A Credit, Margin & Risk Management Facility

FX Bridge has prepared this paper about our credit, margin and risk management facility to promote an understanding of the fullness of the product. This facility is a seamlessly integrated component in the ProTrader Plus 6 platform. We avail ourselves to provide a comprehensive demonstration of the environment, as well as evaluation logins for qualified prospective clients. As its preparers, please find our contact information on the last page.

TOPICS

- Objectives
- Features set
- Use cases
- Methodologies
- User guide

OBJECTIVES

FX Bridge's credit, margin and risk management facility combines several flexible tools to control, manage, analyze and report on client credit, margin and market risk. It is a multi-layered integrated system designed to give account and risk managers a real-time, 360-degree view of client account market risk across time and price. While not required to be deployed in the management regime, our proprietary risk-based margining (often referred to as portfolio margining) is a central feature of the system.

Risk-based margining is a mathematical approach to determine the potential risk of all open spot and option trades in the same currency pair for a given account and assigns a margin value based on the worst-case market scenario. It provides the most effective and efficient method of achieving the goals set out below.

The computational methodology used in risk-based margining is similar to that of SPAN® margining, which is the accepted margining system used in United States futures markets and has an exemplary record of efficiency and safety. There are two configurable parameter arrays needed to perform a risk-based margin calculation:

- Underlying price range
- Volatility range

The objective behind risk-based margining is to determine a margin security deposit based on the largest reasonable one-day loss that a portfolio of long and short spot and options might experience. This is done by using industry-standard option pricing models

to value the portfolio under various market change scenarios. There are three goals implicit in risk-based margining:

- To assure that clients post margin that adequately reflects the actual risk they assume.
- To assure that the margin requirement does not encumber client equity beyond the amount necessary to secure the actual risk clients assume.
- To assure that margin requirements are commercially competitive compared to available alternatives.

FEATURE SET

FX Bridge's credit, margin and risk management facility is a flexible system that combines the following:

- Credit line
- Margining
- Risk management

1. **Credit line** – The system provides configurable controls for managing credit of client accounts either system-wide or by account, and by total credit and/or maximum trade size.
    a. The maximum amount of credit an account can incur at any given time.
        i. Based on the total of:
            1. Spot and short option margin, plus
            2. Long option premium value
        ii. Based on the risk-based margin
    b. The maximum size of any trade.
        i. Based on the total notional value

2. **Margining** – The system provides multiple margin approaches, each with configurable controls, that can be set system wide or by account.
    a. Based on the total of the margins of each currency pair, which can be measured by:
        i. Risk-based margin
        ii. Fixed-dollar margin for spot and short options
        iii. Fixed percentage margin
        iv. Total notional value
    b. Configurable periodic auto-recalculation
    c. No margin

3. **Risk management** – The system provides a set of pre- and post-trade tools and analytics for evaluating and reporting on client account market risk.
    a. Pre-trade risk management
        i. credit-line check

   ii. margin check
b. Post-trade risk management
   i. Cut-loss using thresholds for automated action
      1. Total account liquidation
      2. Individual transaction liquidation, based on:
         a. LIFO
         b. Highest loss
         c. Serial last order liquidation until out of deficit
      3. Other dealer-defined action
   ii. Automatic positions offsetting (position netting)
   iii. Automatic early-warning margin notification
      1. Configurable threshold triggers
      2. Auto-highlighted margin deficit screen display
         a. Margin utilization
         b. Available margin
   iv. Automated email notices
      1. Real-time trade confirmation to dealer and introducing broker
      2. 30-day expiry notices to introducing broker and client
      3. Month-end account statements to client
      4. Daily EOD transaction confirmation statements to client
c. Reporting
   i. Current snapshot of account holdings
   ii. Historical / archival
      1. Account holdings
      2. Spot and option prices
   iii. Integration via API to external tools
d. Real-time position valuation
   i. Spot Summary
   ii. Dealer Option Summary
   iii. Dealer Spot Summary
e. Real-time customer account portfolio valuation
   i. Account Summary
   ii. Open Positions / Pending orders
f. Analysis
   i. Graphical or tabular interface
   ii. Value/risk across a price range
      1. For a current or future date
      2. Under configurable volatility
   iii. Multiple analytics views
      1. Profit and loss
      2. Premium
      3. Delta
      4. Gamma

5. Theta
6. Vega
7. Time
8. Margin

iv. Multiple filtering parameters by:
1. Account
2. Expiry
3. Position type and instrument
4. Actual and simulated

v. Input simulation trades
1. For prospective trade analysis
2. To combine with existing portfolio

USE CASES

Use case 1 - Risk management for future event
The built-in risk management facility can analyze an account's behavior in multiple ways (Greeks, P/L, intrinsic, margin, etc.) and with time and volatility parameters that the dealer can set.

Proposition: A client account has open positions of short calls, puts and spot in the GBP/USD. The customer has ample credit line for the existing positions and to add positions if desired. The dealer is concerned about a dramatic surge in volatility due to an upcoming BREXIT vote.

Application: The risk manager chooses to analyze the client's currency position in a graphical interface called Risk Manager.

- View client's portfolio of GBP/USD positions on a horizontal axis across a range of prices reflective of current market conditions.
- Set the analysis to the date of the future BREXIT vote.
- Set the market volatility to a value substantially higher than current volatility.
- Evaluate account under new price/date/volatility scenario conditions.

Result: The result shows the account is at risk and the dealer can inform the customer to take appropriate protective measures.

Use case 2 – Customized risk-based margin for multi-leg options strategies
The integrated risk-based margin facility can be customized for individual accounts that implement unique trading strategies.

Proposition: A customer account initiates short condor and iron condor strategies in multiple currencies and needs suitable margining that accommodates the multi-leg trading strategies in multiple currencies.

Application: The dealer uses account-specific risk-based margin settings to manage leverage for that client account. The risk-based margin setting establishes the boundaries where each underlying currency is tested for the strategies' worst-case scenario. The customer uses the platform's Margin Calculator to determine the required margin for each multi-leg strategy in advance of the trade.

Result: The result is the dealer's margin settings are effective retroactively should customer place any additional trades. In addition, the customer will see the changes reflected in Margin Calculator and any additional trades will comply with any new risk-based margin settings.

Use case 3 – Risk-based margin for rising market volatility

The configurable periodic auto-recalculation feature protects the customer with increased margin requirements.

Proposition: A customer account that trades short option positions in multiple currencies is maintaining existing positions while market volatility increases. The large intraday price swings do not create a trend up or down but revalues all the options higher because of the increased market volatility.

Application: The dealer uses account-specific risk-based margin settings to accommodate overnight price swings. Even if the dealer does not increase the risk-based margin settings, the margin requirement automatically recalculates based on changes in market volatility. The dealer can set the recalculation to be at the end of the day or multiple times during the day.

Result: The result is the dealer, without having to initiate any other action, ensures appropriate customer margin requirements resulting from changes in market volatility.

METHODOLOGIES

Risk-Based Margining (Portfolio Margining)

The following methodology explains the calculations behind risk-based margining in determining the largest reasonable one-day loss that a portfolio of options in a given currency might experience. This is done by using industry-standard option pricing models (i.e., Garman-Kohlhagen Model) to value the portfolio under various market scenarios.

There are two parameter arrays needed to perform the risk-based margin calculation:

- Underlying Range
- Volatility Range

Underlying Range

Client accounts are assigned a margin rate, for example 2%, for major currency pairs. The underlying range is set at ± the margin rate multiplied by the current spot price.

Volatility Range

The volatility range is set at the current volatility for a given strike ± the volatility shift. The volatility shift is defined by the following equation:

$$\text{Volatility Shift} = \sqrt{\frac{30}{MIN(DtE,90)}} * Reserve\ Volatility * MAX(Market\ Volatility, 10\%)$$

Where:

Min()	= minimum function
Max()	= maximum function
DtE	= Days to Expiration for the option
Reserve Volatility	= 15% for G10 currencies, 20% for all others
Market Volatility	= current volatility for the option

Scenario Construction and Margin Calculation

Borrowing from the SPAN® methodology, portfolios are analyzed under each of 16 change scenarios:

	Underlying Price	Volatility	Risk Charge
1	Down 3/3 Range	Up	100 %
2	Down 3/3 Range	Down	100 %
3	Down 2/3 Range	Up	100 %
4	Down 2/3 Range	Down	100 %
5	Down 1/3 Range	Up	100 %
6	Down 1/3 Range	Down	100 %
7	Unchanged	Up	100 %
8	Unchanged	Down	100 %
9	Up 1/3 Range	Up	100 %
10	Up 1/3 Range	Down	100 %
11	Up 2/3 Range	Up	100 %
12	Up 2/3 Range	Down	100 %
13	Up 3/3 Range	Up	100 %
14	Up 3/3 Range	Down	100 %
15	Up 2 * Range	Unchanged	35 %
16	Down 2 * Range	Unchanged	35 %

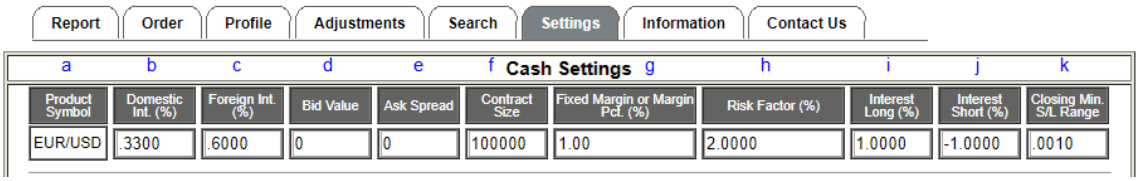
Scenarios 15 and 16 are included to assess the risk of deep out-of-the-money short options that would not fall within the maximum one-day price change. Because of the unlikely event of these options becoming in-the-money, the risk-based margin associated with these two scenarios are only charged at 35% (here) or another configurable amount. The margin assigned to the account is the greatest loss seen across the 16 change scenarios.

USER GUIDE

The following sections show details of using the FX Bridge platform's credit, margin and risk management facilities. The browser-based settings (also accessible in the application-based displays) create the initial parameter setup. The application-based displays show the real-time interactive monitoring tools.

Settings Tab

The Settings tab displays the dealer menu for system-wide default values. The Cash Setting menu selection from the Settings tab shows each currency and the default currency-specific parameters.



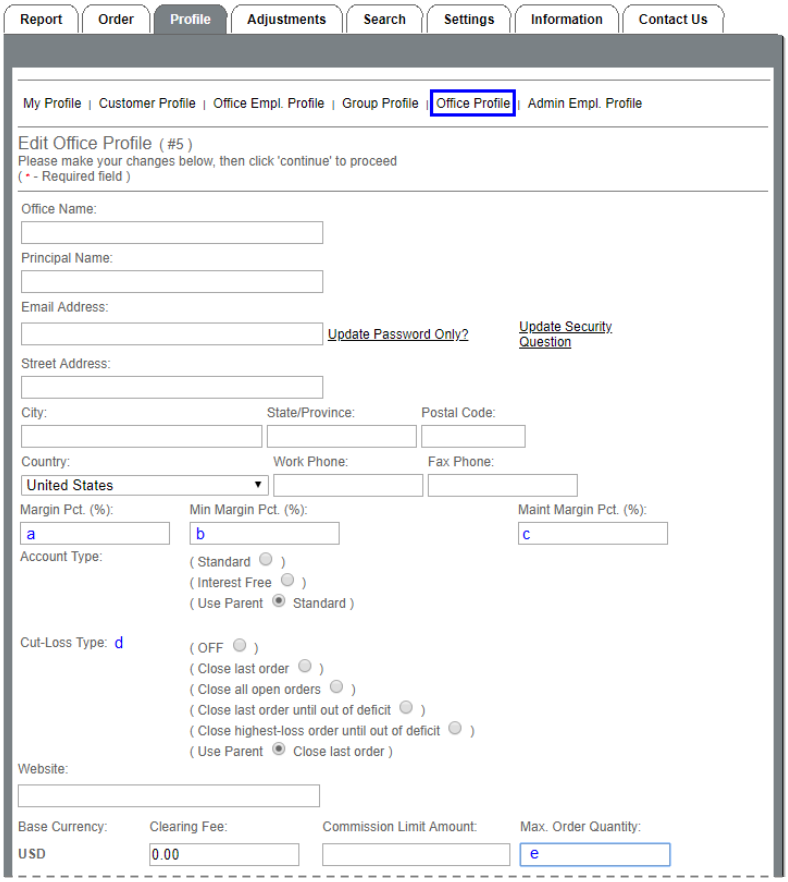
The above screen-shot from the Cash Settings menu is explained below:

a) The Product Symbol is the currency pair
b) The Domestic Interest rate is used by the Garman-Kohlhagen model for proprietary option pricing.
c) The Foreign Interest rate is used by the Garman-Kohlhagen model for proprietary option pricing.
d) The Bid Value parameter shifts the spot bid price down by the amount entered in the parameter.
e) The Ask Spread parameter shifts the spot ask price up by the amount entered in the parameter.
f) The Contract Size allows the platform to use lot size trading (as shown with 100,000) or notional by entering a 1.
g) The Fixed Margin or Margin Pct (%) allows the dealer to create a margin that is a fixed amount per lot or a percentage of the notional value.
h) The Risk Factor sets a range for the underlyer for a proprietary option order book Value at Risk report.
i) Interest Long % is the annual interest rate differential charged to customer accounts who hold a long spot trade open overnight.
j) Interest Short % is the annual interest rate differential charged to customer accounts who hold a short spot trade open overnight.
k) Closing Min. S/L Range is the parameter to limit how closely a trader can place a Stop or Limit order to the market price. For instance, if the market is at 1.30 and the Min. S/L is 10 pips, then the stop or limit order cannot be inside 1.2990 and 1.3010.

Profile Tab

The Profile tab displays the dealer menu for system-wide user authorizations. Users consist of customer accounts, office users, and administrative users – each with progressively more authority within the hierarchy. For clarity, an office is a logical grouping of customer accounts with common properties. Office users are granted access to an office, its customers, and certain rights. An office user, however, does not have access to multiple offices, but only the office to which it is assigned. An "admin" user can be permissioned to have access to certain offices and their customer accounts.

Authority comes in two classifications, the ability to view information, and the ability to create or change information. As an example, a customer account can change its password but is unable to change address information – it can only request the change by an administrative user. The office user can view the customer address but cannot change the address. Address changes can only be made at the administrative level.



The Office profile (shown above) has settings common to the admin and customer profiles. The admin profile sets up a default, while the office profile settings can be used to override the admin profile and the customer account settings can be used to override the office profile settings. The following parameters are used for credit, margin, and risk management.

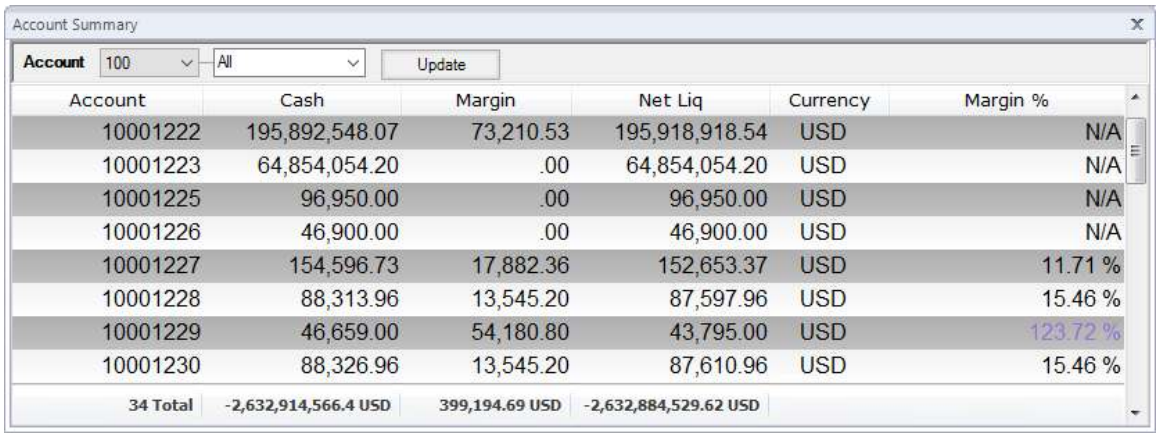
a) The Margin Pct (%) overrides the value set at the cash settings parameter.

b) The Min Margin Pct (%) is the minimum ratio of net liquidation value to required margin. If the ratio goes below this parameter, then the Cut-Loss Type (d) is automatically enabled.
c) The Maint Margin Pct (%) is the point at which the ratio of net liquidation value to required margin creates an early warning to the customer account.
d) The Cut-Loss Type is the automated facility that can liquidate customer account holdings to eliminate the margin deficit. This can be achieved through one of the following selectable methods:

- LIFO
- highest loss
- serial last order liquidation until out of deficit
- total account liquidation
- Other dealer-defined action

e) This Max Order Quantity is used to create the maximum order size for an account. (It is also used to protect against fat-finger transactions.)

Account Summary

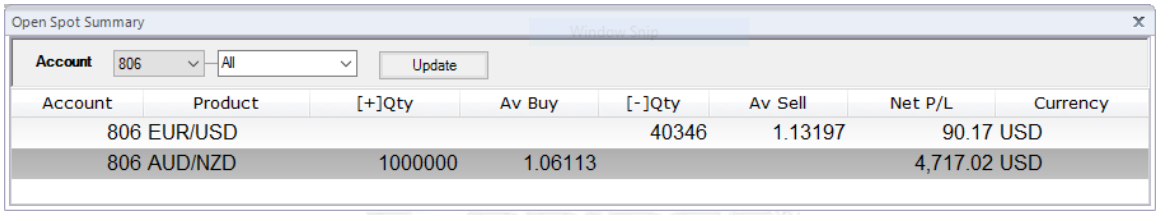


Account	Cash	Margin	Net Liq	Currency	Margin %
10001222	195,892,548.07	73,210.53	195,918,918.54	USD	N/A
10001223	64,854,054.20	.00	64,854,054.20	USD	N/A
10001225	96,950.00	.00	96,950.00	USD	N/A
10001226	46,900.00	.00	46,900.00	USD	N/A
10001227	154,596.73	17,882.36	152,653.37	USD	11.71 %
10001228	88,313.96	13,545.20	87,597.96	USD	15.46 %
10001229	46,659.00	54,180.80	43,795.00	USD	123.72 %
10001230	88,326.96	13,545.20	87,610.96	USD	15.46 %
34 Total	-2,632,914,566.4 USD	399,194.69 USD	-2,632,884,529.62 USD		

The account summary window shows customer accounts and highlights those that are below the maintenance margin threshold but have not yet breached the minimum margin threshold.

Spot Summaries

The Open Spot Summary windows shows aggregate spot transactions.



Account	Product	[+]Qty	Av Buy	[-]Qty	Av Sell	Net P/L	Currency
806	EUR/USD			40346	1.13197	90.17	USD
806	AUD/NZD	1000000	1.06113			4,717.02	USD

The Open Spot Summary shows open spot positions by account or group of accounts.

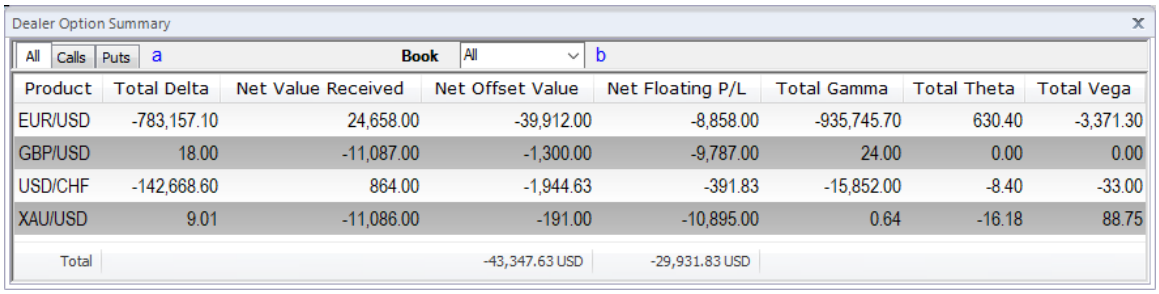
The Dealer Spot Summary shows the open positions for all accounts and filters bases on "A-Book" or "B-Book."


Dealer Spot Summary

Book All

Product	Long Total Qty	Short Total Qty	Net Open Qty	Long Offset	Short Offset	Net Floating P/L	Long Value	Short Value
AUD/CAD	0	900,001	-900,001	0.0000	860,868.9565	22,772.28	0.00	-22,472.28
AUD/JPY	0	100,000	-100,000	0.0000	8,033,100.0000	-728.20	0.00	728.20
AUD/NZD	0	1,000,000	-1,000,000	0.0000	1,067,060.0000	-3,985.26	0.00	3,985.26
AUD/USD	1,500,000	0	1,500,000	1,075,770.0000	0.0000	-45,900.00	46,650.00	0.00
EUR/CHF	0	1,400,000	-1,400,000	0.0000	1,598,464.0000	-75,730.20	0.00	76,430.20
EUR/USD	9,346,882	10,970,000	-1,623,118	10,562,257.0665	12,396,319.4000	-87,843.98	438,317.08	-350,173.10
GBP/USD	1,200,003	400,000	800,003	1,565,271.9132	521,748.0000	-1,287.89	14,567.89	-12,630.00
USD/CHF	0	500,000	-500,000	0.0000	505,180.0000	-9,244.00	0.00	9,244.00
Total						-297,742.41 USD		

Option Summary


Dealer Option Summary

All Calls Puts a Book All b

Product	Total Delta	Net Value Received	Net Offset Value	Net Floating P/L	Total Gamma	Total Theta	Total Vega
EUR/USD	-783,157.10	24,658.00	-39,912.00	-8,858.00	-935,745.70	630.40	-3,371.30
GBP/USD	18.00	-11,087.00	-1,300.00	-9,787.00	24.00	0.00	0.00
USD/CHF	-142,668.60	864.00	-1,944.63	-391.83	-15,852.00	-8.40	-33.00
XAU/USD	9.01	-11,086.00	-191.00	-10,895.00	0.64	-16.18	88.75
Total			-43,347.63 USD	-29,931.83 USD			

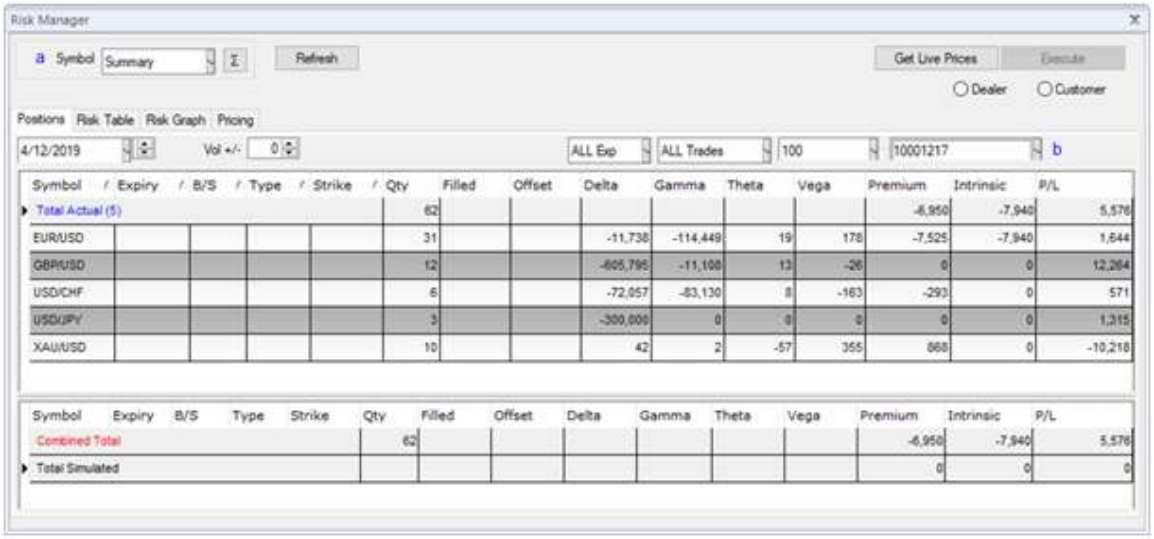
The Dealer Option Summary provides a summary of options information. It can be filtered as follows:

a) By calls, puts or both
b) By A-Book, B-Book or both

In addition, the Dealer Option Summary provides the dealer with a choice of information displayed as shown by the available items below:

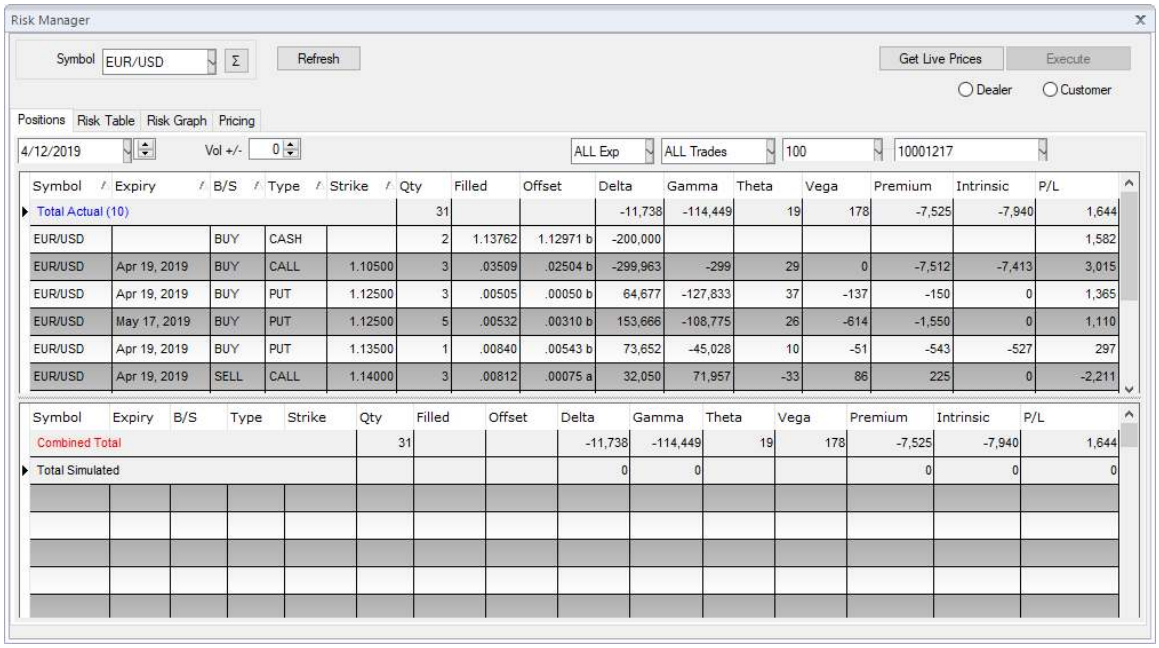
Risk Manager

The Risk Manager is an interactive real-time monitor to evaluate a customer account portfolio and introduce what-if scenarios to evaluate the portfolio under changes in the underlying currency pair, volatility and time. It also provides a tool to create simulated trades to evaluate them independently or to combine them with the existing portfolio.

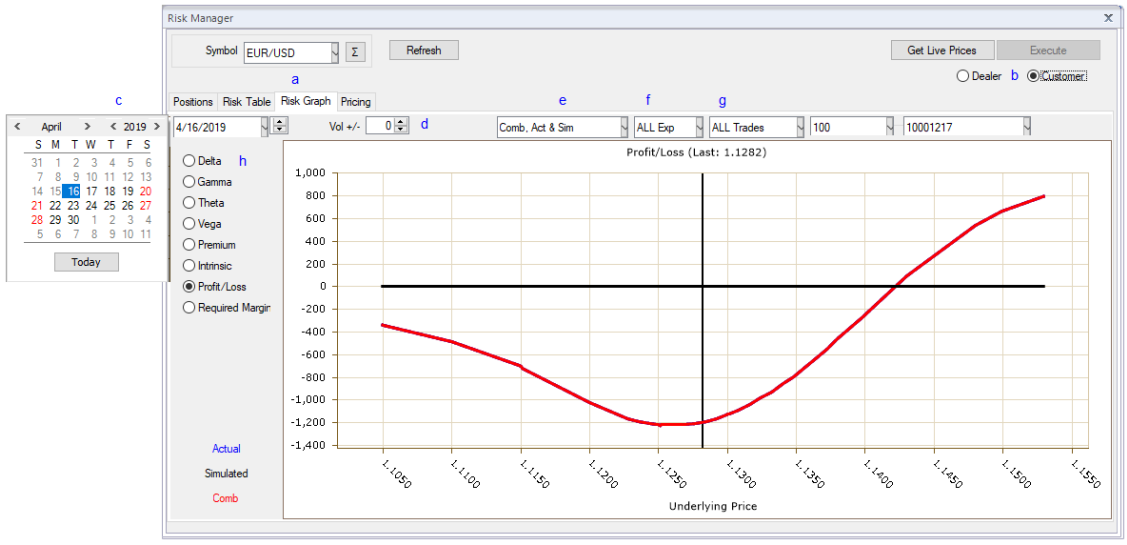


The initial display screen for the Risk Manager shows the summary for an account.

a) The Symbol selector shows a selected currency pair or a summary of all currencies for analysis. The summary is shown above.
b) The account selector allows the dealer to view an individual account.
c) The section for simulated trades allows the dealer to add long and short calls, puts or spot trades to evaluate them independently or in combination with the existing portfolio.

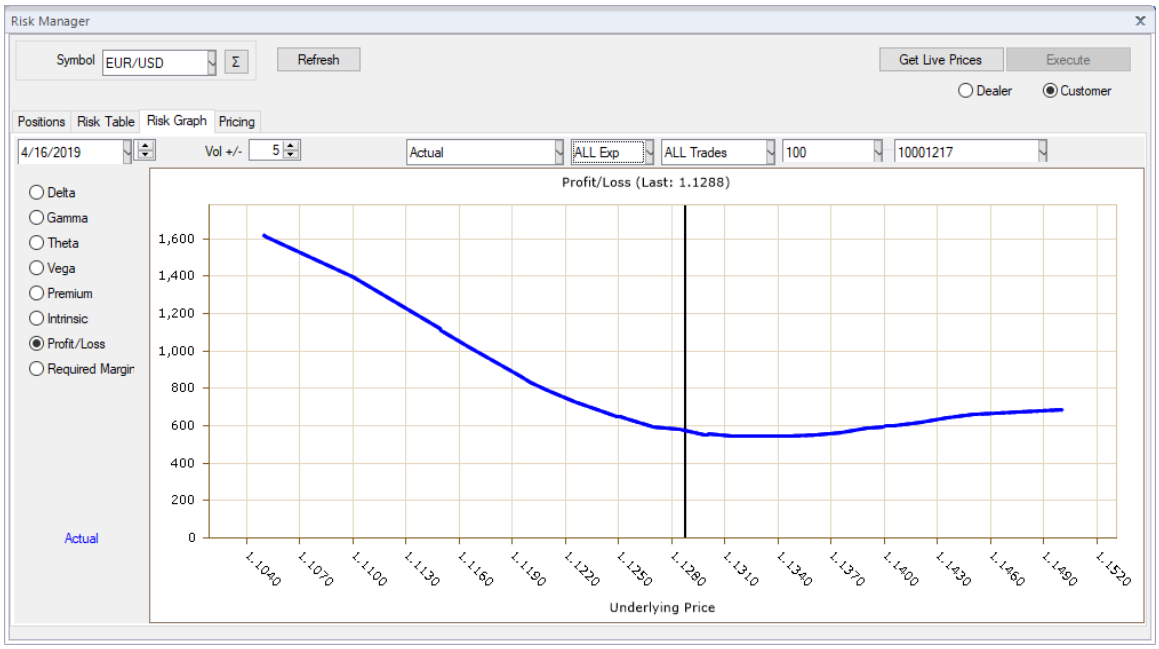


The screen image above shows Risk Manager displaying the customer account portfolio of EUR/USD and the availability to add simulated trades below.

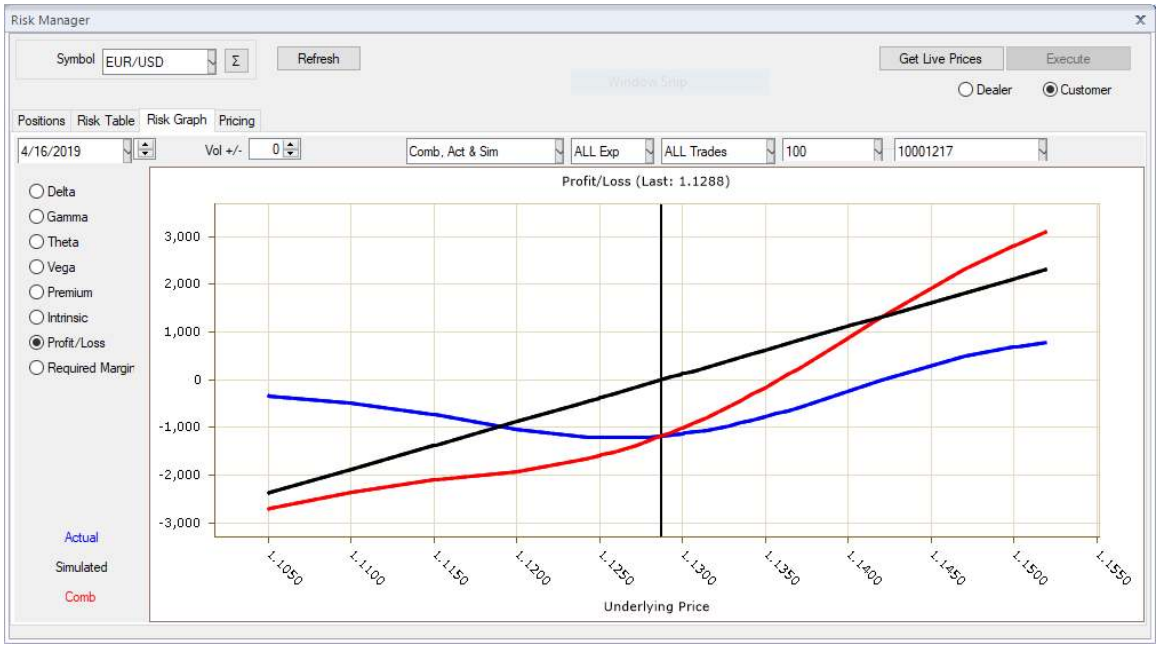


The Risk Graph tab shows the graphical account valuation for the customer account. It provides filters to generate what-if scenarios.

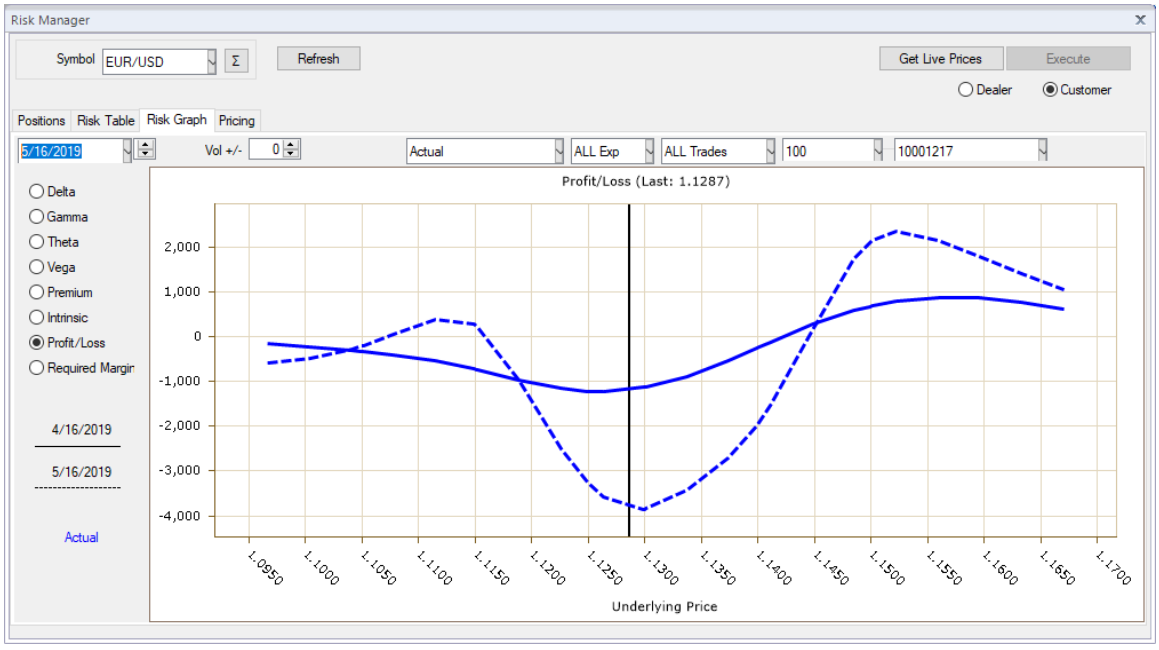
a) The Risk Graph tab selector shows the portfolio over a range of underlying price.
b) The Customer and Dealer radio buttons gives the dealer the choice of seeing the portfolio valuation from the Customer Account perspective or the counter-party perspective.
c) The calendar widget gives the dealer the ability to select a valuation base on today's DtE or a date in the future. Expired options are evaluated as spot trades opened at the strike price.
d) The Vol ± spin button gives the dealer the ability to revalue the portfolio option positions at incrementally higher or lower volatility.
e) The dealer uses this drop-down to choose a view of the actual portfolio, the simulated trades, a combined portfolio of actual and simulated trades, or a combination of the three choices.
f) The Expiration pull-down gives the dealer the ability to filter trades based on the standard expiration dates.
g) The Trades pull-down gives the dealer the ability to filter the trades for spot, call or put options or any combination of the three.
h) The graph radio buttons gives the dealer the choice to select the graph of the Delta, Gamma, Theta, Vega, Premium, Intrinsic value of the options, the Profit/Loss of the portfolio, or the Required Margin.



The above graph shows the customer account's actual portfolio evaluated at 5% more than the current volatilty.



The above screen image shows the customer account portfolio, an additional simulated trade, and the actual and the simulated trades combined.



The above screen image shows the current actual customer portfolio (solid line) and the portfolio at a date one month in the future (dashed line).

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