
Guide to Pre-Trade Validation (PTV) functionality

IDEM Market

Guide to Pre-Trade Validation (PTV) functionality

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London
Stock Exchange Group

Guide to Pre-Trade Validation (PTV) functionality

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Guide to Pre-Trade Validation (PTV) functionality

1. Document history

Issue	Date	Description
Version 1.0	Effective from July 3 rd , 2017	Document creation



Guide to Pre-Trade Validation (PTV) functionality

2. Pre-Trade Validation (PTV) functionality

2.1. Overview

The Pre-Trade Validation (PTV) functionality complements the risk control systems in place by IDEM Members to control order flow activity.

In particular, PTV functionality provides an additional tool for:

- an IDEM Member to monitor the risk associated to its own trading activity;
- an IDEM Member offering Direct Market Access (DMA) to control the risk related to the trading activity of its DMA clients;
- a General Clearing Member (GCM), delegated by its NCM which is an IDEM Member, to manage the cleared risk exposure generated by the trading activity of its NCM.

The PTV functionality is available for all products listed on IDEM via SOLA native APIs (SAIL).

The PTV can be configured by a “Risk Manager” (for one of the purposes described above) to constrain the trading activity of its controlled “Managed Entity”, in case of any breach of pre-defined thresholds as configured by the Risk Manager itself. Such constraints range from the cancellation of a single incoming order to the cancellation of all resting orders and quotes, plus a complete freeze of the technical connection to the matching engine, thereby preventing the Managed Entity from inserting any new order or quote.

This document provides an overview of the PTV functionality, including details of the different controls available for the users of this functionality.

2.2. Definitions

Risk Manager

The Risk Manager controls the level of risk determined respectively by the order flow of its own activity / its DMA clients’ activity (as the case may be) or by its NCM (when the PTV functionality is delegated to the related GCM) trading products listed on IDEM.

The PTV functionality allows the Risk Manager to set Risk Limit Thresholds for a Managed Entity, at the level of a specific Instrument Series or for an Instrument Group.

Managed Entity

The Managed Entity means an entire Member Firm (defined by its MemberID), a single TraderID or a group of TraderIDs of the same Member Firm, that are subject to a common set of PTV controls as defined by the Risk Manager¹.

The Managed Entity could be subject to PTV controls by more than one Risk Manager. In this case, the more stringent limits will apply.

¹ In case a Group of TraderIDs of the same Member Firm is configured in order to be subject to the same set of PTV controls, it is referred to as a “Trader Team”. Moreover, it is also possible to configure a TraderID as responsible for a Trader Team (aka “Team Lead”) and to which all the other TraderIDs will be referenced.



Guide to Pre-Trade Validation (PTV) functionality

Risk Counters

Risk Counters are metrics calculated internally by the trading system and updated, as necessary, on order entry, modification and cancellation, and on trade execution. Risk Counters are compared with the respective Risk Limit Thresholds in order to control the level of risk accumulated by a Managed Entity.

Risk Counters are always reset to zero before the start of a new trading day.

A full description of the Risk Counters maintained by the PTV functionality is provided in the Section 5.

Risk Limit Thresholds

Risk Limit Thresholds are the values, as defined by the Risk Manager, representing the maximum value that a Risk Counter can assume before triggering a pre-defined action that will limit the trading activity of the Managed Entity. A full description of the actions triggered by the breach of each Risk Limit Threshold is provided in the Section 6.

Specific thresholds related to the Market Maker Quoting Protection (MMQP) functionality are referred to as “MMP Limits”. For a full description of the MMQP and its related risk controls, please refer to the documents available on the Borsa Italiana’s website.

Pre-Trade Validations (PTVs)

Pre-Trade Validations (PTVs) are the controls, executed on the SOLA trading system, that compare a Risk Counter to its related Risk Limit Threshold, and trigger a pre-defined action on the trading activity of the Managed Entity in case of breach of the relevant Risk Limit Threshold.

The following Pre-Trade Validations are available in the PTV functionality:

- Max Order Quantity limit for orders and quotes;
- Max Order Quantity limit for cross/bundled/third party orders;
- Position limit on executed trades (net long / short position) during the day, expressed in quantity terms;
- Exposure limit on open orders (excluding quotes) plus executed trades (net long / short position) during the day, expressed in quantity terms;
- Access to the MMQP functionality, allowing the Risk Manager to specifically control the Managed Entity’s quoting activity based on bulk quotes.

Risk Limit Usage

In order to provide real-time information on the level of risk accumulated by the Managed Entity, the PTV functionality disseminates messages related to the “usage” (expressed as a percentage of the related Risk Limit Thresholds as defined by its Risk Manager) of its Position and Exposure limits.

Details regarding the available alerts and rules for the dissemination of Risk Limit Usage messages through the SOLA protocols are described in the Section 6.



Guide to Pre-Trade Validation (PTV) functionality

Order

An Order means an offer to buy or sell a number of Contracts submitted to an order book. The minimum information content of an order includes: i) the instrument, ii) the quantity, iii) the price, iv) the dealing capacity (for own or customer account), v) the type of transaction (buy or sell) and vi) the market mechanism and validity types (aka “method of execution”).

Quote

A quote means a bid(s) and/or offer(s) entered using the Bulk Quoting (BQ) functionality.

Instrument Series

A Instrument Series means a single tradable derivatives instrument, uniquely identified by an ISIN code and by an Instrument ID in SOLA.

Instrument Group

An Instrument Group means an ensemble of Instrument Series on the same underlying with the same delivery type (i.e. cash or physical delivery) and instrument type (i.e. futures or options).



Guide to Pre-Trade Validation (PTV) functionality

3. Setting Pre-Trade Validations

3.1. Obtaining access and testing of the PTV functionality

How to get access to the PTV functionality

IDEM Members interested in the PTV functionality should contact their Technical Account Manager to be enabled for Pre-Trade Validations.

IDEM Member will be required to request a Risk Manager User (“RM”) via BltClub to control order flows of Managed Entities². The Technical Account Management team will provide the customer with the relevant connectivity details.

Relevant contact details are available in the Section 8.

How to test the PTV functionality

IDEM Members that are developing software via the SAIL gateway to manage the PTV functionality must certify their software in accordance with the LSEG Certification Policy described in the “IDEM - Guide to the Trading System” document before using the software in production.

IDEM Members using an accredited ISV to manage Pre-Trade Validations will not be required to perform any certification test before using it in production since ISV will perform any certification test on their behalf. However, IDEM Members are strongly encouraged to test in the Customer Development Service (CDS) to ensure their systems and processes are functioning as expected.

IDEM Members should contact their Technical Account Manager or the Technical Account Management team to discuss software certification and testing.

3.2. Defining Managed Entities

Based on information provided by the IDEM Members, the Technical Account Management team will set up the Risk Manager and related Managed Entity.

Configuration relevant to the Risk Manager and related Managed Entity will be effective from the first Trading Day after the changes are confirmed by the Technical Account Management team.

It is responsibility of the Risk Manager to set up and manage the Pre-Trade Validations for each Managed Entity, and to inform the Managed Entity of the controls that have been applied to its trading activity. Independently of the activation of the PTV functionality, according to Borsa Italiana’s Rules and Instructions, IDEM Members are required to establish, maintain and enforce adequate systems and controls to prevent anomalous orders in terms of price, quantity and frequency.

² Via a separate dedicated form, IDEM Member can identify the Team Lead responsible for a certain Trader Team.



Guide to Pre-Trade Validation (PTV) functionality

3.3. How to set PTVs in SOLA

Once the required Managed Entity(ies) are configured, SOLA native APIs (SAIL) offer a set of dedicated messages to the Risk Manager in order to:

- define which PTVs must be executed for each Managed Entity;
- set up and update the related Risk Limit Thresholds; configured thresholds can be updated in real-time, with immediate effectiveness.

The following messages are available to define PTV limits in the SOLA APIs and to get updates on Risk Limits usage:

- MK: message used to configure Risk Limit Thresholds;
- MQ: message used to configure MMP Limits.

For full details on available SAIL messages implementing the PTV functionality, please refer to the SAIL Specification document available on Borsa Italiana's website.



Guide to Pre-Trade Validation (PTV) functionality

4. Pre-Trade Validations (PTVs)

This section describes the PTVs that are executed by the PTV functionality on incoming orders and/or quotes of a Managed Entity, according to the configurations and Risk Limit Thresholds defined by the Risk Manager for each Managed Entity.

4.1. Maximum Order Quantity Limit for orders and quotes

The system allows the Risk Manager to specify a maximum order quantity for orders and quotes inserted by each Managed Entity in the trading system³.

In case the incoming order / quote has a quantity greater than the specified threshold, it will be automatically rejected⁴.

Relevant Risk Limit Thresholds: MaxOrderQuantity.

4.2. Maximum Order Quantity Limit for cross/bundled/third party orders

The system allows the Risk Manager to specify a maximum order quantity for cross / bundled / third party orders inserted by each Managed Entity in the trading system.

In case the incoming order falling in one of these categories has a quantity greater than the specified threshold, it will be automatically rejected.

Relevant Risk Limit Thresholds: Max Order Quantity on cross/bundled/third party orders.

4.3. Position Limits (on executed trades)

The system allows the Risk Manager to specify a set of limits to control the maximum position accumulated during the trading day by each Managed Entity on executed trades.

On execution of a trade, in case the long / short position accumulated by the Managed Entity goes outside the specified thresholds, the system will remove all the booked orders (at the given granularity) on the relevant side of the order book and prevent any new order and quote from entering the system that could generate a further increase of the controlled long / short position. Thus, in case the MaxTradedLong threshold is breached, all resting buy orders are cancelled and no new buy orders can be inserted in the system.

Please note that, as described above, Position Limits are triggered only after the specified Risk Thresholds have been passed.

Relevant Risk Counters: TradedNet, TradedNetLong, TradedNetShort.

Relevant Risk Limit Thresholds: MaxTradedLong, MaxTradedShort.

³ No Risk Counter is associated to Maximum Order Quantity Limits, since it applies to a single incoming order.

⁴ Each quote in a bulk quote (BQ) message is individually validated. This means that, if a quote has a quantity greater than the related specified threshold, it will be rejected while validation for the all other quotes in the BQ message will be carried on.



Guide to Pre-Trade Validation (PTV) functionality

4.4. Exposure Limits (*on open orders plus executed trades*)

The system allows the Risk Manager to specify a set of limits to control the maximum exposure accumulated by each Managed Entity during the trading day, based on current open (unexecuted) orders⁵ inserted in the system by the Managed Entity plus all executed trades.

When a new order enters the market, in case the long / short exposure for the Managed Entity goes outside the specified thresholds, the incoming order is rejected.

Unexecuted quotes are not included in the calculation of Risk Counters for Exposure Limits. In order to control the quoting activity of the Managed Entity, please refer to the “Access to Market Maker Quoting Protection” under the Section 4.6.

Implied orders from strategies are not included in Risk Counters at Instrument Series granularity, while implied trades are taken into account (for full definitions and calculation rules for the Risk Counters, see the Section 5).

Exposure Limits are strict limits in the sense that they are triggered to prevent the threshold value being surpassed.

Relevant Risk Counters: BookedLong, BookedShort, ExposedLong, ExposedShort, ExposedSpreads.

Relevant Risk Limit Thresholds: MaxExposedLong, MaxExposedShort.

4.5. Granularity of Pre-Trade Validations

For each Managed Entity⁶, Pre-Trade Validations (with specific Risk Counters and dedicated Risk Limit Thresholds) can be configured at the level of:

- Instrument Series;
- Instrument Group.

PTVs for strategies are available at Instrument Group level only⁷.

In case there are Maximum Order Quantity limits defined at both Instrument Series and Instrument Group level, the most restrictive limit will prevail.

4.6. Access to Market Maker Quoting Protection (MMQP)

The Risk Managers have the possibility to define the parameters of the “Market Maker Quoting Protection” (MMQP) available in SOLA for Market Makers (MM) in order to control the behaviour of their applications.

Through the MMQP, the trading system can be instructed to delete all resting quotes in case, during a specified time interval, excessive trading activity against the Market Maker is taking place.

For a full description of the MMQP and its related risk controls, please refer to the Borsa Italiana's website.

Since the MMQP is available to both Market Makers and their Risk Managers, in case two sets of limits are applied to the same Managed Entity, the most restrictive configurations will apply.

⁵ Quotes inserted by the Managed Entity are not taken into consideration for the Exposure Limit's calculation.

⁶ As described in the definitions, a Managed Entity can be an entire Member Firm (defined by its MemberID) or a single TraderID or a group of TraderIDs belonging to the same Member Firm.

⁷ All Risk Spread counters are calculated at the level of the Instrument Group to which the legs belong to and not at the Strategy Group level. Multi Group Strategies are not included in Risk Spread counters.



Guide to Pre-Trade Validation (PTV) functionality

The following parameters can be configured by the Risk Manager:

Field Name	Description
MmpMaxNbTrades	Maximum number of trades that can be executed by the MM in the time interval specified by the parameter "MmpCalculationTimeInterval"
MmpMinTradeVolume	Minimum size of the trades that must be counted to the purposes of the maximum number of trades control, as described above
MmpMaximumTradedVolume	Maximum traded volume that can be executed by the MM in the time interval specified by the parameter "MmpCalculationTimeInterval"
MmpMaximumTradedValue	Maximum traded value that can be executed by the MM in the time interval specified by the parameter "MmpCalculationTimeInterval"
MmpCalculationTimeInterval	Defines the time interval during which the protection rules defined above must be verified

Please note that default values for the above parameters are also set at Exchange level. The Risk Manager must set values that are more stringent than the ones set by the Exchange, otherwise the requested modification will be rejected.

For more information about the default values for the above parameters applied at Exchange level, please refer to related documentation available on Borsa Italiana's website.

Please note as well that the Risk Manager is allowed to leave some values empty (in this case Exchange level will be applied by default).



Guide to Pre-Trade Validation (PTV) functionality

5. Risk counters

5.1. Instrument Risk Counters

Field	Description
TradedNet	<p>Counter maintaining the net traded position of the Firm or Trader team. Incremented on creation of long positions, decremented on creation of short positions.</p> $T_{Ni} = T_{Li} - T_{Si}$ <p>where: T_{Ni} = Net traded positions for instrument i T_{Li} = Long traded positions for instrument $i = \sum_{side=long} t_i$ T_{Si} = Short traded positions for instrument $i = \sum_{side=short} t_i$ t_i = Trade for instrument i either as outright or leg of a strategy</p>
BookedLong	<p>Counter maintaining the number of booked orders on the long side. Incremented on entry of Buy order on the Instrument; Buy orders on Strategies with this Instrument as a buy-side leg; and Sell orders on Strategies with this Instrument as a sell-side leg.</p> <p>Decrementd when the order is cancelled or trades.</p> $O_{Li} = \sum oO_{Li} + \sum oS_{L L_{Li}} + \sum oS_{S L_{Si}}$ <p>where: O_{Li} = Booked Long Orders for instrument i oO_{Li} = Booked Outright Long Order for instrument i $oS_{L L_{Li}}$ = Booked Strategy Long Order, Long on leg i $oS_{S L_{Si}}$ = Booked Strategy Short Order, Short on leg i</p>



Guide to Pre-Trade Validation (PTV) functionality

Field	Description
BookedShort	<p>Same as booked long, for the short side.</p> $O_{Si} = \sum oO_{Si} + \sum oS_{L\ L_{Si}} + \sum oS_{S\ L_{Li}}$ <p>where: O_{Si} = Booked Short Orders for instrument i oO_{Si} = Booked Outright Short Order for instrument i $oS_{L\ L_{Si}}$ = Booked Strategy Long Order, Short on leg i $oS_{S\ L_{Li}}$ = Booked Strategy Short Order, Long on leg i</p>
ExposedLong	<p>Calculated on demand as the sum of BookedLong + TradedNet.</p> $E_{Li} = \max(0, T_{Ni} + O_{Li})$ <p>where: E_{Li} = Long Exposure for instrument i T_{Ni} = Net traded positions for instrument i O_{Li} = Booked Long Orders for instrument i</p>
ExposedShort	<p>Calculated on demand as the sum of BookedShort - TradedNet.</p> $E_{Si} = \max(0, O_{Si} - T_{Ni})$ <p>where: E_{Si} = Short Exposure for instrument i T_{Ni} = Net traded positions for instrument i O_{Si} = Booked Short Orders for instrument i</p>



Guide to Pre-Trade Validation (PTV) functionality

5.2. Instrument Group Risk Counters

Field	Description
TradedNetLong	<p>Counter maintaining the sum of long TradedNet on all Instruments in this Group.</p> $T_{Lg} = \sum_{\forall i \in g} \max(0, T_{Ni})$ <p>where: T_{Lg} = Long Traded positions for group g T_{Ni} = Net Traded position for instrument i</p>
TradedNetShort	<p>Counter maintaining the sum of absolute short TradedNet on all Instruments in this Group.</p> $T_{Sg} = \sum_{\forall i \in g} \min(0, T_{Ni}) $ <p>where: T_{Sg} = Short Traded positions for group g T_{Ni} = Net Traded position for instrument i</p>
BookedLong	<p>Counter maintaining the sum of Booked Long orders on all Instruments in the Group (<i>orders on strategies are not considered</i>).</p> $O_{Lg} = \sum_{\forall i \in g} \sum oO_{Li}$ <p>where: O_{Lg} = Booked Long Orders for group g oO_{Li} = Booked Outright Long Order for instrument i</p>



Guide to Pre-Trade Validation (PTV) functionality

Field	Description
BookedShort	<p>Counter maintaining the sum of Booked Short orders on all Instruments in the Group (<i>orders on strategies are not considered</i>).</p> $O_{Sg} = \sum_{\forall i \in g} oO_{Si}$ <p>where: O_{Sg} = Booked Short Orders for group g oO_{Si} = Booked Outright Short Order for instrument i</p>
TradedNet	<p>Counter calculated as the difference between TradedNetLong and TradedNetShort</p> $T_{Ng} = T_{Lg} - T_{Sg}$ <p>where: T_{Ng} = Net traded positions for group g T_{Lg} = Long Traded positions for group g T_{Sg} = Short Traded positions for group g</p>
ExposedLong	<p>Counter calculated as TradedNet + BookedLong.</p> $E_{Lg} = T_{Ng} + O_{Lg}$ <p>where: E_{Lg} = Long Exposure for group g T_{Ng} = Net traded positions for group g O_{Lg} = Booked Long Orders for group g</p>
ExposedShort	<p>Counter calculated as BookedShort - TradedNet.</p> $E_{Sg} = O_{Sg} - T_{Ng}$ <p>where: E_{Sg} = Short Exposure for group g T_{Ng} = Net traded positions for group g O_{Sg} = Booked Short Orders for group g</p>



Guide to Pre-Trade Validation (PTV) functionality

6. Execution of Pre-Trade Validations

Messages submitted to SOLA will pass through the PTV functionality before reaching the electronic order book. Pre-Trade Validations are specific to the orders and/or quotes inserted by the Managed Entity and are in addition to the standard Exchange-based controls in place on the Exchange, which are implemented and enforced for all IDEM Members.

On order/quote reception, the following sequence of actions are performed by SOLA:

- 1) check if any Position or Exposure limit for the relevant Managed Entity (on the relevant Group and/or Instrument) has been already reached:
 - in case the limit has been already reached, the incoming order/quote is rejected⁸;
- 2) check if Exchange-based controls are passed:
 - in case Exchange-based controls are not passed, the incoming order/quote is rejected;
- 3) check if the Maximum Quantity limit for the relevant Managed Entity is breached (on the relevant Group and/or Instrument):
 - in case the limit is breached, the incoming order is rejected;
- 4) If the above validations are passed:
 - apply Circuit Breaker to the incoming order/quote;
 - apply SEP to the incoming order/quote;
 - if none of the two controls above requires cancellation of the incoming order/quote, the order/quote is directed to the order book;
- 5) before an incoming order/quote enters the order book, Exposure Limit counters are recalculated:
 - where, following recalculation of the Risk Counters, an Exposure Limits is breached, the actions described under paragraph 4.3 are triggered, including rejection of the incoming order/quote;
- 6) where the previous check is passed, the incoming order/quote reaches the order book. Should the incoming order/quote aggress the order book, generating one or more trades:
 - the counters related to Position Limits are updated;
 - where, following recalculation of the Risk Counters, a Position Limit is breached, the actions described under paragraph 4.2 are triggered;
- 7) Risk Usage Messages are disseminated to both the Risk Manager and related Managed Entity.

Risk Counters are also updated (and related actions executed as described in the Section 5), in case of:

- order/quote modifications and cancellations;
- trade executions;
- updates of the Risk Limit Thresholds by the Risk Manager.

⁸ Quotes are individually validated. For this reason, the rejection of a quote does not imply the whole BQ message to be rejected, and validations continue with the following quote(s) contained in the BQ message.



Guide to Pre-Trade Validation (PTV) functionality

7. Order status, error codes and Risk Usage Notifications

7.1. Order status codes

Where a Risk Limit Threshold is breached, dedicated codes are disseminated by the SOLA APIs to identify the reason of order rejection/cancellation. In the SAIL protocol, error codes are also disseminated in order to allow the Risk Manager to identify whether the relevant Pre-Trade Validation control has been breached at the Firm ID vs. Trader ID level, or at Instrument Group vs. Instrument Series level.

Data type	Error code	Error message
<i>SailOrderStatus / FixOrdStatus</i>	T	Order eliminated due to risk limit exceeded
	R	Order eliminated due to risk master switch
<i>SailErrorCode</i>	3100	Order Quantity Limit exceeded at the Trader / Instrument level
	3101	TradedLong limit exceeded at the Trader / Instrument level
	3102	TradedShort limit exceeded at the Trader / Instrument level
	3103	ExposedLong limit exceeded at the Trader / Instrument level
	3104	ExposedLong limit exceeded at the Trader / Instrument level
	3110	Order Quantity Limit exceeded at the Trader / Group level
	3111	TradedLong limit exceeded at the Trader / Group level
	3112	TradedShort limit exceeded at the Trader / Group level
	3113	ExposedLong limit exceeded at the Trader / Group level
	3114	ExposedLong limit exceeded at the Trader / Group level
	3115	TradedSpreads limit exceeded at the Trader / Group level
	3116	ExposedSpreads limit exceeded at the Trader / Group level
	3120	Order Quantity Limit exceeded at the Firm / Instrument level
	3121	TradedLong limit exceeded at the Firm / Instrument level
	3122	TradedShort limit exceeded at the Firm / Instrument level
	3123	ExposedLong limit exceeded at the Firm / Instrument level
	3124	ExposedLong limit exceeded at the Firm / Instrument level
	3130	Order Quantity Limit exceeded at the Firm / Group level
	3131	TradedLong limit exceeded at the Firm / Group level
	3132	TradedShort limit exceeded at the Firm / Group level
	3133	ExposedLong limit exceeded at the Firm / Group level
	3134	ExposedLong limit exceeded at the Firm / Group level
	3135	TradedSpreads limit exceeded at the Firm / Group level
	3136	ExposedSpreads limit exceeded at the Trader / Group level
	3200	Risk Limit disabled for current Group configuration
	3201	Spread Risk Limits cannot be defined for Instruments
	3202	Risk Limit cannot be defined for Strategy Groups



Guide to Pre-Trade Validation (PTV) functionality

7.2. Risk Usage Notifications

Risk Usage Notification messages are sent following a recalculation of the Risk Counters, in order to alert both the Risk Manager and the related Managed Entity of the current level of usage of the allowed Risk Limit Threshold by the Managed Entity itself.

Exchange configuration of PTV functionality will result in alerts being disseminated when relevant Risk Limit Threshold has been “used” at 50%, 60%, 70% and further 10% intervals of its full value, as may be defined by the Risk Manager.

Risk Managers and related Managed Entity(ies) are required to subscribe to dedicated messages in SOLA for receiving these alerts. In particular, the MN message disseminates the percentage of a Risk Limit Threshold, when it exceeds certain pre-defined values at the system level.



Guide to Pre-Trade Validation (PTV) functionality

8. Contact

For further information on this document or to discuss usage of the PTV functionality, please speak to your Account Manager at IDEM:

- e-mail: BusDevE&D@borsaitaliana.it
- telephone: +39 02724261.

For more information on the technical set up, enablement and testing, please contact your Technical Account Manager or the Technical Management team:

- e-mail: clients-services@borsaitaliana.it
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