. In general, a phase change from freeze to pre-call is triggered by the respective Specialist. If there is no trigger by the Specialist during the maximum duration of the freeze phase, the system will automatically switch to the pre-call phase without a price determination. A phase change from freeze to pre-call will not delete the current Specialist quote. The change from freeze to price determination will be triggered by the Specialist by entering a matching quote.

6.2.3 Price Determination

The price determination takes place after a matching quote entry of the respective Specialist. The price is determined by the trading system. The matching quote and all orders, which are in the order book at the time of price determination, are considered in the price determination. Price determination follows the modified principle of highest executable volume: the auction price is the price with the highest executable order volume and the lowest surplus for each potential limit step at or within the current Specialist matching quote. Price/time priority ensures that a maximum of one order is executed partially. Further criteria for determination of the auction price are considered if the order book situation is not clear, i.e. there is more than one eligible limit step with the same executable volume (see: chapter 8 Price Determination Process). After price determination any remaining parts of the Specialist quote are deleted.

6.3 T7 Entry Services (TES) based Trading Phases

All market participants have the possibility to execute off-book transactions with bilaterally agreed price and quantity in T7 using the T7 Entry Service (TES Type LIS) and to enter OTC transactions in T7 using the T7 Entry Service (TES Type OTC).

6.3.1 Off-Book Trading (T7 Entry Service – TES Type LIS)

All participants have the possibility to execute off-book transactions with bilateral agreed price and quantity in T7 using the T7 Entry Service (TES Type LIS). TES Type LIS is designed to execute pre-arranged off-book transactions under the rules of the exchange (on-exchange off-book). Off-book transactions are required to be above a minimum volume defined by the FWB management board (large-in-scale). The volume and the quantity of the transaction is validated against risk limits defined by the participant. The transaction price is checked for a maximum deviation from the last auction price to ensure price quality. Post-trade publication is ensured by the exchange.

In principle, off-book transactions can be executed in all instruments available for on-book trading in T7, excluding structured products. Order information for off-book transactions can be entered by traders and other users. Additionally, order information can be entered by a third participant which is not a counterparty of the transaction. Order information is only displayed to the counterparties of the transaction and to the third participant who entered the order information (if applicable).

Entered order information for off-book transactions has to be approved by traders of both counterparties of the transaction. The approval process can take place manually or automatically. Subsequently, the orders are matched and both counterparties receive a trade information generated by the system. Unconfirmed order information is automatically deleted by the system at the end of off-book trading. T7 transmits all executed off-book transactions to the settlement systems for subsequent clearing and settlement processing.

It is not possible to execute cross trades using TES Type LIS. Participants can agree on a settlement date deviating from standard. TES Type LIS prices do not update the last auction price for on-book trading.

6.3.2 OTC (T7 Entry Service – TES Type OTC)

All participants have the possibility to enter OTC transactions in T7 using the T7 Entry Service (TES Type OTC). TES Type OTC is designed to enter pre-arranged transactions to initiate clearing and settlement via FWB's post-trade infrastructure. OTC transactions can be entered for any volume. Entries are not subject to any validations regarding volume, quantity or price. Post-trade transparency has to be ensured by the respective participants.

In principle, OTC transactions are possible for all instruments available for on-book trading in T7. OTC transactions can be entered by traders and other users. Additionally, OTC transactions can be entered by a third participant which is not a counterparty of the transaction.

Entered OTC transactions have to be approved by traders of both counterparties of the transaction. The approval process can take place manually or automatically. Subsequently, both counterparties receive a trade confirmation generated by the system. Unconfirmed transactions are automatically deleted by the system at the end of off-book trading. T7 transmits the approved OTC transactions to the settlement systems for subsequent clearing and settlement processing.

It is not possible to enter cross trades using TES Type OTC. Participants can agree on a settlement date deviating from standard.

7 Tasks and Duties of the Specialist / Market Maker

7.1 Specialist's Tasks and Duties

In the trading model Continuous Auction with Specialist the Specialist is responsible for a high trading quality. The following general duties result from this task:

1. The Specialist is obliged to maintain a limit control system which monitors valid orders (incl. stop orders, trailing stop orders and stop order of once-cancels-other orders) in the order book for potential execution. In addition, the Specialist is obliged to maintain a system that allows for the entry of quotes relevant for information purposes and for price determination of the trading system.
2. If reference markets are defined the Specialist shall receive real time order book information from these reference markets (if available).
3. The Specialist is obligated to provide quotes for information purposes throughout the trading day. For the quotation the current order book situation and if defined the respective reference markets have to be taken into account. If defined the Specialist must quote for at least a minimum guaranteed size and with a maximum spread in all assigned instruments.
4. The Specialist shall respond to quote requests in due time.
5. The Specialists shall avoid, to the greatest possible extent, partial executions of orders.
6. The Specialist might be obliged to offer additional liquidity to ensure a high trading quality.
7. In specific securities determined by the Exchange, the Specialist has to ensure that per security only one price determination by the trading system takes place per trading day. In these securities, the Specialist is only obliged to enter a standard quote within an adequate time period prior to the price determination.
8. In specific securities determined by the Exchange, the Specialist has to trigger a special auction once per day.
9. If there has not been a price determination for an instrument until a pre-defined point in time during the trading day the Specialist shall initiate a price determination for generating a price without turnover.

The stated Specialist's duties will be outlined more precisely and complemented in the Rules and Regulations of the Frankfurt Stock Exchange or in separate contracts.

7.2 Market Maker's Tasks and Duties

In the trading model Continuous Auction with Market Maker it is the task of the Market Maker to supply the market with the central liquidity for this security. The following duties result from this task:

1. The Market Maker continuously provides information of the actual market situation by entering a quote. Such a quote must have at least the minimum quote volume and a maximum spread for the respective instrument if such requirements are defined.
2. The Market Maker shall respond to quote requests in due time. This response shall correspond to the publicly available quote of the Market Maker.

3. The Market Maker will receive an electronic message to enter a matching quote, in case of a phase change from pre-call to call. This matching quote should correspond to the quote entered earlier and should fulfil requirements for the minimum quote volume and the maximum spread, if defined.
4. If there has not been a price determination for an instrument until a pre-defined point in time during the trading day the Market Maker shall initiate a price determination for generating a price without turnover.

The stated Market Maker's duties will be outlined more precisely and completely in the Rules and Regulations of the Frankfurt Stock Exchange or in separate contracts.

8 Price Determination Process

8.1 Basic Matching Rules

The auction price is determined on the basis of the Market Maker/Specialist quote and the order book situation stipulated at the end of the call/freeze phase.

The fundamental rules of calculating the auction price by the trading system according to modified principle of highest executable volume is explained below:

The auction price is the price with the highest executable order volume and the lowest surplus for each potential limit step in the order book at or within the price range set by the Specialist/Market Maker quote (see example 1).

Should this procedure identify more than one limit step within the price range (including bid and ask limits of the Specialist/Market Maker quote) with the highest executable order volume and the lowest surplus, the auction price will be determined on the basis of the surplus:

- If the surplus for all eligible limit steps on the bid side (surplus of demand) the auction price is calculated according to the highest of these limit steps (see examples 2 and 6).
- If the surplus for all eligible limit steps lies on the ask side (surplus of supply) the auction price is calculated according to the lowest of these limit steps (see examples 3 and 7).

If consideration of the surplus does not lead to a clear auction price, the midpoint of the eligible limit steps is included as additional criterion. This may be the case if there is for several limit steps no surplus on hand (see examples 4 and 8) or if there is an equal surplus on the bid and the ask side (see examples 9).

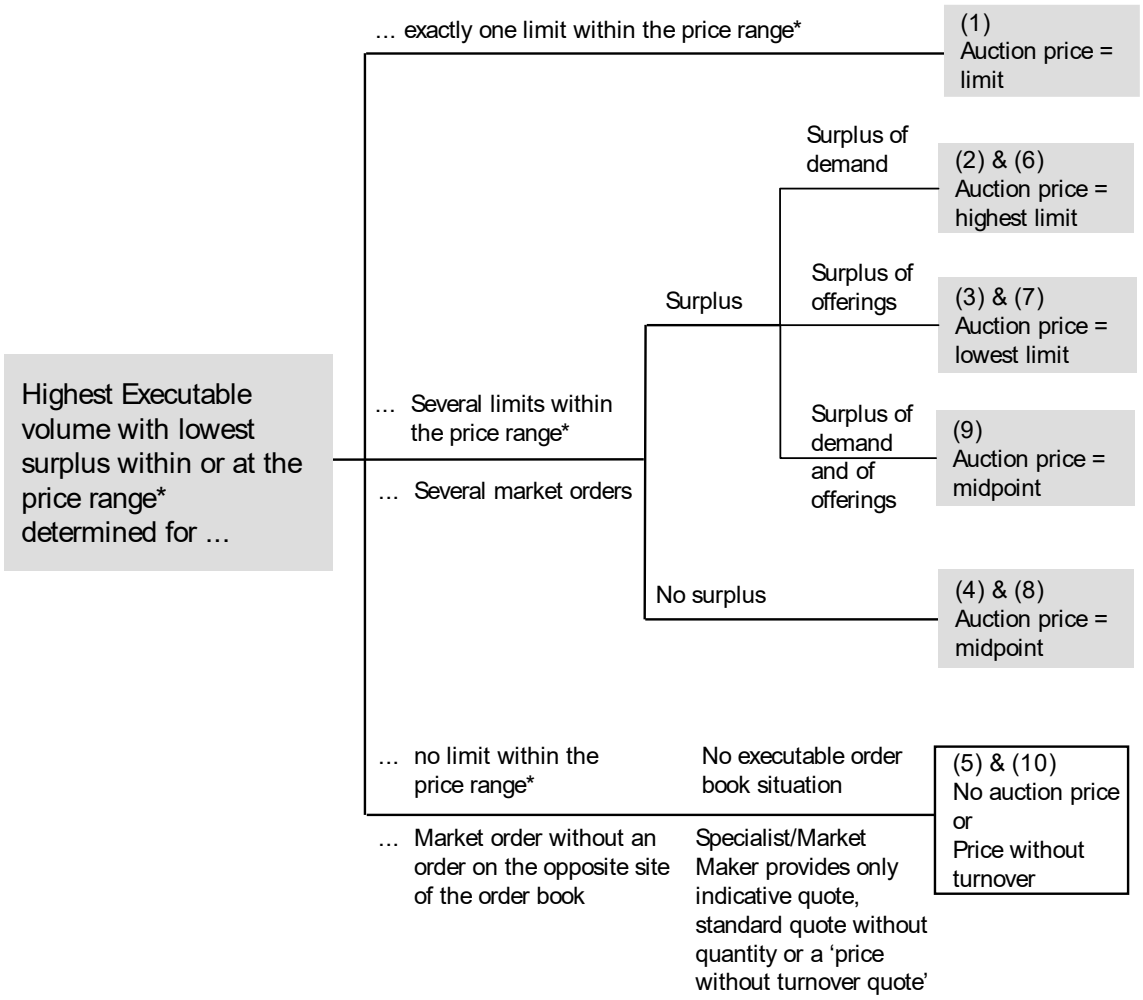
- The midpoint is calculated as the midpoint of the highest eligible limit step with surplus on the bid side and the lowest eligible limit step with surplus on the ask side.
- In case there is no surplus the eligible limit steps, the highest and lowest eligible limit steps are considered for midpoint determination.
- The thereby determined midpoint is – if appropriate – rounded to the next valid limit step according to the applicable tick size and serves as auction price.

If orders at or within the price range cannot be matched, an auction price with turnover cannot be determined (see example 5).

Prices without turnover

If there has not been a price determination for an instrument until a pre-defined point in time during the trading day the Specialist/Market Maker shall initiate a price determination for generating a price without turnover.
Such a price determination will be triggered by entering a respective quote (price without turnover quote). If there is no executable order in the order book a price without turnover based on the bid side of the quote will be determined.

The following diagram gives an outline of how price determination rules affect possible order book constellations in continuous auction. The number in brackets refers to the corresponding example for this rule.



* Specialist/Market Maker quote with or without quantity. Bid and ask limit of the Specialist/Market Maker quote have to be included.

Figure 4: Rules for calculation of the auction price

8.2 Examples for determination of the auction price

The following examples are meant to clarify the calculation of the auction price. For all examples a tick size of 1 € is assumed.

Example 1: There is exactly one limit step at which the highest order volume can be executed and which has the lowest surplus.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				202	800	800		
				201	800	800		
Limit	300	300		200	500	800	100	Quote
Limit	200	500		199	200	700		
Limit	300	800	100	198		700	300	Limit
		800	400	197		400	400	Limit
Quote	100	900	900	196				

An auction price is determined at € 198 with a quantity of 700 and a surplus of 100 on the bid side.

Example 2: There are several eligible limit steps and there is a surplus of demand.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				202	900	900		
				201	900	900	400	Quote
Limit	600	600	100	200		500		
		600	100	199		500	100	Limit
		600	200	198		400	100	Limit
Quote	200	800	500	197		300	300	Limit

An auction price corresponding to the highest eligible limit step at € 200 with a quantity of 500 and surplus of 100 on bid side is determined.

Example 3: There are several eligible limit steps and there is a surplus of supply.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
Limit	300	300		202	500	800		
Limit	100	400		201	400	800	200	Quote
		400		200	200	600		
Limit	100	500		199	100	600		
		500		198	100	600	600	Limit
Quote	400	900	900	197				

An auction price corresponding to the lowest eligible limit step at € 198 with a quantity of 500 and surplus of 100 on the ask side is determined.

Example 4: There are several possible limits and no surplus on hand.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				203	600	600	100	Quote
Limit	300	300		202	200	500		
Limit	200	500		201		500		
		500		200		500		
		500		199		500	300	Limit
		500	300	198		200	200	Limit
Quote	100	600	600	197				

An auction price corresponding to the midpoint of the eligible limit steps is determined at € 200 ((199 + 201)/2) with a quantity of 500.

Example 5: There is no possible limit.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				202	500	500	300	Quote
				201	200	200	200	Limit
Limit	100	100	100	200				
Quote	300	400	400	199				

It is not possible to determine an auction price.

Example 6: Only market orders are executable in the order book with a surplus of demand. Specialist/Market Maker offers no additional liquidity.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
Market	200	200	100	Market		100		
		200	100	202		100	0	Quote
		200	100	201		100		
		200	100	200		100		
Quote	0	200	100	199		100		
		200	100	Market		100	100	Market

The auction price is determined corresponding to the ask limit of the Specialist/Market Maker quote with € 202, a quantity of 100 and a surplus of 100 on the bid side.

Example 7: Only market orders are executable in the order book with a surplus of supply. Specialist/Market Maker offers no additional liquidity.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
Market	100	100		Market	100	200		
		100		202	100	200	0	Quote
		100		201	100	200		
		100		200	100	200		
Quote	0	100		199	100	200		
		100		Market	100	200	200	Market

The auction price is determined corresponding to the bid limit of the Specialist/Market Maker quote with € 199, a quantity of 100 and a surplus of 100 on the ask side.

Example 8: Only market orders are executable in the order book with no surplus. Specialist/Market Maker offers no additional liquidity.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
Market	100	100		Market		100		
		100		202		100	0	Quote
		100		201		100		
		100		200		100		
Quote	0	100		199		100		
		100		Market		100	100	Market

The executable quantity is 100. The auction price is determined corresponding to the midpoint of the lowest and highest eligible limit steps at € 201 ((199 + 202)/2=200,5 rounded to the next tick size which is assumed to be 1€).

Example 9: Orders are executable within or at the Specialist/Market Maker quote and an equal surplus on both sides.

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				203	1.200	1.200		
Limit	100	100		202	1.100	1.200	1.000	Quote
		100		201	100	200	100	Limit
Limit	100	200	100	200		100		
		200	100	199		100		
Quote	1.000	1.200	1.100	198		100	100	Limit

The executable quantity is 100, the surplus on both side equals 100. The auction price is determined corresponding to the midpoint of the highest eligible limit step with surplus on the bid side and the lowest eligible limit step with surplus on the ask side at € 201 ((200 + 201)/2) = 200,5 rounded tot the next tick size which is assumed to be 1 €).

Example 10: There are no executable orders in the order book. Specialist/Market Maker enters a price-without-turnover-quote (pwt-quote).

Bid	Quantity	Cum. quantity	Surplus	Limit	Surplus	Cum. quantity	Quantity	Ask
				202			0	Quote
				201				
Quote	0			200				

An auction price corresponding to the bid limit of the pwt-quote is calculated at € 200 with a quantity of 0.