FIXation Risk Management Guide

Version 3.6.1

Fluent IT & Support Communication Methods

- Send a detailed email to support@fluenttech.net
- Call Production Support directly:

  US: +1 646 918-5201; UK: +44-20-35191284; Denmark: +45-89881779; Luxembourg: +352-20332554

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1. Preface

The FIXation Risk Management works in one of the two modes:

- **Enforced Risk Management**. In this mode, the risk manager defines a set of risk rules that are enforced for all FIXation clients, such as FluentTrade, FluentStream, and Fluent Risk Library (FRL).
- **Custom Risk Management**. In this mode, the trading client is responsible for defining and enforcing its own risk rules. Therefore, the client can configure which part of the risk management should be used.

This document describes the general principles of the Fluent Risk Management System and how to use it.

1.1. Target Audience

This document describes Fluent's Risk Management solution in depth. The document serves the needs of both risk enforcement officers and technically oriented personnel. Therefore, while some sections require business knowledge, some parts of the document require assume that the reader understands how the FIXation Framework operates.

The document is intended both for the Risk Officer (in an Enforced Risk Management mode, this role is typically played by the Prime Broker) and the trading client.

The document assumes that you are familiar with the following concepts:

- High level architecture of FIXation
- FIXation API (Bridge API or Models API)

1.2. Related Documents

For additional information about FIXation, see the following documents:

- *FIXation Installation Guide*
- *FIXation Configuration Guide*
- *FIXation Models API Guide*
- *FIXation Bridge API Guide*
- *FIXation User Guide*
- *FIXation R2R Guide*

2. Business Challenges

With recent shifts in financial trading and data management towards global, multi-asset and high frequency automated trading, risk management systems face ever growing challenges. Modern systems must provide a pre-trade unified risk calculation that synchronizes risk layers between distributed sites and numerous asset classes.

These systems must also address issues of communication failure as well as queuing of non-critical information, which causes unnecessary and costly data transmission delays. Individual technological solutions exist for different stages of the trading process. However, the current fragmented patchwork of technological solutions is complex. In addition, it leaves gaps that are extremely risky. This makes it very hard to comply with the tightening regulation requirements.

Modern compliance and regulation require execution gateways to constantly monitor a variety of risk aspects, with an ability to view and control parameters as well as to block trades when needed, to ensure that no catastrophic malfunctions occur. The problem intensifies for algorithmic and automated trading, where one computer error can swiftly lead to an unsupervised series of risky trades. Traders need a way to effectively maintain a portfolio of risk mitigation tools that enable them not only to block problematic trades, but also to post-analyze these incidents and calibrate these tools accordingly. Moreover, they must do this without hampering the latency of their trades.

3. Fluent Solution

The Fluent risk management system delivers a low latency, fully integrated risk module embedded in the execution gateway and feed handler API (FIXation Framework), as part of FluentTrade, FluentStream, and FRL offerings.

The risk module runs as an integral part of the trading gateway's process, capitalizing on its tools, utilities, strengths and services. A unique set of rules, which are a result of years of extensive research, gives protection from both algorithm errors and accidental errors (such as misspelling). This is achieved with a minimal effect on latency and time-to-market.

Fluent risk management uses pre-trade risk rules to offer a real-time, high level of protection intended to validate specific requirements prior to execution. The two most prominent design characteristics of this mechanism are:

- All risk and compliance checks are performed **before** sending data to market.
- All account rules have been uniquely coded to minimize latency.

These rules monitor the risk associated with many aspects of the process, including:

- Net/Gross open positions
- Net/Gross open orders
- Daily Settlement Limits
- Loss thresholds (P&L) in all hierarchy levels (per LP, per currency pair, currency base)
- Credit utilization in all hierarchy levels (per LP, per currency pair, currency base)
- Credit per client (multi-site)/strategy
- Buying power/Margin utilization
- Buying power factor
- Maximum order size
- Maximum position size
- Settings that reject all outgoing orders
- Settings that allow only closing exiting positions

Any order that violates a rule will be rejected by the risk management system. In addition, the risk management system will send a message that specifies the reason for the rejection.

Fluent offers additional checks that can be customized or added, depending on the requirements of a specific customer.

3.1. Advantages

The Fluent solution offers a number of very significant advantages, such as:

- Fluent’s risk solution enables customers to maintain, import, and export their risk policies fully integrated with the trade gateway, a full suite of tools and simple adaptation capabilities. Specifically, Fluent offers a complimentary Risk to Risk system ("R2R") that integrates with existing or legacy risk systems.

- Fluent's risk solution is both highly configurable and expandable. It boasts a high level of flexibility, enabling customers to react to changes in market circumstances and legislative demands with minimal costs and downtime. This is how Fluent's customers can maintain an optimal risk policy, minimizing exposure for both themselves and their users.
- In addition to providing minimal validation latency, the Fluent solution ensures that the latency increases in a linear fashion as more rules are activated. This number usually stays constant when the system scales.
- Fluent's solution is highly transparent and easy to audit. Customers are aware of each and every risk decision, and can inspect and analyze it fully within the Fluent suite of tools.

3.2. Order Workflow

First, an order follows the main execution path:

1. User request
2. Risk rules
3. Execution
4. API response

Then the results, as well as the execution itself, are internally stored in a manner optimized for low latency fetching.

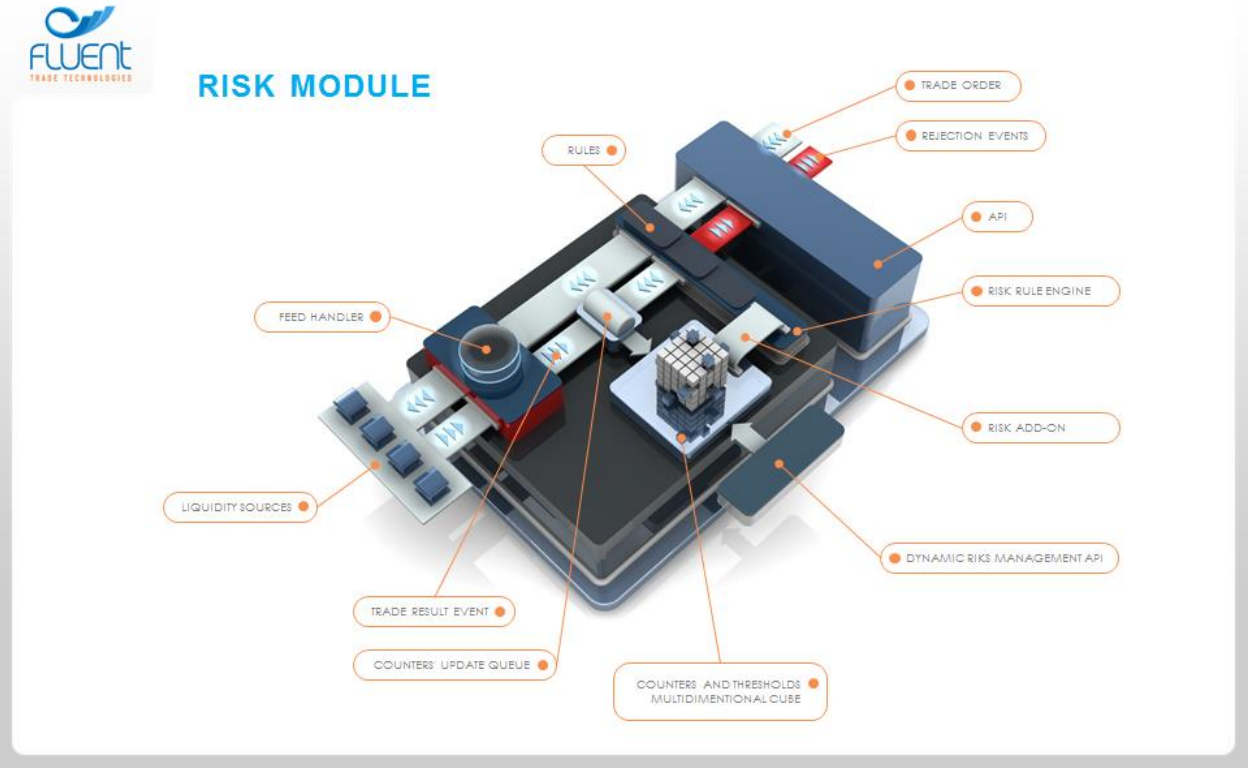

Figure 1: Risk Module: Architecture, Components and Flow

4. How Risk Rules Work

Before sending an order to an execution venue or Liquidity Provider (LP), FIXation performs a series of checks known as rules on different hierarchy levels. A rule represents a pre-defined validation test that compares the following:

- Limit, which is an upper level threshold specified by the risk enforcer. See Limits and Counters.
- Counter or order parameter, such as price, type, etc. See Rule Verification Stages.

Each level within each rule defined by FIXation compares a specific limit with a specific counter. You can activate or deactivate each rule and level separately.

You can instruct FIXation to check a specific rule within a specific level for every placed or modified order. If the counter exceeds the limit specified for the rule and level, FIXation prevents the order from being sent by discarding the order. In this case, the user receives a notification. Otherwise, FIXation approves the order and sends it to the execution venue.

4.1. Limits and Counters

The Fluent's risk mechanism keeps track of each transaction and event that occurs in the system in various aspects. Each aspect is represented by a counter. A counter holds the current status.

A limit determines an upper level threshold for a specific counter.

4.2. Rule Verification Stages

FIXation checks a new order by passing it through a series of rules. Each rule verifies whether the order exceeds one or more limits. Rules apply different types of tests:

- Stage 1, Order validation and sanity check: At this stage, FIXation checks if the order meets the LP requirements, and performs sanity checks based on the information sent by the client. For example, an order validation rule can check whether the type of the order you are trying to place is supported by the LP. Similarly, a rule can check how many orders you are sending per second. See Stage 1: Order Validation.
- Stage 2, Position checks: At this stage, FIXation performs checks based on the information collected about previously placed orders. For example, a position check rule can check how many open orders you have. If approving a new order causes you to exceed the limit for open orders, then the new order will be rejected. See Stage 2: Position Checks.

4.2.1. Stage 1: Order Validation and Sanity Check

At this stage, FIXation can apply the following main rules:

Rule	What is Checked
1 - DUPLICATE_ORDER	How many times the same order is sent within the time limit.
2 - ORDERS_PER_DAY	The maximum number of orders allowed per day. For this rule, only the following rule levels are supported: • PER_EXCHANGE • PER_SYM • PER_SYM_PER_ACCOUNT
3 - MAX_CONSEQUENT_REJECTIONS	The maximum number of allowed consequent rejections. For this rule, only the following rule levels are supported: • PER_EXCHANGE • PER_SYM • PER_SYM_PER_ACCOUNT
4 - PRICE_DISTANCE_FROM_MARKET	Whether the difference (percentage) between the order price and the last price offered by the LP exceeds the limit.
5 - ORDERS_PER_SECOND	How many orders were sent by the client within the last second. For this rule, only the following rule levels are supported: • PER_EXCHANGE • PER_SYM • PER_SYM_PER_EXCH
6 - VOLUME_PER_SECOND	Whether the total size of all orders sent by you in one second is within the limit.
7 - MAX_ORDER_VOLUME	Whether the maximum order value is within the limit. For this rule, only the following rule levels are supported: • PER_EXCHANGE • PER_SYM • PER_SYM_PER_EXCH • PER_SYM_PER_ACCOUNT
8 - ORDER_TYPE	Whether the order type matches the LP requirements.
9 - MAX_NOTIONAL_VALUE	Whether the price multiplied by the order size is within the limit.
10 - STALE_ORDER	Whether the period of time between sending the order and receiving a response by the LP client is within the limit.
11 - MAX_PRICE_PIPS	The allowed price range (in pips). For this rule, only the following rule levels are supported: • PER_EXCHANGE • PER_SYM • PER_SYM_PER_EXCH • PER_SYM_PER_ACCOUNT
ALLOWED_TO_SHORT	Whether the LP allows you to place a short orders.
RESTRICTED_FOR_SHORT_TRADING	Whether a specific symbol is not open for trading.
ADV	Whether the percentage of the total daily average volume represented by the order size is within the limit.

Note
Among these rules, the rule that is preconfigured and most commonly used is ORDERS_PER_SECOND. The rest of the rules are available on demand.

You can view these rules using FluentView (including FluentPrime View and FluentStreamView screens).

4.2.2. Stage 2: Position Checks

Fluent's risk mechanism keeps track of each order-related event (such as filling, rejecting, or modifying an order) as well as other events that might affect the current system state.

The rules that FIXation applies at this stage, and the counters they use, are described in the following table.

Rule	Counter Used	Description
12 - NOP (notional)	TOTAL_EXECUTED	Total quantity of all **executed** orders (in placed currency) may not exceed the limit.
13 - NOO (notional)	TOTAL_OPEN	Total quantity of all open orders (in placed currency) may not exceed the limit.
14 - NOO (in USD)	TOTAL_OPEN_CAPITAL	Total quantity, **in US dollars**, of all **open orders** may not exceed the limit. The counter does not support absolute values. This means that when you buy, the value will be incremented by 1, and when you sell, the value will be decremented by 1.
15 - NOP (in USD)	TOTAL_EXECUTED_CAPITAL	Total quantity, **in US dollars**, of all **executed** orders may not exceed the limit.
16 - NOP + NOO (in USD)	TOTAL_EXPOSURE_ CAPITAL	Total quantity, **in US dollars**, of all **open and executed** orders. The sum of NOP and NOO, in US dollars, may not exceed the limit.
17 - REALIZED_PNL_CAPITAL	TOTAL_REALIZED_PNL	Total size in dollars of P&L from **closed** positions may not exceed the limit. This counter is for view only.
18 - UNREALIZED_PNL_CAPITAL	TOTAL_UNREALIZED_PNL	Total size in dollars of P&L from **open** positions, in comparison with a relevant market index, may not exceed the limit. This counter is for view only.
19 - TOTAL_PNL_CAPITAL	TOTAL_PNL	Total size in dollars of all realized and unrealized orders (the sum of REALIZED_PNL_CAPITAL and UNREALIZED_PNL_CAPITAL) may not exceed the limit. Limits are set on the following levels only: • per_ccy • per_ccy_per_account • per_account • per_strategy (that is per_exchange)

Rule	Counter Used	Description
20 - NET_OPEN_PAO_DYNAMIC_IN_ USD	TOTAL_EXPOSURE_ CAPITAL	Total quantity, in US dollars, of all **open and executed** orders. The sum of NOP and NOO, in US dollars, may not exceed the **dynamic** limit. The counters of this rule are the counters of the rule 16 - NOP + NOO (in USD). The Limits of this rule are dynamic and are set in response to Risk To Risk (R2R) system messages.
21- NET_OPEN_ORDERS_DSL_IN_USD	TOTAL_OPEN_DSL_CAPITAL	Total quantity, in US dollars, of all **open** orders with the settlement date on the particular day may not exceed the limit. See Daily Settlement Limits Rules.
22 - NET_OPEN_POSITIONS_DSL_IN_ USD	TOTAL_EXECUTED_DSL_ CAPITAL	Total quantity, in US dollars, of all **executed** orders, in US dollars, with the settlement date on a particular day may not exceed the limit. See Daily Settlement Limits Rules.
23 -NET_OPEN_POSITIONS_AND_ ORDERS_DSL_IN_USD	TOTAL_EXPOSURE_DSL_ CAPITAL	Total quantity, in US dollars, all **open and executed** orders, in US dollars, for a certain day may not exceed the limit. See Daily Settlement Limits Rules.
GLOBAL_HOLDING	TOTAL_COMMISION	Total holdings value of price and actual file or limit regulatory on 5% holdings may not exceed the limit.

Note

Since Fluent's customers trade on diverse markets in different geographical locations, the risk aspects must be balanced across all markets. Therefore, each rule can be applied on a local level (per site) as well as on the global level (per client across the sites). In addition, all rules are available with three summation methods that correspond to the known risk methodologies: GROSS, NET, and TOTAL.

4.2.3. Daily Settlement Limits Rules

Daily Settlement Limit (DSL) rules enable the Risk Officer to control the amount of money that will be settled on a specific day. The DSL rules are relevant for the base currency only.

4.2.3.1. Setting Limits

DSL rules use the same levels as other rules. However, DSL rules allow you to set only one limit that will take effect upon every single day in the future. This means that you cannot define a certain limit for one day and another limit for other days.

If you update limits, FIXation will use the updated limits for all the days in the future until the next update.

4.2.3.2. Setting the Settlement Date

FIXation sets the settlement date as follows:

- If the placed order includes the settlement date, FIXation validates the risk rules according to this date. For example, the limit for per_sym_per_account is set to 2m. On May 4, the counter is 0. On May, 5 the counter is 1m. You place an order whose quantity is 1.5m. If the order's settlement date is May 4 (that is, when the counter is still 0), the order will be passed through. However, if the settlement date is May 5 (that is, when the counter is already 1m), the order will be blocked.
- If the order does not include the settlement date:
  - In PQ orders, FIXation takes the settlement date from the quote, if the quote provides it.
  - In other orders, or if the quote does not provide the settlement date, FIXation uses a third-party calendar-based data service that enables defines the settlement date for each currency.
  - If no value-date is set, the default for the value-date will be the current trading day.

4.2.3.3. Updating the Counters

When you place an order, the final settlement date is still unknown. FIXation receives the settlement date from the LP only after the order is filled. Because no pre-trade risk check can be performed without the settlement date, FIXation uses its own internal mechanism to calculate the settlement date.

After the order is filled, and the actual settlement date is received from the LP, FIXation updates the executed counters.

FIXation might be configured in a way that forces FIXation to re-check the risk rules after the fill message with the actual settlement date is received from the LP. If the limit is passed, FIXation can alert the Risk Officer as part of the post-trade check.

4.3. Rule Levels

FIXation applies rules for various hierarches, according to the combinations of the following components:

- **Exchange** (LP): Represented by LP_IDs 1-78 (including)
- **Symbol** (for example, FOREX Currency): Currency Base and Currency Pair
- **Strategy**: Supports up to 20 different risk entities, each of which can hold an unlimited number of strategies. Represented by Risk Columns 1-20 (virtual "LP_IDs" 79-98 (including))
- **Account**: represents multiple clients risk situation
- **Site** (Local/Global)
- **Daily / PAST Account balance**: Represented by Risk Columns PAST and PAST2

For each combination, FIXation uses a specific limit. The combination of the components to be checked is called the rule level. For example, a rule that counts open orders can check how many orders are currently open for all currencies of a specific LP. Similarly, another level of the same rule can check how many open orders there are for each currency of each LP.

The following table explains rule levels:

Level	Level Name	Description
0	PER_ORDER	Checks order fields.
1	PER_SYM_PER_EXCH	Counts orders for each currency pair for each LP.
2	PER_EXCHANGE	Counts orders for all currency pairs for each LP.
3	PER_SYM	Counts orders for each currency pair for all LPs.
4	PER_SYM_PER_ACCOUNT	Counts orders for each currency pair for all LPs that belong to the same account.
5	PER_ACCOUNT	Counts orders for all currency pairs for all LPs that belong to the same account.
6	PER_EXCHANGE_GROSS	Counts order for all *currency pair/currency base* for each LP, ***gross*** method.
7	PER_EXCHANGE_NET	Counts order for all *currency pair/currency base* for each LP, ***net*** method.
8	PER_SYM_GROSS	Counts orders for each *currency pair/currency base* for all LPs, ***gross*** method.
9	PER_SYM_NET	Counts orders for each *currency pair/currency base* for all LPs, ***net*** method.
10	PER_ACCOUNT_GROSS	Counts orders for all *currency pairs/currency base* for all LPs that belong to the same account, ***gross*** method.
11	PER_ACCOUNT_NET	Counts orders for all *currency pairs/currency base* for all LPs that belong to the same account, ***net*** method.
12	PER_BASE_PER_EXCH	Counts orders for each currency base for each LP.
13	PER_BASE_PER_ACCOUNT	Counts orders for each currency base for all LPs that belong to the same account.
14	PER_BASE	Counts orders for each currency base for all LPs.

If the client has sufficient permissions, it may activate or deactivate each rule level separately, depending on business needs, regulations, and other requirements.

4.3.1. Virtual LP PAST

To store overnight positions, a virtual LP called PAST 2 is used.

The Risk Officer clears all LPs positions every night. LP counters are added to the virtual LP.

It is assumed that the Prime Broker clears all the LPs every night. If there are overnight positions, these positions are on the books of the Prime Broker. The LP counters are added to the virtual LP.

For example, if a client traded with Hotspot and left a 1M long EURUSD, the overnight position is as follows:

- During the day, the counters are:
  - hotspot counter = 1
  - past 2 counter = 0
  - total = 1
- The day after, the counters are:
  - hotspot counter = 0 (automatic process of Fluent)
  - past 2 counter = 1 (automatic process of Fluent)
  - total = 1
- After closing the position in Hotspot by selling 1M EURUSD. The counters are:

- hotspot counter = -1
- past 2 counter = 1
- total = 0

- The day after, the counters are:
  - hotspot counter = 0 (automatic process of Fluent)
  - PAST 2 counter = 1+-1=0
  - total = 0

4.4. Profit and Loss Counters

When you have a single execution on the market (for example, a buy trade), while the trader is exposed, trader's profits and losses (PNL) are theoretic. Until the trader closes the position, the profits and losses are considered unrealized. Once the trader closes the exposure, the profits and losses become realized. They are calculated as follows:

PNL = (sell price – buy price) * volume

A positive volume indicate a profit, while negative volume means a loss.

The risk is checked as follows:

- Limits are set on the following levels:
  - per_sym
  - per_sym_per_account
  - per_account
- The value is converted to USD.
- Only negative values that exceed the limits will block the trade.
- If the order closes an exposure, the risk check will pass even if the counter exceeds the limits.
- The counter value is not in millions.

4.4.1. TOTAL_UNREALIZED_PNL

Calculation of the exposure (volume that is reflected in rule 12) is performed against the market index, which represents an aggregation of all current liquidity. For example:

TOTAL_UNREALIZED_PNL = Sell position of 1M * sell_price – ask_index_price*1M

When trading a few trades on one side, the accumulated average price is stored. When a trade on the other side occurs, the price will be calculated against the average price, and the PNL will be stored as realized PNL.

The value is dynamic because the market changes and new quotes are published periodically.

4.4.2. TOTAL_REALIZED_PNL

Because the trades do not necessarily come in pairs, all orders on one side are stored as accumulated volume and average price. When an execution on the other side occurs, the executed volume is paired with the same amount of volume stored.

For example:

- Buy 1M 1.33
- Buy 1M 1.31
- Buy 1M 1.35
- AcccumVol: 3M avgPrice: 1.33
- Sell 1M 1.3

Realized PNL: (1.3 – 1.33)*1M

4.4.3. TOTAL_PNL_CAPITAL

PNL is the sum of TOTAL_PNL + TOTAL_UNREALIZED_PNL.

4.4.4. Configuring FIXation for Unrealized PNL Counters

The PNL rules use a model known as index model. This model calculates the average of the last two rates sent by LPs on a specified currency pair.

You configure the index model in **app.cfg**, in the Global Parameters section by creating a model of type **index_model**. You can specify the following parameters to define how the index model is calculated:

Parameter	Description
ignore_lps	Specifies the LPs that you want to exclude from the calculation. If this parameter is not specified, all LPs participate in the calculation.
index_type	Specifies the sensitivity of the index. Possible values: • **avg**: the index is calculated based on the latest prices. Using this mode causes a very sensitive index that can predict the market move when an LP changes the price sharply. • **smoothed**: the calculation smooths the sensitivity of the index by taking into account the previous calculation of the average. The 90% of the smoothed index is the last calculation, 10% is the current calculation. However, with the smoothed index, there might be a short delay in predicting a market move. Default value: **avg**

The following example shows how to create an index model that excludes Hotspot and LMAX from the calculation and generates a regular average (avg):

```
index_model=index_model
    ignore_lps=hotspot_itch,lmax
    index_type=avg
```

4.5. Currency Base and Currency Pairs

FOREX trading is done with currency pairs instruments, such as EUR/USD. However, to facilitate the differentiation between risk management needs with respect to Counters, FIXation tracks both the currency pairs and each currency in the currency pair known as currency base.

In the FluentView user interface, the Risk Officer can select whether system main counters and limits will be based on currency pairs orcurrency bases.

Regardless of the view that you selected, both currency pair and currency base counters are tracked separately by FIXation. For example, a trade on the EUR/USD currency pair will update the counters for:

- EUR/USD
- EUR
- USD

However, there are differences in the way the counters of the currency pairs and currency bases are checked and updated as well as in the value they represent. For more information, see Handling Counters by Currency Pair and Currency Base.

4.5.1. Handling Counters by Currency Pair and Currency Base

Depending on whether you work with currency pair or currency base counters, the counters are handled differently.

4.5.1.1. Checking Counters

Depending on the view you selected, counters are checked differently as follows:

View	Counters Are Checked Against...	Example
By currency pairs	Currency pair limits	In a EUR/USD trade, only the EUR/USD counters and limits are checked.
By currency bases	Currency base limits	In a EUR/USD trade, two sets of counters and limits are checked: for EUR and for USD.

4.5.1.2. Counter Values

In addition, the view determines what the counters represent as follows:

View	What Counters Represent	Example
By currency pairs	The counters move in a one-to-one ratio	In a 1 million trade on EUR/USD, the counter indicates **1**.

View	What Counters Represent	Example
By currency bases	The conversion factor is used for the counter currency	In a 1 million trade on EUR/USD, the counter for EUR indicates 1. The counter for USD indicates **1.2**.

4.5.1.3. Updating Counters

The following table explains the differences in how counters are updated for currency pairs and currency bases. In the **Example** column, it is assumed that:

- A 1 million BUY trade on EUR/USD is done
- The leverage is 2 for both EUR and USD
- The conversion rate is 1.27

Currency Pair/Currency Base	How Counters Are Updated	Example
Currency pairs	• The basic quantity of the trade is updated. • The amount is added for BUY and subtracted for SELL.	EUR/USD Counter = 1
Currency bases	• The amount (quantity * leverage) is added to the first currency base in a BUY. • The amount (quantity*leverage * currency exchange rate) is subtracted from the second currency base. The first currency base has the amount subtracted in a SELL. The amount is added to the second currency base.	EUR and USD Counter = (1*2) = 2 (-1*1.27 * 2) = -2.54

In the risk rules 14, 15, and 16, all values in currency bases and currency pairs are changed to dollar values.

The following example assumes that:

- SELL 1m EUR/JPY
- BUY 1m EUR/USD
- BUY 1m EUR/USD

Where:

- The leverage on EUR USD and JPY are all 2.
- The exchange rate of EUR/USD is 1.27.
- The exchange rate of EUR/JPY is 137.195.

The counters will be updated as follows:

- For currency pairs:

EUR/USD	EUR/JPY	TOTAL	GROSS	NET
2	-1	1	3	2

- For currency bases:

EUR	USD	JPY	TOTAL	GROSS	NET
2	-5.08	274.39	271.31	281.46	276.39

The currency bases are calculated as follows:

- SELL 1m EUR/JPY:

EUR	USD	JPY
-2	0	274.39

- BUY 1m EUR/USD

EUR	USD	JPY
0	-2.54	274.39

- BUY 1m EUR/USD

EUR	USD	JPY
2	-5.08	274.39

Switching between the currency pair to currency base view in FluentView only changes the FluentView's filter. The filter is designed for presentation purposes only to help you decide whether you want to calculate risk based on currency pairs or currency bases. The filter does not affect counters and limits.

5. FIXation Modes

FIXation has several working modes. Each mode determines the actions that a trading client is currently allowed to perform. The following table explains the FIXation modes and what triggers FIXation to switch to each mode.

Mode	Description	Trigger
WAITING	The state in which FIXation begins to run.	Starting FIXation.
RUNNING	A normal working mode in which the trading client can place orders.	Initializing the internal FIXation cache, FIXation is fully synchronized with RiskHub.
SAFETY_LATCH_POSITION_CLOSING	The trading client can only place orders that will close the open positions.	A Safety Latch mode trigger. For more information, see Switching to Safety Latch Modes.
SAFETY_LATCH_BLOCK	The trading client cannot place any orders.	A Safety Latch mode trigger. For more information, see Switching to Safety Latch Modes.
KILL_PERSISTENT	FIXation will exit (the application will be shut down).	Click a button in FluentView.

The following figure shows how FIXation switches from one mode to another.

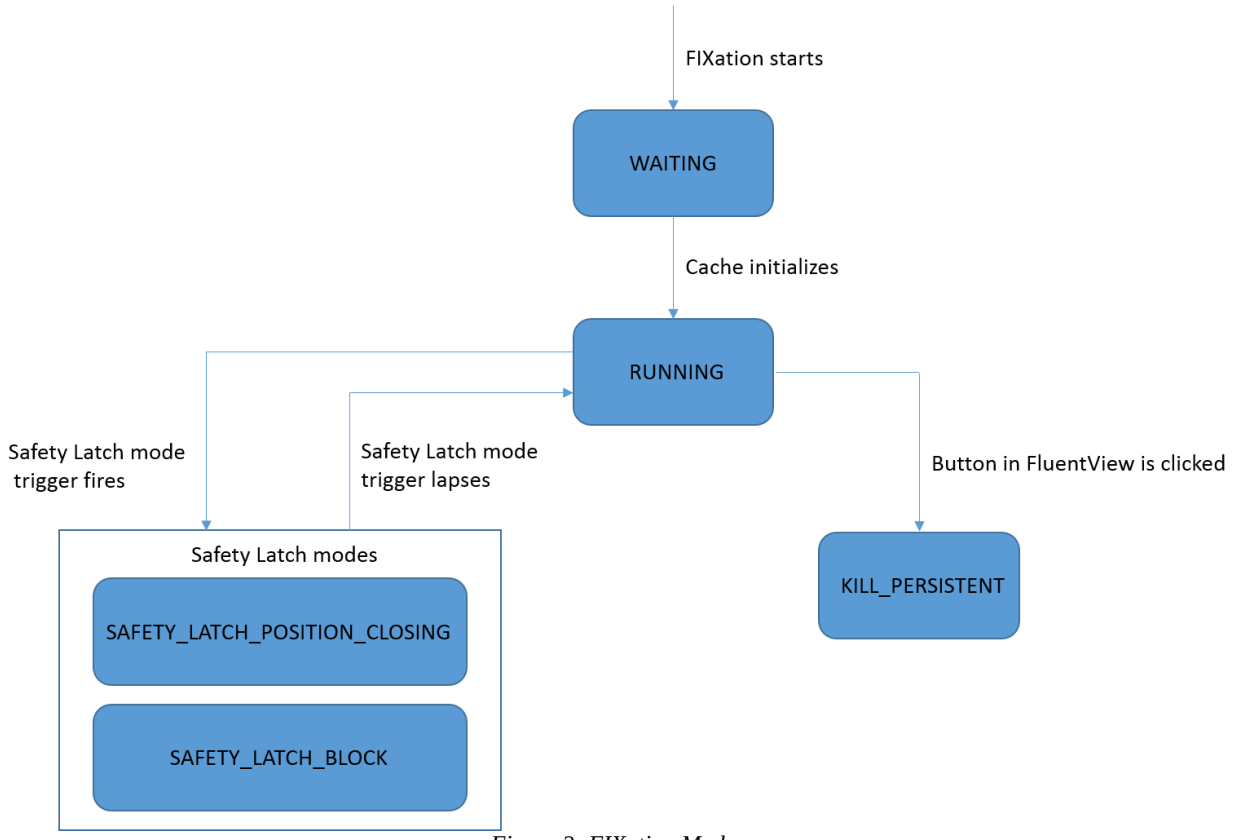

Figure 2: FIXation Modes

5.1. Switching to Safety Latch Modes

SAFETY_LATCH_POSITION_CLOSING and SAFETY_LATCH_BLOCK are known as Safety Latch modes. The goal of a Safety Latch mode is to restrain order-related actions in situations when FIXation cannot evaluate risk positions in a reliable manner. In both Enforced and Custom configuration, every FIXation has one of these modes as a default for situations that require a Safety Latch mode. Therefore, only one Safety Latch mode is effectively in use in each instance of FIXation.

FIXation enters these Safety Latch modes because:

- The system manager or an external system instructed FIXation to enter a Safety Latch mode.
- Disconnection from mandatory remote processes, such as RiskHub and R2R, occurred.
- Internal inconsistency detected (such as Illegal counter or limit values or internal queues exceeded the allowed sanity value).

The following table explains the reasons why FIXation entered a Safety Latch mode in detail.

Reason Code	Description
MODE_RC_SAFETY_LATCH_FULL_Q	FIXation internal queue is filling up (the threshold is configurable)
MODE_RC_SAFETY_LATCH_MP_DISCONNECTED	FIXation disconnected from RiskHub, no heartbeat received
MODE_RC_SAFETY_LATCH_ORDERS_PER_SECOND	Too many orders are sent per second, and the Risk Officer decided that this should put the system in a safety latch mode (configurable).
MODE_RC_SAFETY_LATCH_FROM_CUSTOMER	
MODE_RC_SAFETY_LATCH_FROM_DROP_COPY_ DISCONNECTION	The system disconnected from the drop copy.
MODE_RC_SAFETY_LATCH_FROM_PB_ AUTOMATED_SYSTEM	A message sent from the Primer Broker's automated system or if the Prime Broker's automated system disconnects from FIXation.
MODE_RC_SAFETY_LATCH_FROM_PB	The Risk Enforcer puts a client into either of the above states through FluentView.
MODE_RC_SAFETY_LATCH_FROM_PNL_ THRESHOLD_REACHED	The PNL threshold is reached.
MODE_RC_SAFETY_LATCH_GUARANTIED_ DROPCOPY_NOT_SENT	The guaranteed drop-copy mechanism failed when trying to send a message

Most FIXation modes enforce switching to SAFETY_LATCH_POSITION_CLOSING or SAFETY_LATCH_BLOCK according to the general definition in the FIXation configuration. There are, however, two exclusions to this:

- MODE_RC_SAFETY_LATCH_GUARANTIED_DROPCOPY_NOT_SENT enforces switching to SAFETY_LATCH_BLOCK.
- MODE_RC_SAFETY_LATCH_FROM_PB - The Risk Enforcer can choose if it wants to enforce safety latch block or position closing mode.

5.1.1. Unprocessed Events

To get information about placed or modified orders, FIXation checks all internal notification queues every 450 microseconds. If a notification queue contains an event about a placed or modified order, FIXation updates unconfirmed and confirmed counters accordingly.

If a large number of orders are placed or modified within a short period of time, the notification queue might contain a significant amount of events that FIXation needs to process. To avoid a situation when FIXation is not able to process these events in a timely manner, FIXation enforces a maximum number of unprocessed events that a queue can contain.

If the queue contains more events than specified, FIXation enters a Safety Latch mode. In this case, the system will remain in the Safety Latch mode until the queues contain less events than specified.

5.1.1.1. Defining the Maximum Number of Unprocessed Events

The risk manager can define the maximum number of unprocessed events that a notification queue can contain. By default, **risk_safety_latch_mode_number** is set to **10**.

5.1.2. Disconnection from RiskHub

If FIXation does not receive a heartbeat from RiskHub for more than a second, then there is a risk that FIXation will not able to synchronize the risk in all the different locations in a reliable manner. In this case, FIXation enters the enforced Safety Latch mode.

When a heartbeat from RiskHub is received, FIXation automatically exits the Safety Latch mode and returns to the RUNNING mode.

5.1.3. Illegal Value of a Counter or Limit

FIXation periodically validates the values of the risk matrix, limits, and counters. FIXation validates these values according to a predefined set of guidelines. The goal of this validation is to verify that counter and limits are not accidentally set to an abnormal value. For example, FIXation can verify whether a counter has an extremely high value or an absolute value limit has a negative value. In this case, FIXation considers the value illegal.

If FIXation finds that the value of a counter or limit is illegal, then FIXation will enter the SAFETY_LATCH_BLOCK mode. The system manager can investigate what caused the counter or limit to be set to the invalid value.

After the system manager fixes the invalid value, FIXation automatically returns to the RUNNING mode.

5.1.4. Order from the System Manager or an External System

FIXation enables external systems to change the mode of FIXation based on the information to which FIXation does not have access. For example, an external system might make a decision to change the mode based on data received or calculated from another risk or monitoring banking system (such as an STP system, monitoring current client account balance or additional activities, or even detecting a problematic market trend).

An external system can send messages through the Solace messaging mechanism. FIXation reads these messages and changes the mode accordingly. An external system can send a message that will enter FIXation to a Safety Latch mode. Similarly, an external system can send another message that will change the FIXation's mode back to RUNNING. For more information on external risk systems, see *FIXation R2R Guide*.

5.1.4.1. Closing All Open Orders

If FIXation entered the SAFETY_LATCH_BLOCK mode due to an order from the system manager or an external system, FIXation can be forced to close all open orders. By default, **cancel_all_orders_on_block** is set to 0.

5.1.5. Receiving Notifications

The following sections explain how FIXation sends notifications about a mode change.

5.1.5.1. Receiving Notifications to FluentView

Every time a FIXation mode changes, FIXation sends a 10104 notification to FluentView. This notification includes both the old mode and the new mode.

When an order is placed while FIXation is in a Safety Latch mode, FIXation sends to FluentView a notification DISCARD_RISK_RULE_SAFETY_LATCH_MODE = 10004. In the reject reason field, FIXation specifies the reason why it is in the blocking mode. For example: "FIXation is in waiting mode" or "Lost connection with RiskHub".

5.1.5.2. Receiving Notifications to Solace

FIXation 10104 notifications includes information described in the following table:

Field	Set to...
fixationStateEvent.hdr.event_id	FIXATION_STATE_CHANGE;(10104)
fixationStateEvent.hdr.event_type	SOLACE_FIXATION_MSG_EVENT;(4)
fixationStateEvent.data.extra_int64_2	The new mode
fixationStateEvent.data.extra_int64_3	The previous mode
fixationStateEvent.hdr.publish_time	The current time
fixationStateEvent.data.generation_time	The current time
fixationStateEvent.data.arrival_time	The current time
fixationStateEvent.data.algo_time	The current time
fixationStateEvent.data.reject_reason	The reason why the mode was changed

6. Risk Management Multi-Site Architecture

The risk management solution consists of the following components:

- **FIXation**, which is responsible for setting limits and managing risk rules verification
- **RiskHub**, which is an aggregator and database interface for local instances of FIXation.
  In its database, values of local counters are stored. RiskHub is responsible for the following:
  - Calculating counter values across multiple geographical locations
  - System recovery and persistence

Typically, FIXation and RiskHub communicate through Solace as shown on the following figure.

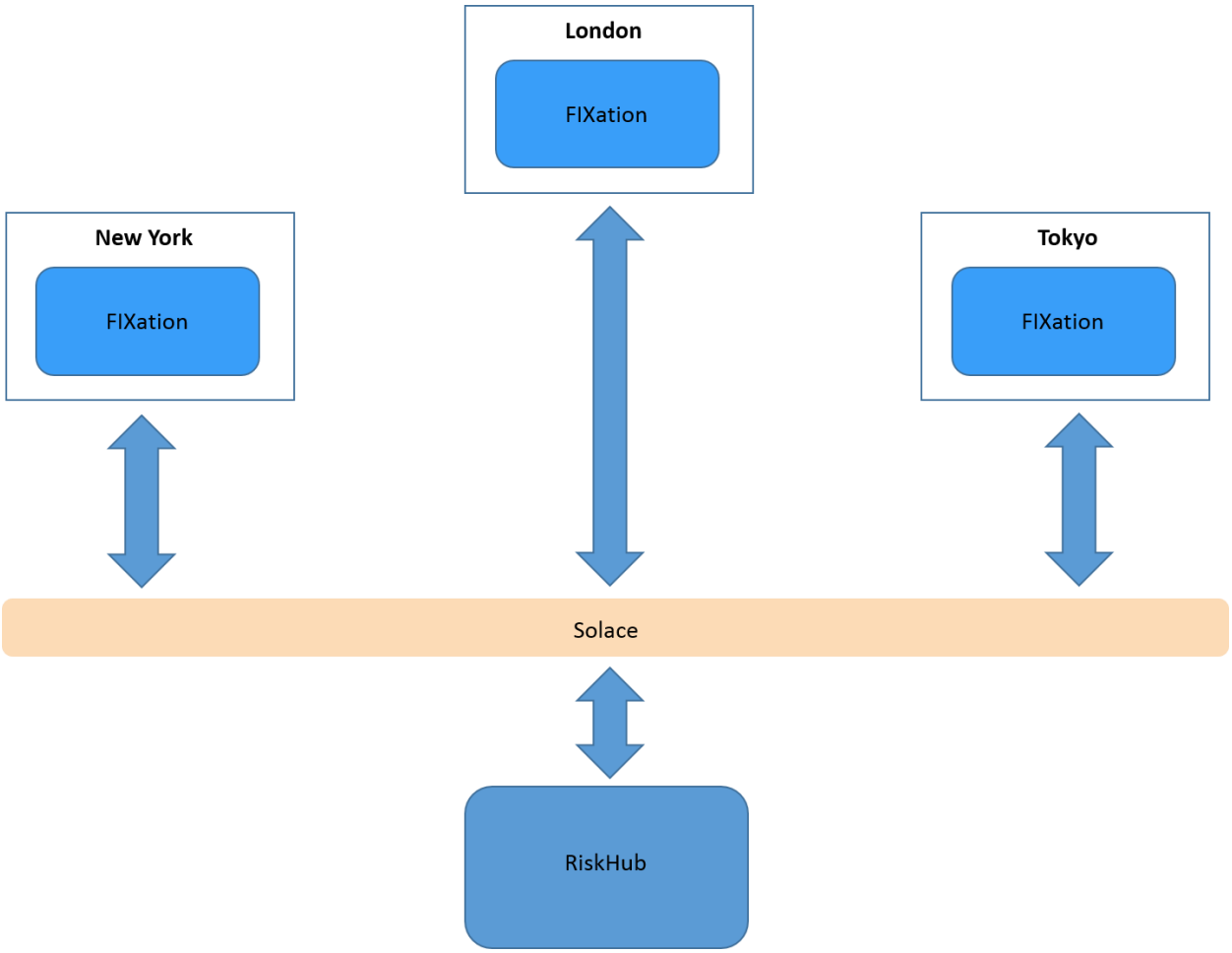

Figure 3: Communication between FIXation and RiskHub

Messages that FIXation and RiskHub exchange with each other are different for calculating global counters and recovery.

6.1. Calculating Global Counters

The risk management system is designed to support multiple trading sites where FIXation is installed. At each site, FIXation sends the values of local counters to RiskHub through Solace. To enable each site to be aware of the global trading situation, RiskHub aggregates all counter values and publishes the total value to each site.

> **Note**
> While values of the local counters are stored in RiskHub, the global values are not stored there because all global values are permanently recalculated.

The following figure illustrates how RiskHub works for a client that has sites in New York, London, and Tokyo. In this example, the local counters of open orders and trading limits are set as follows:

- In New York, there are no open orders. The limit for open orders is set to 15.
- In London, there are 10 open orders. The limit for open orders is set to 20.
- In Tokyo, there are 5 open orders. The limit for open orders is set to 25.

RiskHub summarizes the value of local counters of open orders from all three sites and sends the total value to each site through Solace. If a trader in New York tries to open a new order, RiskHub will cause FIXation to reject the request because the total number of open orders in all sites is 15, and the limit for open orders in New York is 15.

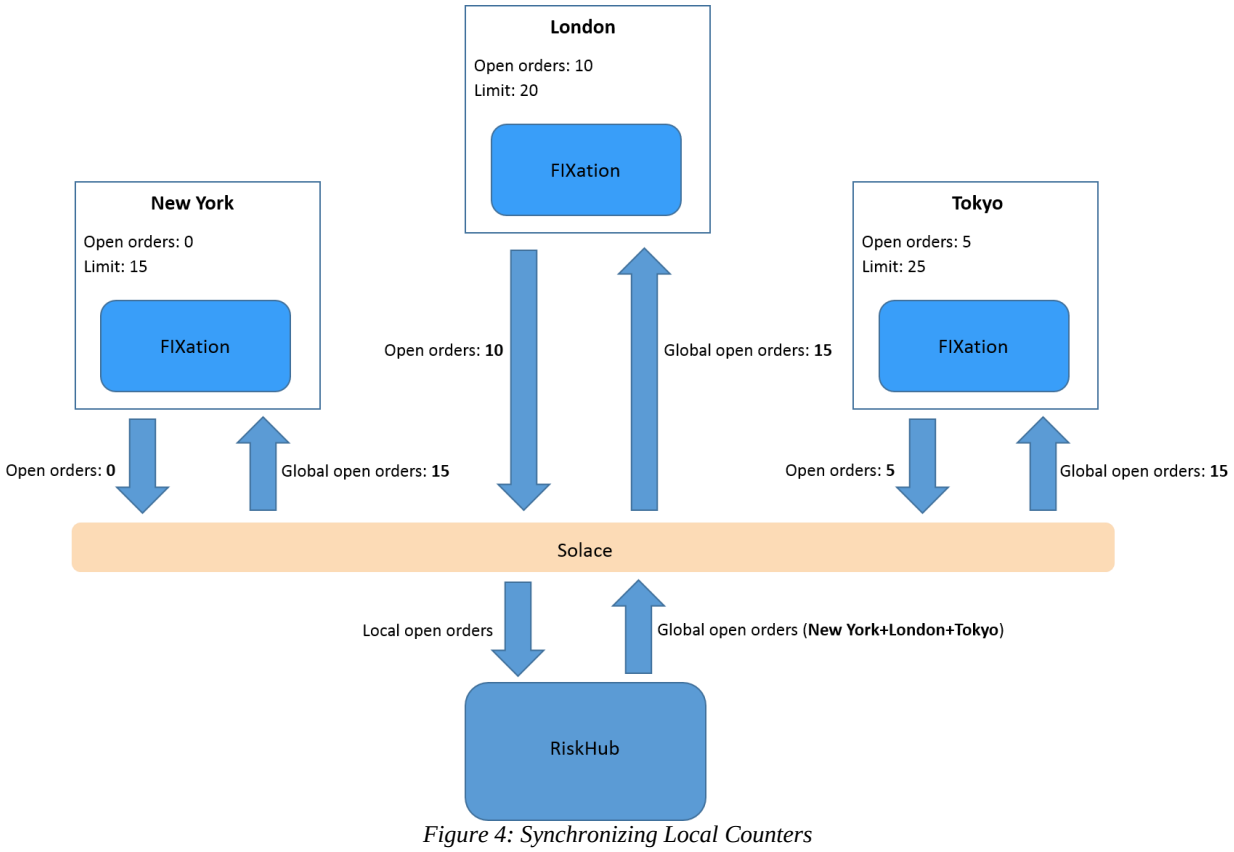

Figure 4: Synchronizing Local Counters

6.2. Recovering Risk Counter Values

Due to the need to provide low latency and to allow for maximal scaling, FIXation itself does not have a database where values of local risk counters would be stored. Instead, these values are stored in RiskHub that serves as a database interface for FIXation. FIXation sends to RiskHub the current counter values once per second (if values changed) or once per minute (always). This ensures that RiskHub stores the latest counter values and can provide them if FIXation shuts down or crashes and needs to restore the latest data snapshot. Reverting to a historical snapshot is also available by demand, for both counters and limits.

When FIXation starts (for example, after a regular shut down or crash), it needs to receive from RiskHub the latest counter values as they were before the shut down or crash. FIXation sends to RiskHub the invalid counter values. For RiskHub, these invalid values are an indication that FIXation requests to get the latest saved counter values. RiskHub sends this data which overrides the invalid values sent by FIXation.

During the communication with RiskHub, FIXation regularly checks for heartbeat messages from RiskHub. If FIXation detects a disconnection from RiskHub due to a failure in either the network connection or RiskHub functioning, FIXation enters a Safety Latch mode. The Risk Officer can configure FIXation so that in such cases, FIXation responds in either of the following ways:

- The entire trading session is frozen and all trading is blocked.
- It is permitted to continue only with those activities that minimize risk, such as closing any open positions.

> **Note**
> In the event of such a failure, it is highly recommended that you check the database counters upon reconnection to the recovery system, to verify they were reset to the correct values. If they are not correct, you must reset them manually.

For more information about Safety Latch modes, see Switching to Safety Latch Modes.

7. Working with the Risk Management Bridge API

The following operations can be performed using either the Bridge API or FluentView:

- Creating a Risk Manager class instance. See Creating a Risk Manager Class Instance.
- Getting the status of a level. See Getting the Status of a Level.
- Getting a Limit. See Getting a Limit.
- Getting a counter. See Getting a Counter.

The following sections explain how you can perform these operations using the Bridge API. For more information on using FluentVlew, see *FluentView User Guide*.

7.1. Creating a Risk Manager Class Instance

To call the API risk handling function, you use the fh::riskManager object.

You need to get the object's instance from the **fh::strategy** class and then call its functions.

7.1.1. Syntax

```
#include <fh.h>
fh::get_risk_manager(fh::fixation);
```

7.1.2. Example

In the following example, you get the **fh::riskManager** object for later use.

```
#include <fh.h>
fh::fixation f;

// ...
// See FIXation initialization example in the Bridge API Guide
// ...

fh::riskManager rm(f);
```

7.1.3. Return Values

The function returns pointer to the riskManager of the strategy.

7.2. Getting the Status of a Level

You can check whether a rule level of the specified rule is currently active or inactive.

7.2.1. Syntax

```
fh::errorCode fh::riskManager::getActive(fh::RULE_ID rule_id,
RiskLevelEnum level, bool &o_global_active, bool& o_active)
```

The following table explains the function parameters:

Parameter	Description
rule_id	The rule ID as described in Rule Verification Stages.
level	The level ID as described in Rule Levels.
o_active	A flag that activates the specified level
global_active	A flag that activates the entire rule

7.2.2. Example

```
#include <fh.h>

fh::riskManager * rm = strategy->get_risk_manager();

fh::errorCode rc = rm->getLimit(NET_OPEN_ORDERS_NOTIONAL, FXALL, EURSD,
PER_EXCHANGE,  limit_parameter;
```

7.2.3. Return Values

For the description of values that the function may return, see Return Value Codes.

7.3. Getting a Limit

You can check a limit defined for a specific rule level of the rule. The following table explains the parameters that are available to you on each level.

Level ID/Parameters	rule_id	fh_id	symbol	account_id	Description
PER_SYM_PER_EXCH	Yes	Yes	Yes	No	Gets the limit of a symbol of the specified LP. To get the total limit for all symbols, set symbol to **total**.
PER_SYM	Yes	No	Yes	No	Gets the limit of the symbol.

Level ID/Parameters	rule_id	fh_id	symbol	account_id	Description
PER_SYM_PER_ACCOUNT	Yes	No	Yes	Yes	Gets the limit of a symbol of the specified account. To get the total limit for all symbols, set symbol to **total**.
PER_EXCHANGE	Yes	Yes	No	No	Gets the limit of a symbol of the specified LP.
PER_ACCOUNT	Yes	No	No	Yes	Gets the limit of a symbol of the specified account.

7.3.1. Syntax

```
fh::errorCode fh::riskManager::getLimit(fh::RULE_ID rule_id, fh::LP_ID
fh_id, char* symbol, typeRiskAccount account_id, RiskLevelEnum level,
int& limit)
```

The following table explains the function parameters:

Parameter	Description
rule_id	The rule ID as described in Rule Verification Stages.
fh_id	The LP ID
symbol	The currency symbol
account_id	The prime broker account ID
level	The level ID as described in Rule Levels.
limit	A flag that activates the specified level

7.3.2. Example

```
#include <fh.h>

fh::riskManager * rm = strategy->get_risk_manager();

fh::errorCode rc = rm->getLimit(NET_OPEN_ORDERS_NOTIONAL, FXALL, "EURSD",
PER_EXCHANGE,  limit_parameter);
```

7.3.3. Return Values

For the description of values that the function may return, see Return Value Codes.

7.4. Getting a Counter

You can retrieve the value of a counter. The following table explains the parameters that are available to you on each level.

Level/Parameter	Rule_id	fh_id	symbol	account_id	Description
PER_SYM_PER_EXCH	Yes	Yes	Yes	No	Gets the counter of a symbol of the specified LP. To get the total limit for all symbols, set symbol to **total**.
PER_SYM	Yes	No	Yes	No	Gets the counter of a symbol.
PER_SYM_PER_ACCOUNT	Yes	No	Yes	Yes	Gets the counter of a symbol of the specified account. To get the total counter for all symbols, set symbol to **total**.
PER_EXCHANGE	Yes	Yes	No	No	Gets the counter of a symbol of the specified LP.
PER_ACCOUNT	Yes	No	No	Yes	Gets the counter of a symbol of the specified account.

7.4.1. Syntax

```
fh::errorCode fh::riskManager::getStatus(fh::RULE_ID rule_id, fh::FH_ID
fh_id, char* symbol, int level,  int &status)
```

The following table explains the function parameters:

Parameter	Description
rule_id	The rule ID as described in Rule Verification Stages.
fh_id	The LP ID
symbol	The currency symbol
level	The level ID as described in Rule Levels.
status	The status value returned

7.4.2. Example

```
#include <fh.h>

fh::riskManager * rm = strategy->get_risk_manager()

fh::errorCode rc = rm->getStatus(NET_OPEN_ORDERS_NOTIONAL, FXALL,
"EURUSD", PER_EXCHANGE,  status);
```

7.4.3. Return Values

For the description of values that the function may return, see Return Value Codes.

7.5. Handling Errors

If a counter exceeds the specified limit, FIXation rejects the order, and the function returns an error. Depending on whether on you place a new order or modify an existing order, the return value will be as follows:

- When you place a new order, the place order function returns ERR_NEW_ORDER_RISK_CHECK_FAILED.
- When you modify an order, the modify function returns ERR_MODIFY_ORDER_RISK_FAILED.

To see a detailed message that describes the reason why the order was rejected, call **o->error**.

8. Working with the Risk Control Remotely through Telnet

You can use the embedded Remote control module to see all the risk status matrices, limits, and states.

The commands use the numeric codes for Rule_id as described in the following table:

Code	Command	Description
12	NOP (notional)	Net Open Positions (notional)
13	NOO (notional)	Net Open Orders (notional)
14	NOO (in USD)	Net Open Orders (in USD)
15	NOP (in USD)	Net Open Positions (in USD)
16	NOP + NOO (in USD)	Net Open Positions + Net Open Orders (in USD)
20	NOP + NOO (in USD) (**dynamic** limits)	Net Open Positions + Net Open Orders (in USD) with **dynamic** limits

8.1. Printing Risk Status Flags

8.1.1. Usage

```
prs <RULE_ID>
```

8.1.2. Example

```
prs 12
```

8.1.3. Sample Output

```
>prs 12

Rule Status:
Rule: EXPOSURE_BALANCE
Global Status: Active
Level PER_ORDER Status:Not Active
Level PER_SYM_PER_EXCH Status:Active
Level PER_EXCHANGE Status:Not Active
Level PER_SYM Status:Active
Level PER_SYM_PER_ACCOUNT Status:Active
Level PER_ACCOUNT Status:Not Active
```

8.2. Printing Risk Limits Matrix

8.2.1. Usage

```
prl <RULE_ID>
```

8.2.2. Example

```
prl 12
```

8.2.3. Sample Output

```
>prl 12
        FXCMPRO  HOTSPOT  CITI  BNP  GS  BOFA  BARX  DB  JPMC  MS  FXALL  REUTERS  HSBC  UBS  RBS  EBS  NOMURA  CS  COMERZ  SBILM  SOCGEN  ALPARI  WELLS_FA  DUKAS_CO
EUR/USD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
EUR/JPY N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
EUR/GBP N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
USD/JPY N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
GBP/USD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
EUR/CHF N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
USD/CHF N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
USD/CAD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
AUD/CAD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
AUD/CHF N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
AUD/JPY N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
AUD/NZD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
AUD/USD N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
CAD/CHF N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
CAD/JPY N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
CHF/JPY N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
EUR/AUD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
EUR/CAD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
EUR/NZD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
GBP/AUD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
GBP/CAD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
GBP/CHF N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
GBP/JPY N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
GBP/NZD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
NZD/JPY N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
NZD/USD N/A     N/A      N/A  N/A   N/A   N/A   N/A  N/A  N/A   N/A   N/A   N/A      N/A   N/A  N/A  N/A  N/A     N/A N/A    N/A    N/A     N/A     N/A       N/A
CCY SUM N/A     20.00    N/A  20.00 20.00 20.00 20.00 N/A  20.00 20.00 N/A   N/A      20.00 20.00 20.00 20.00 N/A     N/A 20.00  N/A    20.00   N/A     N/A       N/A
```

	NATIXIS	RBC	DBAB	ADS	MIZUHO	FASTMATCH	FXSPOTSTREAM	SAXO	GTX	OANDA	LMAX	BTMU	BMPX	SOLIDFX	SQUARED	360T	BAXTER	MAKO	BLOOMBERG	PARFX	FUTURE_1	FUTURE_2	FUTURE_3	LP's SUM	ACC 1	ACC 2
EUR/USD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
EUR/JPY	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	4.00	20.00
EUR/GBP	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	33.00	20.00
USD/JPY	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
GBP/USD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
EUR/CHF	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
USD/CHF	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
USD/CAD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
AUD/CAD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
AUD/CHF	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
AUD/JPY	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
AUD/NZD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
AUD/USD	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	20.00	20.00	20.00
CAD/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CAD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CHF/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/USD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCY SUM	N/A	20.00	N/A	20.00	20.00	20.00	20.00	20.00	20.00	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A	N/A	20.00	N/A	N/A	N/A	N/A		20.00	20.00

8.3. Printing Risk Counter Matrix

8.3.1. Usage

```
prc <RULE ID>
```

8.3.2. Example

```
prc 12
```

8.3.3. Sample Output

```
>prc 12
```

	FXCMPRO	HOTSPOT	CITI	BNP	GS	BOFA	BARX	DB	JPMC	MS	FXALL	REUTERS	HSBC	UBS	RBS	EBS	NOMURA	CS	COMMERZ	SBILM	SOCGEN	ALPARI	WELLS_FARGO	DUKAS_COPY
EUR/USD	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
EUR/JPY	N/A	4.00	N/A	0.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
EUR/GBP	N/A	0.00	N/A	0.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
USD/JPY	N/A	0.00	N/A	0.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
GBP/USD	N/A	0.00	N/A	-1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
EUR/CHF	N/A	0.00	N/A	-2.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
USD/CHF	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
USD/CAD	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
AUD/CAD	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
AUD/CHF	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
AUD/JPY	N/A	0.00	N/A	0.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
AUD/NZD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
AUD/USD	N/A	0.00	N/A	1.00	0.00	0.00	0.00	N/A	0.00	0.00	N/A	N/A	0.00	0.00	0.00	0.00	N/A	N/A	0.00	N/A	0.00	N/A	N/A	N/A
CAD/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CAD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CHF/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/USD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCY_SUM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

	NATIXIS	RBC	DBAB	ADS	MIZUHO	FASTMATCH	FXSPOTSTREAM	SAXO	GTX	OANDA	LMAX	BTMU	BMPX	SOLIDFX	SQUARED	360T	BAXTER	MAKO	BLOOMBERG	PARFX	FUTURE_1	FUTURE_2	FUTURE_3	LP's_SUM	ACC_1	ACC_2
EUR/USD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
EUR/JPY	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	4.00	0.00	4.00
EUR/GBP	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	0.00	2.00	0.00
USD/JPY	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	0.00	1.00	1.00
GBP/USD	N/A	0.00	N/A	0.00	0.00	0.00	-2.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	-3.00	-3.00	0.00
EUR/CHF	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	-2.00	-2.00	0.00
USD/CHF	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
USD/CAD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
AUD/CAD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
AUD/CHF	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
AUD/JPY	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00
AUD/NZD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	0.00	0.00	0.00
AUD/USD	N/A	0.00	N/A	0.00	0.00	0.00	0.00	0.00	0.00	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	N/A	0.00	N/A	N/A	N/A	N/A	1.00	1.00	0.00
CAD/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CAD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CHF/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
EUR/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/AUD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CAD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/CHF	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
GBP/NZD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/JPY	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
NZD/USD	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
CCY_SUM	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A		4.00	5.00

9. Risk Management Logs

You can enable logging the following latency check information:

- Risk check rules latency, which describes how long it took to check the risk rules before the order is placed.
- Risk updating counters latency, which describes how long it took to update the risk matrices when an update was received about the order status (for example, when the status changed).

9.1. Risk Check Rules Latency

The following example shows a sample log of the risk check rules latency.

```
num_items       latency       min       max       avg      avg99      avg95      median
306          1084          1         58        3.5       2.9        2.5        2.0

 histogram:
 1:    1.63% (5)
 2:   62.42% (191)
 3:   23.86% (73)
 4:    2.29% (7)
 6:    0.33% (1)
 7:    6.21% (19)
 8:    0.98% (3)
 9:    0.33% (1)
12:    0.33% (1)
52:    1.31% (4)
58:    0.33% (1)
```

9.2. Risk Updating Counters Latency

The following example shows a sample log of the risk updating counters latency.

```
num_items       latency       min       max       avg      avg99      avg95      median
612          2311          1         16        3.8       3.7        3.5        3.0

 histogram:
 1:    0.16% (1)
 2:   22.39% (137)
 3:   37.42% (229)
 4:   15.69% (96)
 5:    8.01% (49)
 6:    8.82% (54)
 7:    2.78% (17)
 8:    1.63% (10)
 9:    1.80% (11)
10:    0.49% (3)
12:    0.33% (2)
```

```
   13:   0.16% (1)
   15:   0.16% (1)
   16:   0.16% (1)
   10:   0.49% (3)
   12:   0.33% (2)
   13:   0.16% (1)
   15:   0.16% (1)
   16:   0.16% (1)
```

9.3. Enabling Logging Latency Checks

To enable logging latency checks information, set the **latency_log_level** parameter to **4** or **5**.

Appendix A: Return Value Codes

The following table describes the value codes that the functions described in this document may return. The static method **FIXationErrorCode.pretyPrint** will return the string in the **Code** column from the **Value** (if exist).

Code	Value	Description
ORDER_NOT_FOUND	-1	Order ID is not found in the system.
OK	0	OK.
ERROR	1	There was an error in the provided parameters.
NOT_YET_IMPLEMENTED	2	The current function is not yet implemented.
ERR_INIT_TIMEOUT	3	FIXation initialization was not complete in a timely manner.
ERR_SUBSCRIPTION_UNKNOWN_INSTRUMENT	4	Attempt to subscribe to an unknown instrument (currently, not in use yet).
ERR_SUBSCRIPTION_ALREADY_REGISTER	5	Attempt to subscribe to an instrument to which you are already subscribed (currently, not in use yet).
ERR_SUBSCRIPTION_QUEUE_IS_ALREADY_DEFINED_FOR_THIS_INST_ID	6	Attempt to subscribe when the queue is already defined for the instrument ID (currently not in use yet).
ERR_SUBSCRIPTION_PARAMETERS_ALREADY_DEFINED_FOR_THIS_INST_ID	7	Attempt to subscribe when subscription parameters are already defined for this instrument ID (currently, not in use yet)
ERR_QUEUE_FULL_CANNOT_PUSH	8	The action failed due an attempt to push data into a full queue.
ERR_QUEUE_NULL_PARAM_CANNOT_PUSH	9	The action failed due an attempt to push a NULL into a queue.
ERR_QUEUE_EMPTY_CANNOT_POP	10	Attempt to pop from an empty queue. This value is used internally only and is not related to JixiQueuePoller
ERR_QUEUE_NULL_PARAM_CANNOT_POP	11	Attempt to pop to a NULL location. This value is used internally only and is not related to JixiQueuePoller.
ERR_QUEUE_NOT_VALID	12	Attempt to work with an invalid queue. This value is used internally only and is not related to JixiQueue.
ERR_SUBSCRIPTION_INVALID_INSTRUMENT	13	Attempt to subscribe to an instrument that is not defined in the FIXation configuration files.
ERR_SUBSCRIPTION_LP_FEED_HANDLER_IS_NOT_ACTIVE	14	The feed handler or its sockets are not properly configured in the FIXation configuration files.
ERR_SUBSCRIPTION_LP_FEED_HANDLER_IS_NOT_ACTIVE_OR_NOT_CONNECTED	15	The rate socket for this LP is not connected.
ERR_SUBSCRIPTION_FAILED	16	Attempt to subscribe failed.

Code	Value	Description
ERR_SUBSCRIPTION_LP_FEED_HANDLER_IS_NOT_ LOGGED_IN	17	Currently, not in use yet.
ERR_SUBSCRIPTION_ALREADY_IN_THE_PROCESS_OF_ SUBSCRIBING_UNSUBSCRIBING	18	Currently, not in use yet.
ERR_UNSUBSCRIBE_WITH_NULL_QUEUE	19	This value is for internal use only.
ERR_UNSUBSCRIBE_WITH_UNKNOWN_QUEUE	20	This value is for internal use only.
ERR_UNSUBSCRIBE_LP_FEED_HANDLER_IS_NOT_ACTIVE	21	This value is for internal use only.
ERR_UNSUBSCRIBE_INVALID_INSTRUMENT	22	This value is for internal use only.
ERR_UNSUBSCRIBE_FAILED	23	This value is for internal use only.
ERR_UNSUBSCRIBE_ALREADY_UNSUBSCRIBED	24	Attempt to unsubscribe without being subscribed.
ERR_CONNECTION_TIMEOUT	25	waitForConnection() function timed out.
ERR_CONNECT_MISSING_LP	26	Attempt to connect to the LP that is not properly configured in the FIXation configuration files.
ERR_CONNECTION_ERROR	27	Attempt to connect to the LP when its sockets are not properly configured in the FIXation configuration files.
ERR_CONNECT_CANNOT_CONNECT_CHANNEL_NONE	28	Connect to the LP operation was requested with Channel.None.
ERR_DISCONNECT_MISSING_LP	29	Attempt to disconnect with LP that is not properly configured in the configuration files.
ERR_DISCONNECTION_ERROR	30	Attempt to disconnect from the LP when its sockets are not properly configured in the FIXation configuration files.
ERR_DISCONNECT_CANNOT_DISCONNECT_CHANNEL_ NONE	31	Disconnect from the LP was requested with Channel.None.
ERR_OBJECT_QUEUE_EXPANDING	32	This value is for internal use only.
ERR_OBJECT_QUEUE_CANNOT_EXPAND	33	This value is for internal use only.
ERR_STAT_NO_TRADE_SOCKET	34	This value is for internal use only.
ERR_STAT_NO_RATE_SOCKET	35	This value is for internal use only.
ERR_NO_BID_BOOK	36	This value is for internal use only.
ERR_NO_BID_PRICE_AT_THIS_LEVEL	37	This value is for internal use only.
ERR_NO_CURRENT_BID_BOOK	38	Currently, not in use yet.
ERR_NO_ASK_BOOK	39	This value is for internal use only.
ERR_NO_ASK_PRICE_AT_THIS_LEVEL	40	This value is for internal use only.
ERR_NO_CURRENT_ASK_BOOK	41	Currently, not in use yet.
ERR_INVALID_PRICE_LAYER	42	This value is for internal use only.
ERR_NO_NEXT_LAYER	43	This value is for internal use only.
ERR_ADDTAG_TAG_ALREADY_EXIST	44	Currently, not in use yet.
ERR_REMOVETAG_NO_SUCH_TAG	45	Currently, not in use yet.
ERR_NEW_ORDER_MISSING_LP	46	Attempt to send an order to LP that is not properly configured in the FIXation configuration files.
ERR_NEW_ORDER_INVALID_INSTRUMENT	47	Attempt to send an order using an instrument that is not defined in the FIXation configuration files.
ERR_NEW_ORDER_INVALID_PRICE_OBJECT	48	Currently, not in use yet.
ERR_NEW_ORDER_NO_ORDER	49	This value is for internal use only.

Code	Value	Description
ERR_NEW_ORDER_NO_TRADING_CONNECTION	50	Attempt to send an order when the trading socket is not connected.
ERR_NEW_ORDER_INVALID_PRICE	51	Attempt to send an order with the price less than, or equal to, zero.
ERR_NEW_ORDER_INVALID_LIMIT_PRICE	52	Attempt to send a limit order with the price less than, or equal to, zero.
ERR_NEW_ORDER_INVALID_SIZE	53	Attempt to send an order with a wrong size. Order sizes are subject to the rules defined by each LP.
ERR_NEW_ORDER_INVALID_QUOTE	54	Attempt to send a previously quoted order without a Quote id.
ERR_NEW_ORDER_UNSUPPORTED_TIME_INFORCE	55	Attempt to send an order with a Time-In-Force value that the LP does not support.
ERR_NEW_ORDER_UNSUPPORTED_ORDER_TYPE	56	Attempt to send an order of type the LP does not support.
ERR_NEW_ORDER_THROTTLE	57	Attempt to send order when the time limit has been passed.
ERR_NEW_ORDER_SYSTEM_FLUSHING_ORDERS	58	Attempt to send an order when the system is in the middle of flushing existing orders (part of the FIXation shutdown process).
ERR_NEW_ORDER_UNKNOWN_TYPE	59	This value is for internal use only.
ERR_NEW_ORDER_SIDE_VALUE_UNSUPPORTED	60	Attempt to send an order with an unsupported Order Side value.
ERR_NEW_ORDER_SIDE_NOT_SET	61	Attempt to send an order with OrderSide.SIDE_NONE.
ERR_NEW_ORDER_POOL_DRAINED	62	Creating the order failed due to FIXation memory internal problems.
ERR_SYSTEM_NO_IMPL	63	This value is for internal use only.
ERR_CANCEL_ORDER_NO_ORDER	64	This value is for internal use only.
ERR_CANCEL_ORDER_ALLREADY_COMPLETE	65	Attempt to cancel an order that was completed.
ERR_CANCEL_ORDER_ALLREADY_EXPIRED	66	Attempt to cancel an order that was expired.
ERR_CANCEL_ORDER_ALLREADY_CANCELED	67	Attempt to cancel an order that was already canceled.
ERR_MODIFY_ORDER_NO_ORDER	68	This value is for internal use only.
ERR_MODIFY_ORDER_NO_PREVIOUS_ORDER	69	This value is for internal use only.
ERR_MODIFY_ORDER_ALLREADY_COMPLETE	70	Attempt to modify an order that was completed.
ERR_MODIFY_ORDER_INVALID_SIZE	71	Attempt to modify an order with an unsupported size. Order sizes are subject to the rules defined by each LP.
ERR_MODIFY_ORDER_MODIFY_NOT_SUPPORTED	72	Attempt to modify an order for the LP that does not support modifying orders.
ERR_ORDER_ID_NOT_FOUND	73	This value is for internal use only.
ERR_UNKNOWN_LP	74	Currently, not in use yet.
ERR_API_NO_MORE_PARAMS	75	This value is for internal use only.
ERR_API_BAD_REQUEST	76	This value is for internal use only.
SUCCESS_VWAP_NO_RETURN_VALUE	77	Generating VWAP did not take the entire book.

Code	Value	Description
SUCCESS_VWAP	78	Generating VWAP took the entire book.
ERR_NOT_ALLOW_TO_SHUTDOWN	79	This value is for internal use only.
ERR_JIXI_NOT_ENOUGH_LENGTH	80	An NTBA provided as output parameter is not long enough.
ERR_INIT_CALLED_TWICE	81	JixiGeneralFacade.init() was called more than once.
ERR_INIT_CFG_FAILURE	82	FIXation initialization process failed due to a problem in the FIXation configuration files.