



# **Omnesys Technologies**



## **NEST Strategy**

### **Value-Neutral Pair Strategy (Inter-Exchange)**

March 28<sup>th</sup>, 2014

**Version 2.0.0.3**

## Document Information

DOCUMENT CONTROL INFORMATION	
DOCUMENT	Value-Neutral Pair Strategy (Inter-Exchange)
VERSION	2.0.0.3
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REVIEWER	BRIJESH DAMODAR / ATHUL KUDVA
REVIEW NOTES	
VERSION NOTES 2.0.0.3	This document explains the Value-Neutral Pair strategy (Inter-Exchange) functionality.
KEYWORDS	

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## Value-Neutral Pair Strategy (Inter-Exchange):

This strategy allows for arbitrage between NFO and BFO segments (Inter-Exchange) (i.e. buy one future scrip and sell another future scrip).

### Nest Strategy Client:

**Portfolio Tree:** Each portfolio comprises of 2 tokens. The future scrips tokens in the portfolio can be same scrips different months, or different scrips same months or same scrip same months but different exchanges or different scrips different months.

### **Input Parameters:**

Following user parameters need to be entered:

**Portfolio Name:** It is the name which user wants to give for a particular portfolio.

**Pro/Cli:** It gives user an option to trade in either pro account or in Client Account. When cli is selected, front-end will give an option to the user to the select client code.

**First Leg:** is used to select which scrip (scrip1 or scrip 2) user wants to do first (buy or sell). It is this parameter that will decide which leg the system needs to enter first.

**Spread type:** User has four options to select from:

- a. **Price Ratio:** This is the desired ratio between two future legs. The ratio by default needs to be entered Sell Scrip/Buy Scrip.

***Calculated Price Ratio = Weighted Avg. Sell Price / Weighted Avg. Buy Price***

For **example:** Nifty Futures November (NIFTY11NOVFUT) price is Rs. 5175 and BSE NOV 2011 FUTURE (BSXNOV2011) is Rs. 17178. Let say the user wants to Sell NIFTY11NOVFUT and buy BSXNOV2011. Hence, the calculated price ratio is weighted average Sell Price/ Weighted Average Buy Price is  $5175/17178 = 0.3012$ . Let say user entered the ratio as 0.305 with first leg as BSXNOV2011. Current Nifty November 2011 Futures (NIFTY11NOVFUT) price is Rs. 5178 and BSXNOV2011 future price is Rs. 17178. Currently the calculated ratio is 0.3012. Hence, the legging will be done. For instance, if Nifty price is 5178, it will place buy BSXNOV2011 at  $5178/0.305 = \text{Rs. } 16977.049$  rounded off to Rs. 16977.05. Let say Nifty Futures price changes to 5200, it will modify the first leg buy BSXNOV2011 to  $5200/0.305 = \text{Rs. } 17049.18$  round off to Rs. 17049.20 and so on.

**b. Basis Points:** Instead of Price Ratio another way is to define the ratio in terms of **basis points**. In other words, it is nothing but the sell/buy ratio but expressed in basis points. Basis points can also be termed as  $[(\text{Sell}-\text{Buy})/\text{Buy}] * 10000$ . Our system will convert the Basis points into Set Ratio internally. Relation between set ratio and basis points is given by:

$$\text{Set Ratio} = 1 + (\text{BasisPoints} / 10000)$$

c. **Spread:** It is the difference between sell token and buy token. The formula for the Spread is given as below:

$$\text{Calc. Diff.} = \text{Wtd Avg Price of Sell Token} - \text{Wtd Avg Price of Buy Token}$$

d. **Spread \* Lot:** The formula for this type of spread is given as below:

$$\text{Calc. Diff.} = \text{Wtd Avg Price of Sell Token} * \text{lot size of sell token} - \text{Wtd Avg Price of Buy Token} * \text{lot size of buy token}$$

When either one of the options is selected, the corresponding value needs to be entered in the box named Spread/Ratio.

**Execution Type:** It has three options: Single Lot, Multiple Lot and Value Based. When Value-based is selected "Total Lots" and "Order Lots" field will be disabled at token levels & when Single Lot based option is selected "Total Value" and "Order Lots" fields will be disabled at token levels. If Multiple Lot option is selected, "Total Value" field is disabled at token level.

**Order Type:** This parameter is useful in determining how the first leg (bidding leg) will be placed in the market. It has two options:

- a. **Best Bid/Offer:** If user selects Best Bid/Ask, then the strategy will place a single limit day order for the first leg. For placing first leg, our system will calculate the first leg option price based on the set parameters. If the market price is better than calculated price, it will try to become best buyer/seller depending on whether one is buying or selling a given token.

**It should be noted that bidding to become best buyer and best seller till the calculated first leg price. So calculated first leg price becomes a floor/ceiling for bidding.**

- b. **Sweep/Stand Price:** If user selects Sweep/Stand Price, then the strategy will place a single limit day order at a price calculated based on the limit specified and the price of the second leg. For placing first leg, our system will calculate the first leg price and place the order in the market at the calculated price but **will not** become best buyer or seller. First leg price will be modified based on the changes in the prices of second leg.

**Market Depth:** The threshold qty % will be checked for the second leg for the specified market depth. It specifies till how much depth once must check for the quantity. It should be noted that although depth is 5, but if the quantity is available at lower depth (say 3<sup>rd</sup> depth) itself, it will take weighted average accordingly and then calculate the first leg price. In other words, the strategy will not calculate the weighted average price for the particular leg till the depth specified, but will calculate the weighted average price based on the quantity available and price at which it is available.

**SL Qt Threshold Qty (%):** It is used to check whether a mentioned percentage of the order lots are available for the second leg for the specified market Depth. If the specified threshold quantity percentage for the second leg is not available, no first leg orders will be placed. Even during modification of first leg, quantity checks are done for the remaining legs. If any time during the modification, if the quantity becomes unavailable for second leg, the existing first leg open order will be cancelled.

**Market Protection Type:** is useful to prevent user from manual/typing errors. It has three options:

**1. In Percentage:** is useful to prevent user from manual/typing errors. For example, let's say user has entered a spread as 6, and has entered market protection as 30% and the calculated market difference comes out to be 10, the system will not allow the orders to be executed (placed) below Rs. 7. Similarly, if the calculated market rate comes out to be -10, and user has entered market protection as 30%, and entered spread as -14, then the system will not allow the orders to be executed (placed) below Rs. -13. In other words, it will prevent the user from the downside risk by as much as 30% during the initial placement/modification of orders.

**2. Absolute:** The orders will not be generated if the set limit is beyond the market protection limit. Based on the value entered, it will create a band of Current difference +/- Market protection limit. If the set limit is beyond this band it will not allow any orders to be placed.

**3. No (Market Protection):** If this option is selected, then the Market protection will not be considered before placing the orders.

**Market Protection Value (MP Value):** This is where the value needs to be entered for market protection after selecting market protection type. If market protection type is selected as no, this parameter field will be disabled. In order to apply the market protection, one needs to calculate the current market rate to compare with the limit specified by the user.

**Spread/Ratio:** This is the desired spread/ratio between the two selected legs. The user needs to enter the desired value based on the spread type selected. .

**Quote Threshold:** The order is placed only when the market spread/ratio is more than or equal Quote threshold. The idea is to start bidding when the Quote threshold is breached. It is always **lower** than or **equal** the "Limit". Quote threshold is applicable both during **initial placement** as well as during **modification** of orders.

**Second Leg Type (2<sup>nd</sup> Leg Type):** This parameter decides how the second leg order or partially open first leg order (after second leg is placed) should be placed after timer expires. It has one option:

- a. **LTP Based MPP%:** If this option is selected, partially open first leg order or second leg open order after timer or threshold breach will be converted to limit order but that limit order will have price depending on whether the order is a buy order or a sell order:

**For Buy Orders:**

**Limit price for Buy Order = Current LTP + (Current LTP \* MPP%)**

**For Sell Orders:**

**Limit price for Sell Order = Current LTP - (Current LTP \* MPP%)**

As and when LTP changes, the pending orders will also be modified according to the foresaid formula.

Following parameters need to be entered for both the tokens:

**Exchange Segment:** It is the relevant exchange on which user wants to run pair strategy.

**Instrument Type:** Based on the exchange segment selected, relevant instrument type will appear in this drop-down. For both the legs, this parameter should be selected separately.

**Scrip Name:** It is the scrip name that user needs to select on which user wants to do a pair trading. For both the legs, this parameter should be selected separately.

**Expiry Date:** It is the expiry date for the relevant futures scrip for a particular segment in particular exchange for a given leg. For both the legs, this parameter should be selected separately.

**Tick Size (Rs.):** It is a minimum tick for that scrip for each token.

**MPP%:** The user needs to specify the MPP% for both the legs separately.

**Buy/Sell:** This parameter is useful in deciding which leg will be a buy order and which leg will be a sell order. For both the legs, this parameter should be selected separately.

**Order Lots:** This field will only be enabled when Execution type selected is Multiple Lots. This is the quantity in lots to be placed per opportunity for execution for that particular leg.

**Total Lots (in lots):** This is the total quantity that needs to be executed for each scrip token. For each scrip, the lots should be entered separately at token level. It is **not** necessary to have same lots for both scrips. It could be same or different. If the lots are different, it will place the lots according, thus ensuring even execution (based on lot difference between two scrips) at each round. Hence, ensuring that at any given moment during execution, it is as close to quantity neutral as possible. For Multiple Lot, order lot for each leg will determine how the execution will be done, till the total lots are completed. For Single Lot as execution type with uneven lots, the strategy will first find out the smallest lots of two scrips.

For example, for total qty for scrip 1 is 20 lots and scrip 2 is 10 lots. The strategy will first calculate which scrip has the smallest lot. In our case, scrip 2 has 10 lots which is less than scrip 1's 20 lots. Hence, for every 1 lot of scrip 2 it will do 2 lots of scrip 1 in our example. Hence, in total it will do 10 rounds with ratio of 1:2 for scrip2:scrip1.

For uneven ratio, such as total qty for scrip 1 is 17 lots and scrip 2 is 21 lots. It will first calculate that smallest of total lots between two scrips. In this example its scrip 1, for every 1 lot of scrip 1 it will do 1.2353 lots of scrip 2 for 17 times in our example. Since 1.2353 for scrip 2 is not possible, it will round it off to 1 lot. Hence in round 1, it will do 1:1 ratio, with 0.2353 lots is a residual for scrip 2. It means that 0.2353 was traded less for scrip 2. In round 2, it will again do 1:1 ratio for scrip1:scrip2, with 0.2353 lots as a residual for scrip 2. Hence, cumulative residual after round 2 is 0.4706. In round 3, it will do 1 lot of scrip 1 buy 2 lots of scrip 2. The reason, if it does trading in the ratio of 1:1, the cumulative residual after round 3 will be 0.7059, however if 1:2 lots is done, the residual changes in favor of scrip 1 with (1-0.7059) as -0.29411. This means that after round 3, scrip 2 is over traded by 0.29411 or scrip 1 is under-traded by -0.29411. Hence, whenever a cumulative residual cross 0.5, an adjustment of (addition or subtraction) is done based on the under-trading or over trading on the scrip with maximum lots.

**Total Value (in Rs):** This is the total value that needs to be executed for each scrip token. For each scrip, the values should be entered separately at token level. It is **not** necessary to have same value for both scrips. It could be same or different. If the values are different, it will place the lots accordingly, thus ensuring even execution (based on total price difference between two scrips and taking lot size into consideration) in each round. Hence, ensuring that at any given moment during execution, it is as close to value neutral as possible. For value-based execution, the working is exactly similar to lot-based execution. However, estimated lots are calculated based on the LTP and the board size of the lot. Before every round, it will check whether or not it will breach the total value on either leg (side) or not if the respective lots are traded for the given round.

**Note:** This field will get disabled when single lot or Multiple Lot option is selected as Execution type.

**Threshold Price (in Rs.):** It is a price that needs to be subtracted if the scrip is to be sold or added if the scrip is to be bought from the placed price. For instance, if the quantity for the first leg for a given round is 3 lots and for second leg is 1 lot with threshold price for first leg as 1 Rs. and second leg as 2 Rs and threshold quantity percentage as 80%. User is buying first leg and selling second leg. Assume that 2 lots are traded in the first leg, this means that timer for leg 1 starts and simultaneously timer for leg 2 starts. At the end of the timer, both legs (scrip 1 remaining leg and scrip 2 leg) are traded at market price or limit order based on LTP Based MPP% depending on second leg type selected. However, before the timer for leg 1 expires, if the LTP for scrip 1 breaches Weighted average Placed price of the first two lots + threshold price of scrip 1 then it will trade the remaining lots of scrip 1 to market order or limit order based on LTP Based MPP% depending on second leg type selected. Similarly, as soon as the second leg is placed, timer for leg 2 starts. If the LTP for scrip 2 breaches Weighted average Placed price of scrip 2 - threshold price, second leg will be placed to market or LTP Based MPP% depending on second leg type selected.

**For buy:** Weighted average Placed price of scrip + threshold price

**For sell:** Weighted average Placed price of scrip - threshold price

**Threshold Qty (in %):** is the quantity that needs to be traded for first leg, before second leg can be placed. For instance, if the quantity for the first leg for a given round is 3 lots and for second leg is 1 lot with threshold quantity percentage as 80%. It means that unless 80% of 3 lots that is 2.4 lots rounded to 2 lots are not completed, it will not place the second leg.

**Threshold Time (in seconds):** is the time after which the order should be placed at market price or LTP Based MPP% depending on second leg type selected. It is applicable for both legs and has to be entered separately for each leg.

**Modify Factor (in Rs.):** This parameter is only used when the order type selected is Best Bid/Ask. Modify factor will be disabled if Sweep/Stand option is selected as order type. This parameter decides by how much the user should become best buyer/seller from the second best.

**Execution Difference:**

The above parameter needs to be updated from the Nest Strategy front end. Once the parameters are updated, the user needs to click on start button to run the Nest Strategy engine in the backend.

**Working:**

1. If Value Based, execution type is selected, then the total number of lots will be estimated based on the value entered for either leg. The number of rounds it will take to execute buy and sell side in even fashion is decided by the board lot quantity, LTP, and the total value entered for both tokens. Based on that, it will calculate the number of rounds it needs to complete the entire total lots. If the Multiple lot is selected as execution type, then the order lot will be enabled, and the system will not calculate the order lot for any leg. If Single Lot based execution type is selected, the strategy will calculate the number of lots to be placed for each round based on total lots specified.
2. Based on Order Type selected, and the spread type, it will calculate the first leg price based on the price of the second leg and the spread/ratio set by the user. As the second leg price changes, the first leg price will be modified.
3. On trade of first leg, timer starts for the second leg, if the price is available, it gets traded, else after timer expires, it will trade the second leg at Limit price based on LTP Based MPP%. However, if the first leg is partially traded, it will check the traded quantity with the threshold quantity (%). If the traded quantity is greater than the threshold quantity (%) then the second leg is placed. However, if the partial traded quantity is greater than threshold quantity, additionally, timer for leg 1 also starts. At the end of timer 1, if the quantity is not traded, it is traded at Limit price based on LTP Based MPP%.
4. Before the timer expires on either leg, if the threshold price is breached, it will trade the leg to limit order based LTP Based MPP% to prevent incurring further losses.
5. The whole process is repeated several times based on the minimum of the total quantity between two scrips if the execution type is Single lot or Value based. For uneven lots, it will adjust the lots accordingly in a evenly fashion such that at any given point of time, the difference between total bought quantity and total sold quantity are in the ratio as close as possible to the ratio of total buy (quantity) value and sell (quantity) value. At any moment of time, on either side, one side (buy or sell) is always one lot for execution type value based/ single lot based.

**Some key points with regards to Execution:**

1. If for any reason individual or all portfolios are stopped, and if the first leg is partially or completely open or second leg is partially or completely open or both legs are in open condition, it will get cancelled.
2. The system will place the order based on LTP Based MPP%, and it will modify any open orders as soon as the LTP changes. The orders can remain in open condition. The next round will only be fired, once the round of orders is fully completed.



**Portfolio and Parameters:**

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PortFolio Name :

Account Details  
 Pro/Cli:  Acct. Id:

First Leg:  Spread Type:  Exec.Type:  Order Type:

Scrip 1  
 Exch-Seg:  Inst.Type:  Scrip Name:  Expiry Date:  Tick Size:  MPP%:

2ndLegType:  SL QtThr.Qty(%):  Mkt. Depth:

Scrip 2  
 Exch-Seg:  Inst.Type:  Scrip Name:  Expiry Date:  Tick Size:  MPP%:

Mkt.Prt.Type:  Mkt.Prot:  Spread/Ratio:  QuoteThres:

Scrip 1	Order Lots	Total Lots	Total Value	Thr.Price(Rs.)	Thr.Qty(%)	Thr.Time	Modify Factor	Scrip 1	Traded Qty
Buy/Sell <input type="text" value="Buy"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text" value="1.00"/>	Rem Qty	<input type="text"/>

Scrip 2	Order Lots	Total Lots	Total Value	Thr.Price(Rs.)	Thr.Qty(%)	Thr.Time	Modify Factor	Scrip 2	Traded Qty
Buy/Sell <input type="text" value="Sell"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	Rem Qty	<input type="text"/>

## Risk Management

Risk Management System can be configured to have following checks before the orders are released to the exchange. The checks which are defined by exchange with respect to Algorithms are in place in the system. Below mention rules can be configured in the system to control the risk parameter which is defined by exchange.

Sr.No.	Checks	Rules to set	Remarks
1	Price Check	Check Price Range Based on LTP Check Circuit Limit	This rules will create a price range on the basis of Last Traded Priced as per the percentage set in the category window.
2	Quantity Check	Order Quantity including Square off Order Board Lot Quantity including Square off Order	This rules will restrict per order the number of quantity to be placed in market which is defined the category window. The user can define the number of quantity in Weights and in lots for Futures.
3	Order Value Check	Order Value including Square off Order	This rule will restrict per order the order value which can be placed in the market which is defined in category window
4	Trade Price Protection Check	Check Circuit Limit including square off order	This rule does not allow to place the order which has been placed above the Higher Circuit Limit or Lower circuit limit which id defined for contract/scrip by exchange
5	Market Price Protection	Check Price Range Based on LTP	This rule will create a price range on the basis of Last Traded Priced as per the percentage set in the category window.
6	Cumulative Open Order Value check	Pending order value	This rule will restrict the Open Order with the Value set in the category
7	Automated Execution Check	Turnover Order Level and Turnover Order Level Limit	This rule will calculate the value of all executed/ Unexecuted and un confirm orders and if breach the value set in category then further order will get rejected
8	Automatic stoppage in event of Algo execution leading to a loop or a runaway situation.	Order Throttle	If there number of order per seconds breaches the value which is set in Throttle then further order gets rejected by the system.
9	Net Position Vs. available margin	Gross Exposure, Gross Exposure Derivative, Var Margin Order Level, Span Margin Order Level	User can set the risk parameter based on Exposure and Margin based on which the margin used will be calculated on the basis of position taken. If the Margin used is equal to Cash margin then further order will be rejected by the system

10	RBI Violation checks for FII Restricted stocks.	Restricted Basket or RMS Blocking	User need to create a Restricted basket for the scrip and assign to the category of the user / client. Also RMS blocking can be used.
11	MWPL violation check	RMS Ban Symbol or RMS Blocking	The scrip for which market wide position limit is breach then scrip can be blocked or it needs to be in Ban.
12	Position Limit Checks	Scrip Group / Scrip Margin	User can define the quantity scrip wise in which the position cane be taken in scrip group and then it needs to be assign to category at client level
13	Trading Limit Checks	Scrip Group / Scrip Margin	User can define the quantity scrip wise in which the position cane be taken in scrip group and then it needs to be assign to category at branch level
14	Exposure Limit check at individual client level and at overall level	Gross Exposure and Gross Exposure Limit	User can define the Exposure at Branch Level as well as Broker Level
15	Number of orders for the logic	NA	Depends on the user parameter (i.e order qty) set. This can vary from a minimum of a single lot to a maximum of total qty set.
16	Maximum number of scrips / contracts in which the logic will work at a time	NA	At a time, maximum number of scrips/contracts in which logic will work at a time is 2
17	Number of legs		Two