USER GUIDE
TRADESIGNAL
11.0

TRAYPORT

A TMX COMPANY

TABLE OF CONTENTS

WHAT'S NEW

GENERAL APPLICATION CHANGES

INTRODUCTION OF THE MINI TOOLBAR

The property inspector has been replaced with the mini toolbar resulting in more efficient property changes. The mini toolbar is displayed in each element, similarly to charts, watchlists, and so on, and the options adapt to the selected element and item. With the mini toolbar you have quick access to the most used

↑ EXAMPLE OF THE MINI TOOLBAR

properties of an item and any changes made in the mini toolbar are updated live. Additionally, the mini toolbar is shown in each workspace individually, also on another desktop.

Within the mini toolbar, settings are available for Symbols, such a chart type, period and used colors. For tools, settings are also available, including colors, line styles and alerts. Settings are also available for Indicators and Strategies, such as inputs, colors and line styles. All available settings for the activated item are displayed with a click on the gear at the end of the mini toolbar, see "Mini Toolbar" on page 45.

General Chart Settings and Money Management are now accessible via the Home-Tab, see "Settings" on page 157 and "Money Management" on page 236.

Saving default settings is now possible in the context menu of properties that have a default setting, see "Default Settings" on page 53. As before are some default settings part of the "Tradesignal Options" on page 319.

HIDE ELEMENTS IN THE CHART

For a more focused overview in your charts, you can now easily hide a individual chart elements with a click on the eye in the "Mini Toolbar" on page 45. Hidden elements like indicators, symbols or strategies are still calculated but their output is not visible

↑ HIDE ELEMENTS IN THE CHART

anymore. With another click on the eye is the output visible again, see "Mini Toolbar" on page 45.

USER-DEFINED CONTINUATIONS AND ROLLING CONTRACTS FOR JOULE PERIOD SPREADS

The new Wizard allows you to create user-defined continuations for a period spread as well as a rolling contract. Please define the second leg as second contract to select in the wizard. The symbol name reflects both used legs, see "User-defined continuations" on page 84.

NEW ADDITIONAL SYMBOL SEARCH BOX

A new symbol search box has been added to the symbol lists. The search finds symbol folder as well as single symbols. First please select the datafeed where you want to search the symbol. In addition, a filter can be applied to the results: Automatic, Commingled - All Venues, Commingled - Cleared and Non-Commingled.
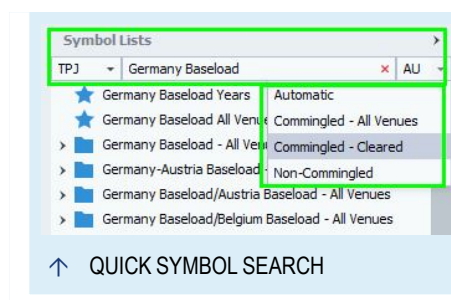
The new symbol search box is added to other dialogs and wizards like for "User-defined continuations" on page 84 as well to make the symbols search easier.

NEW COLOR SCHEME

The color scheme of the icons and the themes are adjusted to our new company colors. The icons are still at the same position, but changed the color. Some icons are new because of the new mini toolbar. Themes are still available in dark and light versions as before.

CLICK ONCE INSTALLATION AND UPDATE

Tradesignal and the embedded Tradesignal DataConnect are now installed via Click Once. If you have Tradesignal already installed via the previous method InstallShield, please uninstall Tradesignal before the start of the Click Once Installation. A setup process after the initial installation will guide you through the setup of the datafeeds and the license.

If a new version of Tradesignal is available in the future, you will be notified in the application and will perform the update. It is not necessary anymore to download the update from our cloud service.

When a new empty workspace is opened, a variety of sample workspaces grouped by security type, region and market are shown.

To use one of them, just click on the image and the workspace is created. To save your changes in the workspace, please save the workspace.

DIFFERENT COLORS FOR DIFFERENT FIBONACCI LEVEL

All Fibonacci tools can now have different colors for each line/level. As default is still one default color specified, but you can change the color for each line in the mini toolbar easily. In order to set the color back to one default color, select *None* in the color picker for each changed line.
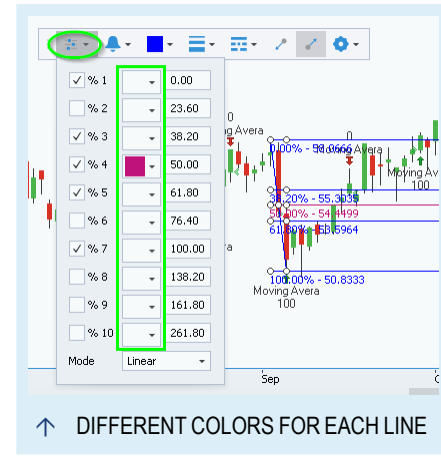
↑   DIFFERENT COLORS FOR EACH LINE

CUSTOM DISPLAY NAMES

For symbols, indicators and strategies you can define a custom display name in the Appearance settings. For example you can define a different name for one of two equal indicators in a chart or shorten the display name of the symbol within the legend. When using format characters like %n for the name or %lp for the period of the symbol the custom display name is updated after a symbol replacement. All available format characters are explained in the tool tip.

DEFAULT SYMBOL LISTS IN FOLDER

Symbols have to be part of a symbol list. If you move a symbol via drag-and-drop into a folder without a symbol list, Tradesignal creates automatically a default symbol list in this folder. In this way you do not need to create manually a symbol list at first, see "Symbol Lists" on page 62.

REPLACEMENT FOR JOULE SYMBOLS

It is now possible to replace only the parts of a Joule symbol with a compatible replacement or to replace the single contract with a compatible rolling contract, see "Symbol Replacement" on page 70. All others parts of the symbol stay the same.

↑   REPLACE PRODUCT

You can quickly replace the product of a symbol as well as the calendar and period. For example, you can replace a gas symbol with another gas symbol without searching for the new symbol in the symbol search or
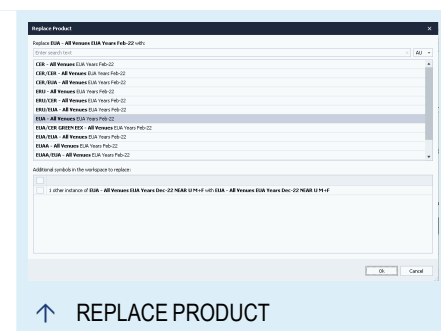
lists. Select **Replace > Replace Product**, **Replace > Replace Calendar Period** or **Replace > Replace Rolling** in the context menu of the symbol and the appropriate wizard appears.

In addition, all wizards offers a bulk replacement operation for every instance of the same symbol in the workspace and you can also replace the legs of a spread.

INDICATORS AND STRATEGIES

→ The indicator Order Book Depth is extended with the function Annotate to see the corresponding close and volume fields, see "Order Book Depth" on page 718.

→ The new indicator Trade Volume Magnitude plots the trade volume on a given bar and indicates if the trades were made on Bid or Ask side, see "Trade Volume Magnitude" on page 799.

→ The indicator Strategy Market Position is extended with a color inputs for the color of the band, see "Strategy Market Position" on page 787.

EQUILLA

→ The **DataOptions** meta property has a new value called **DataExtendedInlineHistory**. If the new value is specified, extended history for all inline instruments is requested.

→ A custom symbol list with alternate instrument properties, created via Equilla in the strategy code, can now be optimized with the optimizer. So it is possible e.g. to optimize in one go more then one period per symbol for a strategy.

→ The new **Annotate** function adds an annotation for the current bar. The function needs a name and a value. A grouping is optional. Annotations are shown e.g. in the data inspector and tool tip, see the Equilla help for Annotate.

→ To show an input from your Equilla code always in the new mini toolbar, please use the new **Prominent** attribute in the declaration of the input. Only inputs marked as prominent appear on the toolbar, see the Equilla help for Inputs.

→ The **NewInstrumentDefinition** function returns a modified version of the **InstrumentDefinition** for the bound data item and includes the period and optional an additional FID. You can use the

function to create variations of the parent instrument e.g. to forward the parent unit and currency to the inner instrument, see the Equilla help for NewInstrumentDefinition.

MISCELLANEOUS CHANGES

→ Tradesignal for the start-up and Tradesignal DataConnect now use named pipes instead of sockets for non-server mode to eliminate port dependency.

→ Tradesignal supports now Drag-and-Drop for symbols from Joule. If a symbol is dropped from Joule into an empty workspace or onto the background of the program, a new chart is created. This feature needs the latest version of Joule.

→ The predefined continuations and rolling contracts for Gas and Emission symbols from Joule are extended by symbols for each type of season and each quarter for Gas and for December only for emissions.

→ It is now possible to reload a workspace, if the needed data feed was not available at the opening of the workspace. Please wait until the data feed is connected and then reload the workspace, either via the **Reload** button in the toolbar or via F5.

→ The autosized width of a column in a correlation matrix after a scan can be defined in the settings: manual only, widest cell or widest header or cell, see "Correlation Matrix" on page 270.

→ Tradesignal uses now telemetry to support our development team for new features and bug fixes. The settings for telemetry are available in the "Tradesignal Options" on page 319.

→ Symbols (single or multiple selected) and symbol list from a predefined symbol lists can be copied to **My Symbol Lists** via copy-and-paste, see "Symbol Lists" on page 62.

→ You can now use **Alt** and the mouse wheel to scroll in the value axis. With **Crtl** in addition you can zoom and with **Shift** in addition you can scroll slowly.

GETTING STARTED

USER INTERFACE IN A NUTSHELL

When you start Tradesignal, the main user interface may look like this:
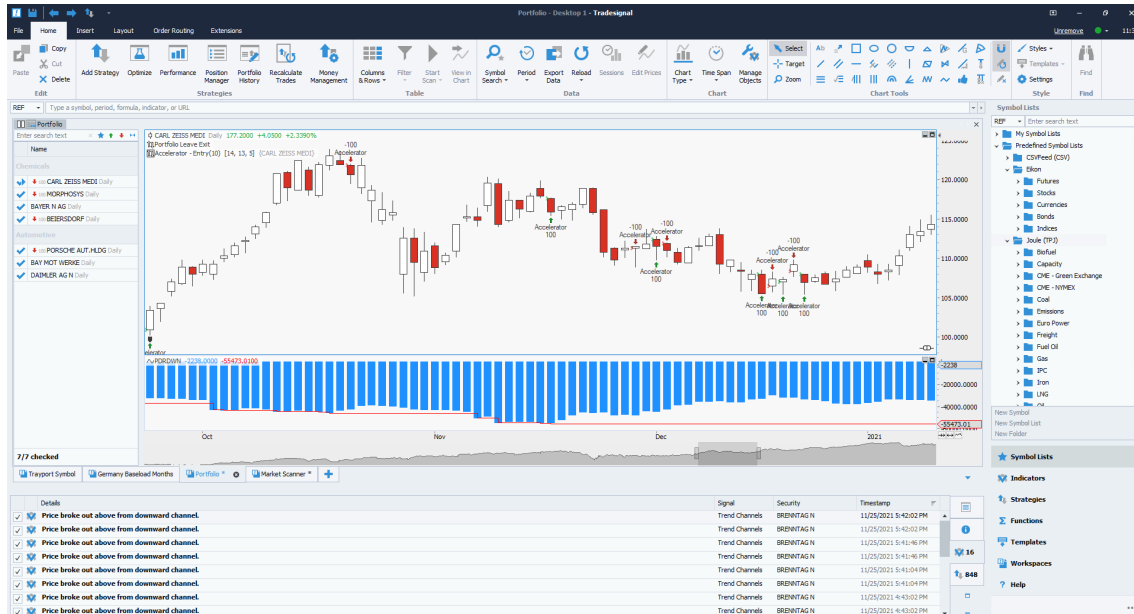
↑ THE TRADESIGNAL USER INTERFACE

→ At the very top area of the window, there is the title bar. It contains information about the current window and the "Quick Access Toolbar" on page 48.

→ Below the title bar, there is the "Toolbar" on page 42 (or Ribbon bar). It offers access to all basic functionality (Edit, Insert, Search...). The Toolbar is tabbed with different toolbars for different groups of functionality. New tab pages may appear depending on the document currently selected in a workspace.

→ To the right of the toolbar tabs, you can see the status of the connection to the data provider. A green icon shows that the connection is available, and a red icon signals a failed connection. To reconnect a failed connection, double-click the icon to open the Primary Data Feed (Online Data) Settings in the "Tradesignal Options" on page 319.

→ When you move the mouse pointer over the connection status, a pop-up opens. Here you can find information about

- → the used data provider

- → the current connection status

- → the connected server (depending on the used data provider)

- → the set timezone

→ To the right of the connection status, the time (depending on the time zone) is displayed. When scheduled jobs are active, an icon is displayed to the left of the connection status.

→ On the right, you can find the "Toolbox" on page 49. It offers access to symbols, properties, indicators, strategies, functions, templates, (saved) workspaces and help. Above the button area, the details are displayed, like symbol lists or the property manager for the selected elements.

→ In the middle, you find the open "Workspaces" on page 31. This is where document types like "Chart" on page 96, "Portfolio" on page 251, "Watchlist" on page 77, "Scanner" on page 71, indicators, strategies, and other information are displayed. The tabs below the currently visible workspace allow selection of which workspace to show.

→ Below the workspaces, there is the "Output Window" on page 331 which contains tabs for the "Alerts" on page 329 generated by strategies, tools and indicators.

USING MOUSE AND KEYBOARD

MOUSE HANDLING

The user interface is operated with the mouse.

→ Elements and buttons are activated or selected by clicking on them with the left mouse button (default). Typical activities are clicking on buttons to start activities, clicking on menu entries, or clicking on a drawing object to select it. When chart objects are selected, their properties become available in the "Mini Toolbar" on page 45.

→ To open the context menu of an element, click on it with the right mouse button (also called right-click). The context menu opens, and you can select entries in the menu by clicking the default (left) mouse button. Context menus are available almost everywhere, e.g. for documents, indicators etc.

→ Some elements or menus open with a double click. This means clicking two times in fast succession with the left mouse button. (If you click too slowly, you may simply open and close an element. In this case, try double-clicking again.) Typical double-click activities are opening symbol lists (instead of clicking on the plus symbol), or opening a symbol in a chart (instead of selecting Open in Chart from the context menu).

→ You can move elements around with the mouse. To do so, you need to drag-and-drop the elements. Click on the element with the left mouse button and keep the button pressed while moving the pointer to a new position (drag). Once there, release the mouse button (drop). Typical drag-and-drop activities in Tradesignal are applying indicators to symbol charts by dragging them into the chart, or drawing lines, squares etc. with the chart tools.

KEYBOARD HANDLING

Many elements can be opened/closed, or actions can be started, by pressing a certain keyboard shortcut. These shortcuts are notated in a special way, for example:

→ **Ctrl + S** means "press the **Crtl** key and the S key at the same time".

→ **Ctrl + Shift + F4** means "press the **Crtl** key, the **Shift** key and the **F4** function key all at the same time". (Function keys are usually in the top area of a keyboard.)

You can find a comprehensive list of all shortcuts in the chapter "Keyboard Shortcuts" on page 54.

HIDING USER INTERFACE ELEMENTS

You can hide the toolbar, the toolbox and the alert area.

→ To hide the Toolbar, click on the icon with the vertical arrow at the top right in the header bar. To display the hidden Toolbar temporarily, left-click onto one of the toolbar tabs that remain visible.

→ To hide the Toolbox, click on the icon with the small right-pointing arrow in the toolbox title. The toolbox is hidden to the very right, under a long button labeled with the currently

selected toolbox panel. Click on this button to temporarily open the toolbox, or click the left-pointing arrow button at the top of the bar to show the full toolbox once more.

→ To hide the alert area (which is situated in the lower area of the workspace), click on the button to the bottom-right of the pane, below the tabs. When hidden the alert area will be replaced with a small info icon next to the workspace tabs, click this to restore the alert pane. The alert pane can also be maximized using the button above the collapse button. You can find more information on alerts in the chapter "Alerts" on page 329.

IMPORTANT FEATURES TOUR

In this article you can find an overview of the most important Tradesignal functions. For detailed information, please follow the references to the respective articles.

CLASSIC CHART ANALYSIS

Tradesignal makes it easy for you to create charts for one or more symbols, indicators and strategies. The design possibilities are vast. In the following, some important features will be given.

You can find an introduction to the user interface in the chapter "User Interface in a Nutshell" on page 15.

↑   A CHART

CREATING A CHART

To open a new empty chart, click on the **Chart** button in the "Toolbar" on page 42. You can then add symbols to this chart, e.g. by dragging symbols from the "Toolbox" on page 49 into it.

You can also quickly open a chart for a symbol directly from the toolbar:

01. Click on the Symbol Lists button in the Toolbox.

02. Open a symbol list, e.g. the Nasdaq indexes, and look for the ".NDX".

03. Double-click on the entry. Alternatively, right-click on it and select **Open in Chart** in the context menu.

Alternatively, you can enter the symbol shortcut in the "Command Line" on page 38:

01. Enter the shortcut ".NDX" in the command line.

02. Select **New Chart** from the drop-down menu.

The data is displayed as a candlestick chart. You can change this default chart setting in the Tradesignal Options, see the chapter "Setting a New Default Chart Style" on page 106. The line and bar chart types are also available as default.

In general, many more chart types are available to you, like Forest, Equivolume, Kagi or Point&Figure.

> **Tip:** You can find a complete list of all available chart types in the chapter "Chart" on page 96.

On the top left in the (sub-)chart, you can find the chart legend. Here, information about the symbols, indicators, strategies, periods etc. is available. The chart legend offers a context menu in which you can find various functions, depending on the entry type.

↑ A CHART WITH LEGEND AND CONTEXT MENU
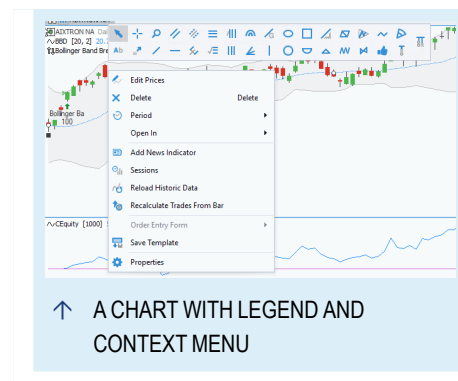
CHANGING THE PERIOD AND TIME SPAN

There are various ways to change the displayed data. In the toolbar, the buttons **Period** and **Time Span** are available. Click on the small arrows to open the respective button menus.

→ Keep the **Period** at **Daily**. With this setting, one bar (candlestick) is drawn per day.

→ For the **Time Span**, select **Current Year**, for example.

↑ EDITING THE PERIOD
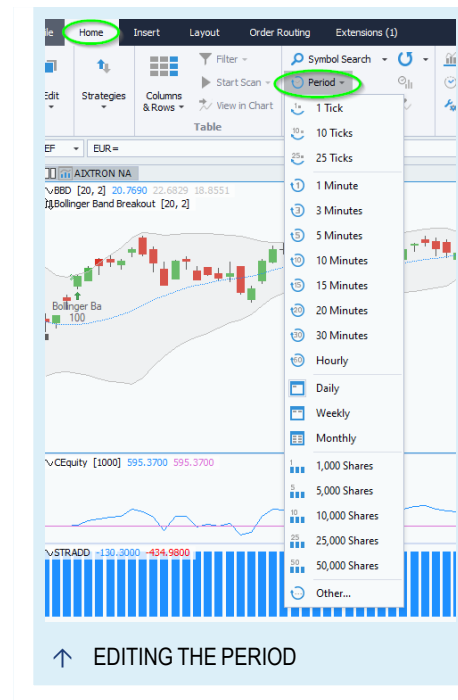
You can also change the displayed time span and prices by directly manipulating the axes with the mouse. To do so, click on the time axis with the right mouse button and keep it pressed while moving the mouse left and right. You can see that the axis is stretched and shrunk. The price axis can be changed accordingly. You can find more information in the chapter "Stretching/shrinking Axes" on page 101.

ADDING DRAWING ELEMENTS

In the chart tools you can find simple drawing elements like lines, circles and rectangles, but also tools with a calculation function, like the Fibonacci Retracements or Andrew's Pitchfork. You can find more information in the chapter "Chart Tools" on page 161.

↑ TREND LINE AND REGRESSION CHANNEL

01. Click on the symbol for the trend line in the toolbar.

02. With the mouse button pressed, draw a trend line between two points in your current chart. A line is drawn.

03. Now click on the symbol for the linear regression channel in the toolbar.

04. With the mouse button pressed, draw a linear regression channel from a low to a high in the chart. You can see that the midline and a regression channel are calculated and drawn; they change angle and width depending on the bars (candlesticks) that are included from the start to the end point.

Some drawing elements can be combined with the alert function. You can find more information in the chapter "Alerts" on page 329.

CHANGING THE CHART DESIGN

You can edit the details of the chart design, for example by changing the chart properties in the Home-Tab **Styles**.

However, you can also use one of the available chart styles to change the design extensively.

01. Click on the small arrow on the **Styles** button in the toolbar to open the button menu.

02. Select a style from the list, for example **Blue**. If you have drawing elements in the chart, you can see that changing the style also results in color changes for the drawn elements.

> **Tip:** You can find more information in the chapter "Settings" on page 157.

DISPLAYING SEVERAL SYMBOLS IN THE SAME WORKSPACE

You can display more than one symbol in the same workspace, e.g. as subchart. For that, it is important to have a look at the settings for subcharts in the "Tradesignal Options" on page 319.

↑   THREE CHARTS AS SUBCHARTS
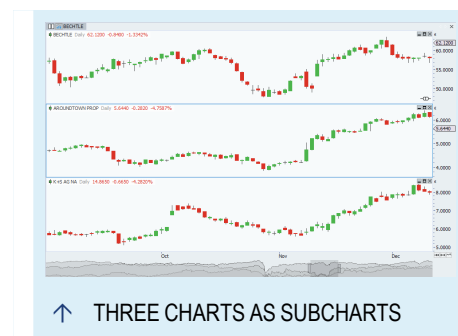
01. Open the file menu (above the toolbar in the Tradesignal window) and select the entry **Options**.

02. On the left, click on the entry **Advanced** and then check whether the setting **Instruments > Open symbols in a new subchart** is selected.

This entry has the following effect:

→ If no subcharts should be opened: If a chart with a symbol is displayed and you add a symbol by selecting **Add Symbol** in the context menu of that symbol, then the symbol is displayed in the same chart as the first symbol. This can make it hard to distinguish between the two quotations.

→ If subcharts should be opened: The added symbol is displayed as a subchart below the first symbol.

Subcharts share the same time and price axes. This has the advantage (or disadvantage) that all changes of e.g. period and time span apply to all subcharts.

> **Tip:** You can edit the period for a single symbol in the chart legend context menu.

You can also display several charts in one workspace. For this, simply add the symbol by selecting **Open in Chart** in the symbol context menu. This way, the chart opens with its own axes.

> **Tip:** You can find more information in the chapter "Chart" on page 96.

KEEPING THE SYMBOL OVERVIEW

You can see symbols and symbol lists by clicking on the button **Symbol Lists** (1) in the toolbox.

Symbol lists are sorted in groups. These are labeled with a folder symbol (2). Click on the plus symbol in front of it to display the symbol lists.

Symbol lists are labeled with a document symbol with a star (3). Symbols are labeled with a star (4).

The context menu offers a lot of functions for both. For example, you can open symbols in charts or in a market depth document. Symbol lists can be opened in a "Scanner" on page 71, "Watchlist" on page 77or a "Portfolio" on page 251.

On the top of the symbol lists is quick symbol search (5).

You can find more information in the chapter "Symbol Lists" on page 62 and the chapter "Symbol Search" on page 59.

ADDING SYMBOLS TO LISTS

Single symbols are always managed in symbol lists.
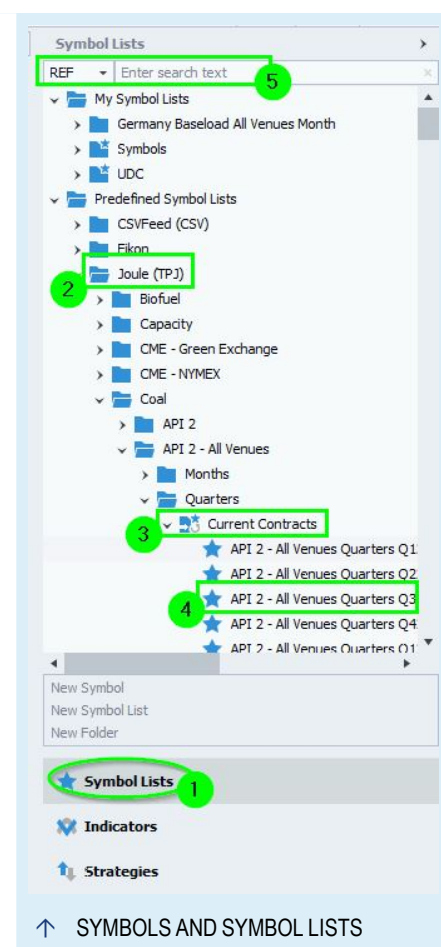
01. To add a new symbol, open the context menu of a symbol list and select **New Symbol**. The New Symbol wizard opens.

02. You can choose between three options. Select **A standard symbol (from the data provider)**.

03. The "Symbol Search" on page 59 opens. Search the symbol you want to add.

You can also add symbols to symbol lists by dragging symbols into them from other lists.

> **Tip:** You can find more information in the chapter "Add a Symbol to a Symbol List" on page 64.

CREATING A NEW SYMBOL LIST

You can create your own symbols lists, for example to have your favorites in one list.
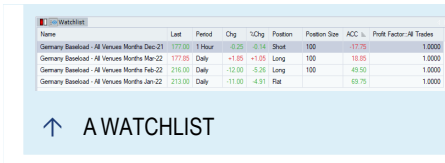
01. In the toolbox, click the **Symbol Lists** button and then on **New Symbol List** in the Related Task area. The Symbol List wizard opens. Select the option **User-defined Symbol List**.

02. The second window of the Wizard opens. Enter a name for the symbol list.

03. Click on **Add** to start the "Symbol Search" on page 59. Find the symbols, select them and add them to the list.

04. Click on **Done**. The new symbol lists appears in the toolbox.

> **Tip:** You can find more information in the chapter "Symbol Lists" on page 62.

USING A WATCHLIST

The Watchlist is optimized for monitoring symbol data in realtime. In combination with indicators (see below), alerts can be issued when certain data is "interesting" as defined by your indicators.

The easiest way is to open an existing symbol list in a Watchlist.

01. Right-click on a symbol list in the toolbox and select **Open in Watchlist** from the context menu. The Wizard opens.

02. You can add one or more indicators, for example the "Relative Strength Index".

03. In the next step, you can also add one or more strategies.

04. When finished selecting, click on **Done**.

Similarly you can open single symbols in the Watchlist.

To open an empty Watchlist, click on the **Watchlist** button in the toolbar.

You can sort the Watchlist columns by clicking on the respective column header. A small triangle appears (pointing up or down, depending on the sorting direction). To change the direction, click on the column header again.

Symbols can be copied from other tables into the Watchlist by using Drag-and-Drop, e.g. from the Scanner to the Watchlist. In a similar way, you can drag symbols from the Watchlist into a "Scanner" on page 71 or "Portfolio" on page 251.

01. Click into a table cell of the symbol you want to copy. A small plus sign and a rectangle appear under the mouse cursor.

02. Drag the cursor into the other table. The symbol is copied into the table.

> **Tip:** You can find more information in the chapter "Watchlist" on page 77.

SCANNING SYMBOLS

The Scanner helps you search the large number of symbols traded at international markets for profitable trading candidates.

In contrast to the "Watchlist" on page 77, the "Scanner" on page 71 offers no realtime information. It is therefore more useful for scanning large symbol lists for indicator or price patterns, for example overnight.

↑ SYMBOLS IN A SCANNER

Similar to the Watchlist, you can quickly fill the Scanner by calling up the context menu of a symbol or symbol list and selecting **Open in Market Scanner**.

As for a "Watchlist" on page 77, you can

→ open an empty Scanner via the toolbar

→ directly add indicators and strategies when creating a Scanner

→ copy symbols from the Scanner into other tables by using Drag-and-drop, or filling symbols from other tables into the Scanner

→ sort the columns in the Scanner by clicking on the respective column headers.

Tip: You can find more information in the chapter "Scanner" on page 71.

INDICATORS AND STRATEGIES

Indicators and strategies are the main themes in analyzing symbol quotations.

Alongside classic drawing tools like trend lines or channels, indicators help to classify trends or offer clear trading signals. In Tradesignal, you can use indicators with Charts, Scanners, Watchlists and more. Indicators can be combined, derived from each other, or calculated for more than one symbol.

Strategies combine indicators with entry and exit signals. This allows you to trade mechanical systems.

Tip: You can find more information in the chapter "Introduction to Functions, Indicators and Strategies" on page 369.

APPLYING AN INDICATOR TO A CHART

01. Open a symbol in a chart.

02. Click on the **Indicators** button in the toolbox.

03. Drag the indicator "Moving Average Exponential" onto the chart legend of the symbol. Alternatively, you can also select **Apply** in the context menu of the indicator.

In a similar way you can apply indicators to a "Watchlist" on page 77, "Scanner" on page 71 and "Portfolio" on page 251.

Tip: You can find more information in the chapter "Using Indicators" on page 372.

EDITING THE INDICATOR PROPERTIES

You can edit the properties of indicators.

→ Click on the indicator in the chart and the "Mini Toolbar" on page 45 is displayed. The common properties are now direct changeable and the changes are applied live in the chart.

For the "MACD" indicator in our example, you can set the **PeriodSlow** to "38" by clicking into the field and entering a number. You can also click on the spin buttons to increase or decrease the number.

APPLYING AN INDICATOR TO AN INDICATOR

You can apply a second indicator to the indicator used above, "Moving Average Exponential", for example via the command line.

01. Click on the *Moving Average Double Crossover* entry in the chart legend to select the indicator.

02. Enter the symbol shortcut *MACD* in the command line.

03. Select **Add Indicator** in the drop-down menu.

The MACD indicator is now applied to the Moving Average Exponential.

APPLYING STRATEGIES TO A CHART

Strategies are an important part of trading systems, since they combine indicators with entry and exit signals. This allows you to trade mechanical systems.

Strategies are applied similarly to indicators. You can apply strategies to "Chart" on page 96, "Watchlist" on page 77, "Scanner" on page 71 and "Portfolio" on page 251.

↑ APPLYING STRATEGIES

Here is an example that you can also use for the optimization below.

01. Open a symbol in a chart, for example a symbol of the Dow Jones group.

02. Click on the **Strategies** button in the toolbar.

03. Select the *Moving Average Double Crossover* strategy and drag it into the chart.

04. Click on the strategy in the chart and change the properties in the mini toolbar.

05. Set **PeriodFast** to *5* days and **PeriodSlow** to *10* days.

Now the strategy is set up.

Alternatively, you can add trading systems by clicking on the **Add Strategy** button in the Trading Systems group in the toolbar. A window opens in which you can find strategies sorted by subject, e.g. strategies for stops or position sizing.

Tip: You can find more information in the chapter "Using Strategies" on page 381.

OPTIMIZING TRADING SYSTEMS

Trading systems are often based on mathematical or statistical calculations and include many variables. The "Optimizer" on page 274 helps you to find good and stable parameter sets for your trading system.

↑ OPTIMIZER RESULTS

For the following example, please use the system you created in the previous section.

01. Click on the **Optimize** button in the toolbar.

02. Select the method **Brute Force**.

03. In the right field, select the parameter **PeriodFast**.

04. Remove it by clicking on the **<<** button in the middle of the window.

05. Select **PeriodSlow** in the field on the right and enter the start value *10* and the end value *50*.

06. Click on **Next**. Click on **Next** again (so that all available data is used for optimization) and finally click on **Optimize** in the last window.

The optimization starts. This may take some time, therefore a button Pause is available in the Optimizer group in the toolbar. Click on it to halt the optimization and to display the intermediate results.

When the optimization is finished, the results are displayed, in this case for optimizing the Moving Average Double Crossover strategy. During the optimization, Tradesignal has calculated and checked many possible parameter

combinations, and the result shows that certain settings for PeriodSlow would have been more profitable than others.

To apply the result of the optimization, for example the number for PeriodSlow with the highest profit, simply double-click on the row with the highest profit and confirm the warning with **Yes**.

Please remember that the optimization is always a backtest, e.g. working with the data of past trading periods. Therefore it is recommended to check the optimization results against current developments from time to time.

> **Tip:** You can find more information in the chapter "Optimizer" on page 274.

PORTFOLIO TRADING

Trading with a trading system of one or more symbols, or even several trading systems, is done most effectively by using the Portfolio function. With it, you can trade via a central account that includes settings for money and risk management. The Portfolio also allows you creating a global Performance Report.

↑ PORTFOLIO AND PERFORMANCE REPORT

In a similar way to the Scanner and Watchlist, you can open an empty Portfolio from the toolbar, or you can open symbols and symbol lists in a Portfolio by selecting **Open in Portfolio** from the context menus.

As for a Watchlist, you can

→ directly add indicators and strategies when creating a Portfolio

→ copy symbols from the Portfolio into other tables by using Drag-and-drop, or filling symbols from other tables into the Portfolio

> **Tip:** You can find more information in the chapter "Portfolio" on page 251.
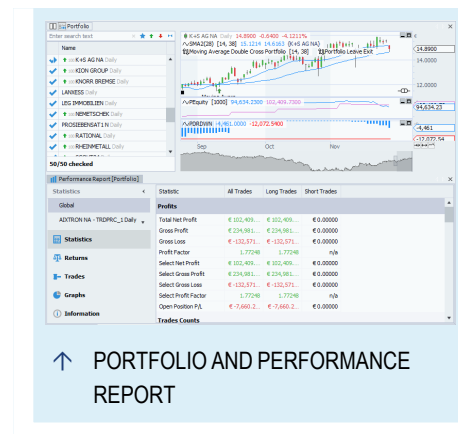
POSITION MANAGER

When trading a mechanical system, the
Position Manager offers a complete overview
over your current trading system activities. It
displays open, filled, and canceled orders and
your currently held positions.

You can open the Position Manager via the
button Position Manager in the toolbar.
However, there are only entries in the Position
Manager if a number of conditions have been
met.
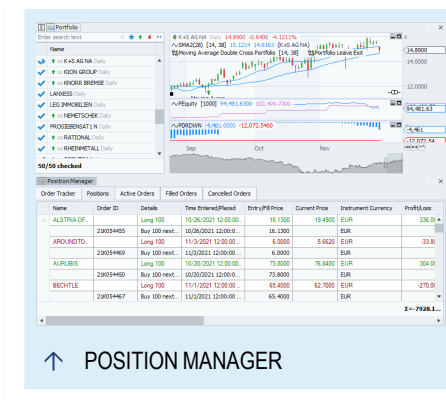
↑ POSITION MANAGER

> **Tip:** You can find more information in the chapter "Position Manager" on page 246.

The Position Manager is closely correlated with automatic order routing, see next
paragraph.

AUTOMATIC ORDER ROUTING

The automatic order routing function in Tradesignal allows you trading with a
more or less mechanical trading system connected to your broker. You can
decide if the orders are to be routed automatically or only with a manual
confirmation.

If you are using broker software without interfaces to Tradesignal, you can set up
the order routing so that the trading activity is only displayed in the Position
Manager. You can then enter the orders into the broker's software manually.

> **Tip:** You can find more information in the chapter "Automatic Order Routing" on page 307.

USING THE HELP BUTTON

With the help button in the *File* menu you can:

→ call up the help topics of Tradesignal

→ write an e-mail to support with necessary system information

→ show the application log file

→ get information about your current Tradesignal version

HELP LIBRARY

Show the online version of the help as found in the Toolbox "Help" on page 53. The help topics give you an overview of Tradesignal help. You can either manually search the tree structure for an article or you can use the input field to search for a specific keyword. In this case, a flat list of articles with those keywords is displayed. If you want to go back to the overview, click on the link Table of Contents.

GET SUPPORT INFORMATION

This function collects some data about your Tradesignal system and puts it into a ZIP file, so that it can be attached to your email to send to support. If the workspace is also important, please add the current open and selected workspace to the support information via the dialog. Please keep in mind, that the workspace has to be saved and focused. This data collection will help the support team solve your problem.

SHOW LOG FILE

Open the application log text file with detailed information.

ABOUT TRADESIGNAL

Shows you information about your Tradesignal installation.

USER INTERFACE

WORKSPACES

The workspace is the area of a software desktop in which documents are open and editable. Tradesignal workspaces provide many special functions to make using the software easier for you.

You can use workspaces for the following:

→ Editing and saving several charts at the same time

→ Arranging charts in groups

→ Saving different documents like charts, scanners, portfolios and editors as one workspace

→ Working with several desktops and monitors at the same time

WORKING WITH WORKSPACES

CREATING NEW WORKSPACES

Tradesignal always opens a new workspace if you start a new document on an empty desktop.

You can also use the following methods to set up new workspaces manually:

→ Press the **Ctrl + N**.

→ Click on **New** in the context menu of the workspace tab.

→ Click on the **plus** (+) button next to the workspace tabs at the bottom of the screen.

→ Click **New Workspace** on the bottom of the Workspaces Manager.

→ Click **File > Open > Open > Recent > Create new blank workspace**.

USE A SAMPLE WORKSPACE

When a new empty workspace is opened, a variety of sample workspaces grouped by security type, region and market are shown.

To use one of them, just click on the image and the workspace is created. To save your changes in the workspace, please save the workspace.
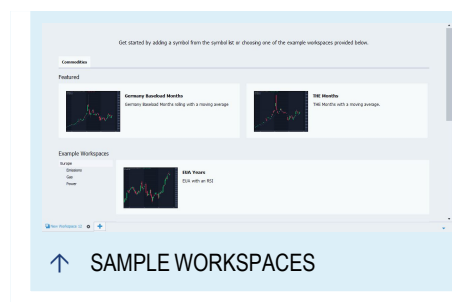
↑   SAMPLE WORKSPACES

OPENING WORKSPACES

There are multiple options for opening exisiting workspaces.

FROM THE WORKSPACES MANAGER

→ Open the **Workspaces Manager** in the toolbox and double-click a list entry.

→ Right-click on the name of a package and select either **Open all workspaces in this package** or **Open All Yellow Workspaces** (red, blue) to open the color-tagged ones only.

→ For color-tagging workspaces in the toolbox, see the chapter "Workspaces" on page 53.

FROM THE FILE MENU

→ Click *File > Open > Open > Recent* and select a workspace from the list of recently edited workspaces.

→ Click *File > Open > Open*, select a package and click on the workspace you want to open.

> **Note:** Press **Ctrl + O** and select one or more workspaces.

RENAMING A WORKSPACE

To rename a workspace, open the context menu of the workspace tab and click on **Rename**. A dialog opens in which you can enter a new name for the workspace.

CLOSING A WORKSPACE

To close a single workspace, choose one of the following options:

→ Press the **Ctrl + Shift + F4**.

→ Click on **Close Workspace** in the context menu of the workspace tab or in the file menu.

→ Click on the **x button** on the tab of the workspace.

To close all workspaces, click on **Close all Workspaces** in the *File* menu.

The last closed workspace can be quickly restored using the Restore Removed Items feature.

SAVING A WORKSPACE

To save workspaces, choose one of the following entries in the file menu:

→ **Save (Ctrl + S)** to save the current workspace (also available in the tab context menu).

→ **Save as** to save the current workspace under another name.

→ **Save all** to save all open workspaces.

Tip: You can find all saved workspaces in the "Workspaces" on page 53 Manager of the toolbox.

DELETING A WORKSPACE

You can only delete workspaces that have been saved. Otherwise you can simply close a workspace that is no longer useful.

To delete a saved workspace, open the **Workspaces** manager in the toolbox for a list of saved workspaces. Choose **Delete** from the context menu of an entry.

NAVIGATING THROUGH WORKSPACES

You can browse through open workspaces by pressing **Ctrl + W** for forward and **Ctrl + Q** for backward scrolling.

You can change the workspace sequence by clicking on a tab and drag-and-drop it to the left or right.

Note: If you want to see all open workspaces at a glance in multiple line, select Multiline in the context menu of the workspace.

DEFINING KEYBOARD SHORTCUTS

You can assign the keyboard shortcuts **Ctrl + 0 up to 9** for often used workspaces. For this, either:

→ Right-click on the workspace tab or

→ Right-click in the list of workspaces in the **Workspace Manager** in the toolbar and choose **Set Shortcut** to select a key command from the sub-menu.

ARRANGING WORKSPACES ON MONITORS

You can move a workspace to another monitor by clicking the workspace tab and drag-and-drop it to the target monitor.

You can also arrange the workspaces on more than one monitor by clicking on the Layout button in the toolbar and choosing up to ten monitors to distribute the workspaces.

ARRANGING WORKSPACES ON DESKTOPS

You can display workspaces on new desktops. Desktops are new windows that will appear in the Windows task bar. They only offer the context menus of workspace bar and chart.

To display a workspace on a different desktop, right-click the workspace tab, then choose **Change Desktop** from the context menu to select a desktop. Alternative you can drag-and-drop the workspace tab to the according desktop.

You can move the new desktop to other monitors by drag-and-drop.

LOCKING LAYOUT

To prevent unwanted changes in the layout design of your workspaces, either

→ click the **Layout** toolbar tab and click on **Lock**, or

→ right-click the workspace tab and choose **Lock** from the context menu.

Documents in a locked workspace cannot be changed in size, form or position.

To unlock the workspace, simply click on the toolbar button a second time.

CHANGE TAB COLOR

You can change the color of the workspace tabs. This makes it easier to visually differentiate between workspaces.

To change the tab color, right-click the workspace tab and choose **Tab Color** from the context menu. Pick a color or remove an unwanted color by choosing "No color".

PASSWORD PROTECTION

You can restrict access to a workspace by specifying passwords for opening and editing it by selecting the **Layout** toolbar tab and clicking on **Password Protect...**
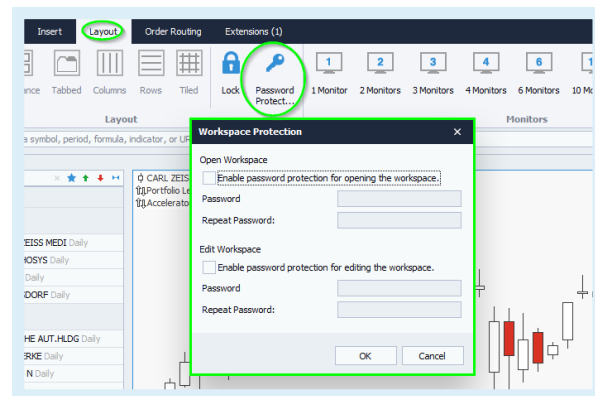
Caution: The password cannot be recovered, so if you lose it, you will not be able to edit/access your protected workspace anymore.

ORGANIZING DOCUMENTS IN WORKSPACES

DEFAULT LAYOUTS

Tradesignal offers several default layouts for documents on a workspace. You can find them by selecting the **Layout** tab on the toolbar.

Rebalance arranges the documents as homogeneous as possible on the workspace.

Tabbed arranges all documents in a single stack. Each document is accessible via a tab.

Columns arranges all documents in a row.

Rows arranges all documents in a vertical column.

Tiled generates a checker-board pattern of the open documents. The documents are arranged as homogeneously as possible in size and position.

Maximize (key F4) shows the active document in full size in the workspace. A double-click on the document tab will also maximize the document. Repeat to return to the former arrangement.

You can change the size of a single document by moving the frame of the document to the left, right, up or down.

MOVING DOCUMENTS

You can move documents across the workspace by drag-and-drop the document tab to a new position. During dragging, the position is marked by a black, rectangular frame.

In principle, documents can be placed to the left, right, above or below another document.

In addition, you can place a document over another one, which results in a document stack. In this case, two tabs will be offered in the document space. The following rules apply to stacked documents:

→ Click on the document tab to bring the document to the front of the stack, i.e. display.

→ Drag the document tab to the left or right to change the position of the document in the stack.

QUICK NAVIGATION BETWEEN DOCUMENTS

A document is activated when you click on its tab or frame.

You can also use keyboard commands for quickly switching between documents (especially when stacked):

→ **Ctrl + Tab** switches to the next document in the workspace. If documents are stacked, the next document in the stack is displayed.

→ **Ctrl + Shift + Tab** switches to the previous document in the workspace. If documents are stacked, the previous document in the stack is displayed.

COPY AND PASTE DOCUMENTS

In a workspace, you can copy documents and then paste them into another or the same workspace, duplicating it.

01. Activate a document by clicking on its tab or frame.

02. In the *Edit* group in the **Home** tab of the "Toolbar" on page 42, click on the button **Copy** (keyboard shortcut **Ctrl + C**).

03. If necessary, switch to another workspace and click on the button **Paste** (keyboard shortcut **Ctrl + V**).

SYMBOL LINKING

You can link several documents so that in all documents the same symbol or period is displayed. The links are connected to colors, which are displayed as small filled rectangles on the top left of the document tab.

You can find the linking possibilities in the context menu of the document tab:
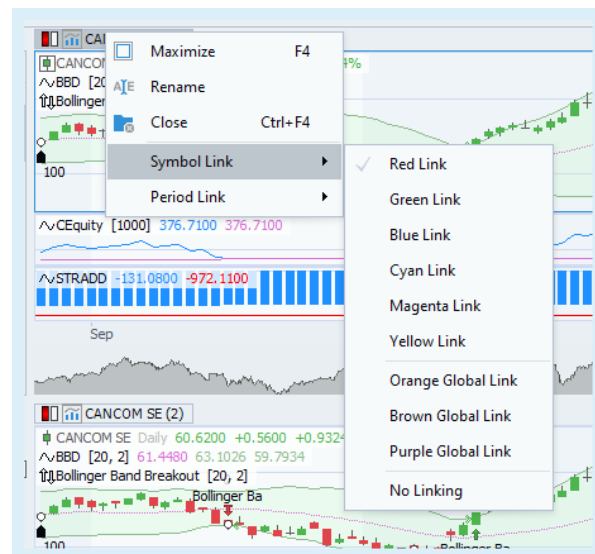
Symbol Linking When you change the symbol of a linked document, the symbol is changed in all linked documents.

Period Linking When you change the period of a linked document, the period is changed in all linked documents.

You have the choice between

→ Six normal links: these links only apply within the same workspace.

→ Three global links: these links apply across all workspaces.

Note that you can assign only one document and one period link per document.

→ **Global component linking** In addition to linking components within a single workspace, a component can be marked with a 'global link'. The effect of this is that whenever a globally linked item is changed (either the symbol or period replaced), all other components in all open workspaces with the same global link color will also be updated.

RESTORING REMOVED ITEMS

When a workspace or item in a workspace is closed, or an item from a chart or watchlist is deleted, a yellow pop-up window will be displayed at the bottom of the application window with a button labelled **Unremove**. This button may be clicked to undo the last remove/delete operation. Clicking the **x button** on the pop-up window will hide it without performing the undo operation (a new link labelled **Unremove** will instead be displayed to the left of the clock at the top right of the application window).

To only show the unobtrusive link at the top right of the application window, uncheck the corresponding box in the options found under *File > Options > Advanced > Workspaces*.

COMMAND LINE

The command line is a central control element of Tradesignal. From here, you can

↑   COMMAND LINE

→   create new documents like charts or scanners

→   apply indicators and strategies

→   open Internet pages

→   enter Equilla formulas

→   change the trading period of charts

→   enter Tradesignal-specific !Bang commands
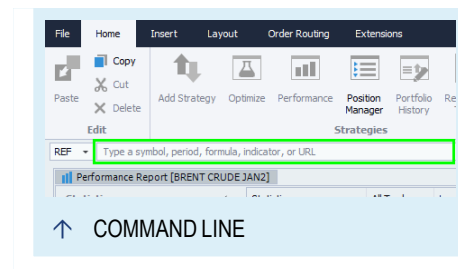
GLOBAL COMMAND LINE FUNCTIONS

The command line is context-sensitive, i.e. in the drop down menu of the command line, only functions available for the entered command or text are displayed. The most probable function is offered first.

↑   COMMAND LINE WITH MENU OPENED

→   Double-click in the command line field to open the drop-down menu. This can be useful e.g. if there is a symbol shortcut in the command line and you want to call up a function for it.
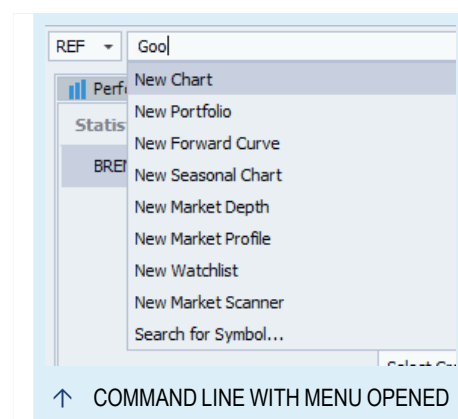
The command line "remembers" previous entries.

→ Click the small arrow to the right of the command line field to open the list of previous entries. You can delete the command line history in the "Tradesignal Options" on page 319.

On the basis of these remembered entries, the command line offers auto-completion upon entering letters. For example, if you have already entered "nsd.x" once, the next time you type "nsd" it will lead to the correct auto-completion.

SYMBOL SHORTCUTS

With a symbol shortcut you can open a "Chart" on page 96, a "Scanner" on page 71, a "Watchlist" on page 77 or a "Portfolio" on page 251. If such document types are already open, you can display the symbol in them. In case of an open chart, you can either substitute the displayed symbol or add a second time line to the existing chart.

Further commands can be entered along with the symbol shortcut:

Periods Enter a trading period right after the symbol shortcut. For example, ".DJI 60m" will open an hourly chart of the Dow Jones index. ".DAX 5kt" will open a chart where every bar is comprised of at most 5.000 ticks of the German DAX.

Data fields Enter a data field name, for example "CAT NYS bid" oder "CAT NYS ask". (Calls up data from the data provider.)

Units Enter a unit; this is especially useful in case of commodities and goods. (Calls up data from the data provider.)

Currency Enter the currency in which the symbol should be displayed. For example, enter "IBM NYS eur" to display IBM in euros. You can find the currency shortcuts in the symbol properties in the toolbox.

SHORT CODES OR NAMES FOR INDICATORS

Tradesignal indicators can be found by entering either their short code or a characteristic part of their name.

For example, entering "MOM" in the command line leads to the top suggestion "Add Indicator Momentum".

Entering "momentum" leads to the top suggestions "Add Indicator Momentum"and "Add Strategy Momentum Zero Line Crossover".

Tip: To find possible short codes, open the indicator window in the toolbox and hover over the list entries with the mouse. You can find the short code in the tool tip.

EQUILLA CODE

You can also enter "Equilla Basics" on page 397 directly in the command line (not available for trading commands like Buy or Short). This way you can easily set up new indicators or display an often-used spread between two symbols.

ENTER A FORMULA IN A CHART

You can create and apply indicator combinations by directly entering the formula in the command line. In that formula, you can combine Equilla functions and perform arithmetic operations. An editor is not necessary.

To apply the following examples, an instrument has to be open in a chart.

```
Example 1: Calculate a five day average of the trading volume and then the
ten day momentum:
Momentum( Average( Volume, 5 ), 10 )
```

```
Example 2: Calculate the absolute difference between the open and close,
then the 14 day RSI and then the exponential average for it over 5 days:
Drawline( XAverage( RSI( ABS( Open - Close ), 14 ), 5 ) )
```

```
Example 3: Display the difference between the close and the 200 day average
line:
Close - Average( Close, 200 )
```

DISPLAY SYNTHETIC TIME LINES, E.G. SPREADS

If you want to display the difference or ratio between two timelines, enter the two symbol shortcuts with the arithmetic operator between them. Instead of entering the symbol short cuts you can also drag the symbol from a symbol list, scanner, watchlist or an open chart to the command line.

For example, enter

```
fdax 2006m / fdax 2006z
```

and choose the option New Formula Chart to display the spread.

OPEN WEB ADDRESS

To open a web site, enter a website address in the command line and choose the option New Browser.

CHANGING THE TRADING PERIOD

This feature is available for every document with an editable time period. Enter one of the following period shortcuts in the command line and choose the option Set Intra-Bar Period:

m, monthly Display a monthly period.

w, weekly Display a weekly period.

d, daily Display a one day period. You can add a number, e.g. "2d" for a two day period.

h Display a period based on hours. A leading number has to be added, e.g. "3h" for a three hour period.

m Display a period based on minutes. A leading number has to be added, e.g. "5m" for a five minute period.

s Display a period based on seconds. A leading number has to be added, e.g. "6s" for a six second period.

t, tick Display a one tick period. You can add a number, e.g. "15t" for 15 ticks, or "90kt" for 90.000 ticks.

!!BANG COMMANDS

The so-called !!Bang commands in Tradesignal work in a similar manner to the traditional commands for command line interpreters. They always have a leading "!!" (2 exclamation marks) and offer you a quick way to access certain software functions.

!! Enter only the 2 exclamation marks in the command line to open a list of all available Bang!! commands.

!!add Adds a symbol to an open document in the workspace. Example: "!!add .dax" adds the dax in a Chart, Scanner, Watchlist or Portfolio.

!!close + option - "!!close d" Closes the active document, "!!close w" closes the active workspace and "!!close all" closes all workspaces and documents.

!!eval + formula name Adds an Equilla formula in the chart. Example: "!!eval open of .dax" adds the timeline for the dax open to a chart.

!!evalseries + formula series name Adds an Equilla formula series to a chart.

!!log Opens the Tradesignal log file which contains important information about the program status and error messages.

!!new + type shortcut (+ content) Opens a new document. For most documents, the content, e.g. a symbol or web address, has to be given. The following shortcuts are available: b - browser, c - chart, f - Equilla function, i - indicator, m - Scanner, o - Portfolio, p - market profile, s - strategy, t - Position Manager, v - Watchlist, w - workspace.

!!replace + symbol shortcut Exchanges the symbol in the active chart with the symbol given in the command. Example: "!!replace .dax".

!!replaceall + old symbol shortcut + new symbol shortcut Exchanges the old symbol in all charts with the new symbol. Example: "!!replaceall ADS GER".

!!set + document property Changes the property settings of a document. Example: "!!set historylength 100" for a chart.

!!setall + document property Changes the property settings of all documents in which this property is applicable. Example: "!!setall historylength 100" for all charts.

TOOLBAR

In Tradesignal, the classic menu is substituted with a ribbon-style toolbar. There are multiple tab-pages of toolbar buttons and menus organized according to general functionality.

↑ TOOLBAR
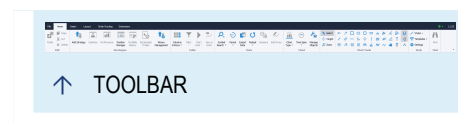
→ The first tab is the *File* menu, that will show the backstage view of the application when selected. The backstage view is an interactive menu that contains all functions that operate on a workspace as a whole (for example printing).

→ The *Home* tab contains the majority of functions that pertain to the contents of a workspace.

→ The remaining tabs contain the functions implied by their title. *Insert* for commands concerning inserting content into a

workspace. *Layout* for workspace layout commands. *Order routing* for functions concerned with order routing.

→ The final tab *Editor* will only appear if a text editor is selected in a workspace. This tab has all functions concerned with editing Equilla or HTML source code and debugging Equilla content in charts. See "Equilla Debugger" on page 401 for more information.

→ Some buttons open menus that offer further functions. You can recognize these by the small black arrow below the buttons.

→ The arrangement of the buttons in the toolbar changes depending on the monitor or program window size. Therefore, either more buttons or fewer buttons (but with menu functionality) are visible.

→ For many functions, you can open a help topic. The help is available via the key **F1** if the tool tip says that there is a help file for this feature. The help topic is then displayed in the internal browser.

→ You can toggle the Toolbar with the keyboard shortcut **Ctrl + F1**, by double-clicking on a Toolbar tab or by clicking the small arrow on the far right of the toolbar tabs. When collapsed the toolbar can be temporarily shown by clicking on one of the toolbar tabs.

TOOLBAR TABS AND GROUPS

The functions displayed on a Toolbar tab are further organized into named groups to improve identification. The following groups are available by toolbar tab:

FILE TAB

This tab shows the backstage view, which combines typical file operations like save and open with interactive inline content organized as sub menus:

Recent List of recently opened workspaces.

Print Print preview and printing.

Save & Send Functions to export the current workspace in various ways and formats.

↑ FILE TAB
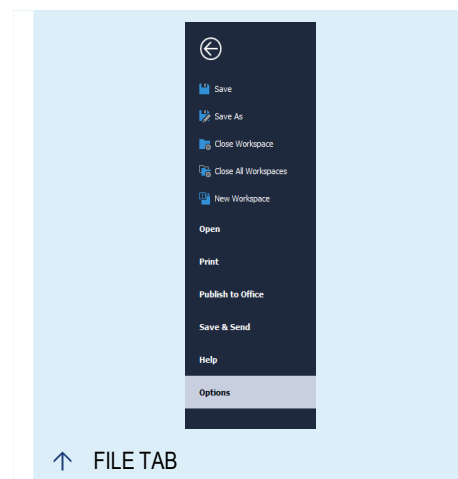
Help The application Help menu, see "Using the Help Button" on page 29.

Options All application configuration options, see "Tradesignal Options" on page 319.

HOME TAB

Edit The typical clipboard functions like copy and paste.

↑ HOME TAB

Strategies Functions to add and augment trading system components.

Table Functions concerning table-based elements.

Data Functions associated with searching for - and manipulating - financial data.

Chart Functions concerned with chart document.

Chart Tools Drawing tools for use in charts.

Favorites Any indicators with short codes that have been color-tagged will be listed here.

Style Operations for creating and applying styles and templates to workspace elements.

Find Search for items withing open workspace elements.
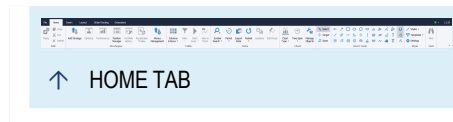
INSERT TAB

Charts Chart-like items that can be inserted into a workspace.

↑ INSERT TAB

Tables Table-based items that can be inserted into a workspace.

Trading Trading-system related elements.

Research Research tools.

Developer Developer specific tools.
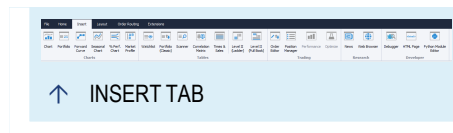
LAYOUT TAB

Layout Functions to change the layout of the current workspace

↑ LAYOUT TAB
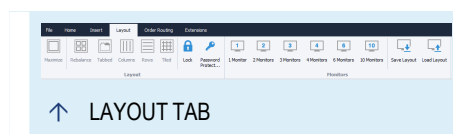
Monitors Options to utilize multiple monitors and to save and load different layouts for the use of multiple monitors.

ORDER ROUTING TAB

Automatic Order Routing Functions to control and configure automatic order routing.

Order Entry Form Access to "Manual Order Routing" on page 317 functionality.

↑   ORDER ROUTING TAB
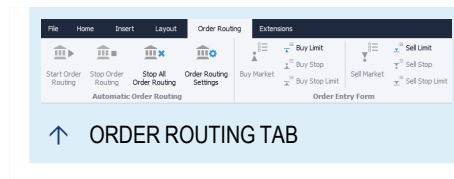
EDITOR TAB

Edit The typical clipboard functions like copy and paste.

Text Editor Functions found in a typical developer text editor

↑   EDITOR TAB

Export Options to export an Equilla script in various ways.

Find Typical search (and replace) operations.

Debug Commands to control the "Equilla Debugger" on page 401.

Breakpoints Set and manage breakpoints for use when debugging.
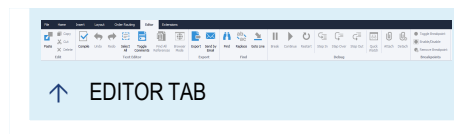
MINI TOOLBAR

The mini toolbar is the place to change properties of any item quick and easy. The mini toolbar is shown in nearly every type of charts and tables like scanner, watch list. All changes are applied live. Additionally, the mini toolbar is shown in each workspace individually, also on another desktop.

↑   EXAMPLE OF THE MINI TOOLBAR IN A CHART

MINI TOOLBAR IN CHARTS

If you click on any item in a chart, the mini toolbar is shown automatically and the most common used properties are adjustable right away in the mini toolbar. Most of the properties have a tool tip which shows further information about the property. Hex codes for colors can be edited via copy-and-paste.

Within the mini toolbar, settings are available for Symbols, such a chart type, period and used colours, please see "Symbol Properties in the Mini toolbar" on

the next page. For tools, settings are also available, including colors, line styles and alerts, see "Chart Tools" on page 161. Settings are also available for Indicators and Strategies, such as inputs, colors and line styles, see "Using Indicators" on page 372 and "Using Strategies" on page 381.

If you need an overview of all properties, please click on the gear (1) and change the properties as wished. The changes are also applied live in the chart.

With a click on the little eye (2) you can hide elements in the charts. Hidden elements are still calculated but their output is not shown. If the element has connected tools, the tools are also not shown anymore. The symbol in legend of the hidden element is crossed out. With one more click on the eye the element is shown again.

↑   OVERVIEW OF ALL PROPERTIES (1) AND HIDE ELEMENT (2)

General "Settings" on page 157 and "Money Management" on page 236 are now accessible via the Home-Tab in the "Toolbar" on page 42.

However, you can activate the deprecated property inspector in the Advanced area of "Tradesignal Options" on page 319.

SYMBOL PROPERTIES IN THE MINI TOOLBAR

Click on the symbol name or the bars to edit the symbol properties. Depending on the symbol in the chart, you can do the following:

→   Display the trading volume and define colors for rising/falling

→   Define the colors of candles, bars etc. in the chart

→   Set other properties, e.g. "Open Interests" for Futures

In the mini toolbar of the symbol you can find the following parameters.

→   Chart Type, see "Chart" on page 96

→   Period, see "Time Spans and Periods" on page 218

→   FID, field of the symbol

→   Appearance of the symbol like Bullish/Bearish Colors, Line Color

If you need an overview of all properties, please click on the gear and change the properties as wished.

GENERAL SETTINGS

Scale Align Select whether scales should be displayed left, right, or left and right.

Scale Labels Select whether the current price should be displayed as a special label on the scale.

Legend Here you can set the legend (top left of the chart) to either visible or hidden (invisible).

Display Units Here you can change the display units, e.g. with how many decimal places or fractions the prices should be displayed. The default display unit will be read from the symbol properties. You can customize the default display unit via sessions.

VOLUME PROPERTIES

Volume Bars Select whether the volume should be displayed as a forest (histogram) chart on the bottom of the chart.

Color Basis Select what should determine if a volume bar is shown as rising or falling

Rising / Falling Color Here you can set the colors for the volume bars.

INSTRUMENT PROPERTIES

Depending on the chart type, additional parameters may be available.

FID Here you can set which fields (Last, Bid, Ask) are used for chart calculation.

Unit Here you can change the unit, e.g. Barrel, Bushel etc. Whether this option is available depends on the used data provider.

Currency By default, the currency related to the exchange on which the symbol is traded will be displayed; you can change the default currency to your preferred one.

Exchange Displays the exchange at which the symbol is traded.

Data Quality Displays whether the data is realtime or delayed.

Expiry Date Displays the date, when the contract will expire.

PERCENT PERFORMANCE

In this group are "Percent Performance" on page 154 properties for a specific symbol. This allows you to enable it only for certain symbols.

APPEARANCE

In an additional area, you can find parameters depending on the chart type, e.g. bullish and bearish color settings.

MINI TOOLBAR IN TABLES AND OTHER ITEMS

The mini toolbar is also used in tables like "Scanner" on page 71, "Watchlist" on page 77,"Correlation Matrix" on page 270 and "Market Depth" on page 90 and other items like "Portfolio" on page 251, "Position Manager" on page 246 or "Optimizer" on page 274. The

↑   EXAMPLE OF THE MINI TOOLBAR IN A WATCHLIST

handling of the mini toolbar is the same as for charts. For more information, please check the help article of the specific item.

If some settings are not part of the mini toolbar, you find all settings via the gear in **Manage Objects** in the home tab in the toolbar.
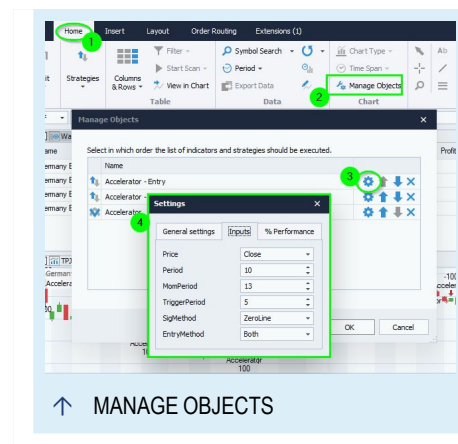
↑   MANAGE OBJECTS

QUICK ACCESS TOOLBAR

The Quick Access Toolbar allows you to create a personalized toolbar comprised of buttons and menus found on the various Toolbar tabs. The Quick Access Toolbar can be displayed above or below the main Toolbar by using the option available in the context menu by right-clicking on the Quick Access Toolbar.

ADDING ITEMS

Items may be added to the toolbar either by

→   right-clicking on the desired item in the main Toolbar and selecting the option **Add to Quick Access Toolbar**, or
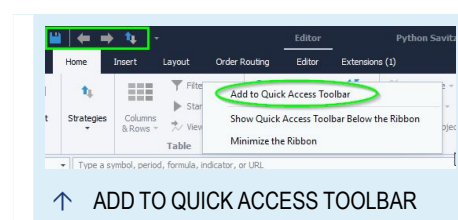
↑   ADD TO QUICK ACCESS TOOLBAR

→ using the + button in the tree of commands found in the options under *File > Options > Personalize > Ribbon Toolbar*

Some items may not be added to the Quick Access Toolbar. These items will have the **Add to Quick Access Toolbar** option disabled in their context menu.

REMOVING ITEMS

Items may be removed from the Quick Access Toolbar by either

→ right-clicking on the desired item on the Quick Access Toolbar and selecting the option **Remove from Quick Access Toolbar**, or

→ using the **x button** on the desired item in the **Toolbar Items** list found in the options under *File > Options > Personalize > Ribbon Toolbar*

REORDERING AND GROUPING

Items in the Quick Access Toolbar may be reordered and/or grouped using the **Toolbar Items** list in the options under *File > Options > Personalize > Ribbon Toolbar*. The up and down arrows against an item may be used to reposition that item. The **Begin Group** box may be checked to inset a group separator before the selected Toolbar item.

TOOLBOX

The toolbox on the lower right grants you access to many key features of Tradesignal, namely symbol lists, indicators, strategies, (Equilla) functions, templates, and workspaces.

↑ TOOLBOX
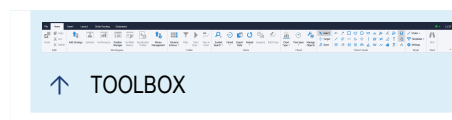
GENERAL FEATURES

CONTEXT MENUS

In all windows you can right-click on a list entry to open its context menu. There, you can find functions like applying, editing, renaming, deleting, etc. You can also tag list entries with colors to find them more easily later.

RELATED TASKS AREA

Here you can find links to related tasks. These depend on the active tool.

→ For symbols, the available links are **New Symbol List**, **New Symbol** and **New Group** (see the chapter "Symbol Lists" on page 62).

→ For indicators, strategies, functions and workspaces, you can find the link **New...** (indicator, strategy etc.) and links for "Package and File Management" on page 334 (**New Package** and **Show/Hide Packages**). Packages correspond to folders on your computer and should make tool handling easier for you.

→ Templates are saved from charts (see the chapter "Saving a Template" on page 223), so only links for Package Management are available here.

Note: In lower version of Tradesignal were the properties part of the toolbox which can be shown via "Tradesignal Options" on page 319 again.

EDIT THE TOOLBOX APPEARANCE

You can also decrease and increase the number of tool buttons, as well as completely removing tools from the toolbox. Click on the small arrow head on the lower right to open the context menu of the toolbox. You have the following options:

Show More Buttons Display one of the small buttons below the toolbox as a regular tool button. You can repeat this until all tools are shown as tool buttons.

Show Less Buttons Display one of the tool buttons as small symbol button below the toolbox. You can repeat this until all tool buttons are shown as small buttons.

Add or Remove Buttons Here you can completely suppress the display of tools in the menu. For this, click on the respective entries in the subordinate menu to switch the tools on or off.

Alternatively you can reduce/expand the display of the tool buttons by dragging the separator between the button menu and the display window upwards or downwards. For this, position the mouse cursor on the dotted grip bar above the tool buttons so that it changes into a double arrow. Then drag the grip bar up or down and release the mouse button when done.

REPOSITIONING TOOLBOX ELEMENTS

Toolbox buttons can be reorganized by drag-and-drop them either

→ vertically within the same list of buttons, or

→ to the opposite edge of the application window, to split the toolbox on both left and right sides

To drag all toolbox elements to the opposite side, hold the **Ctrl** key while dragging a single button.

COLLAPSING AND TEMPORARILY SHOWING THE TOOLBOX

You can hide and show the toolbox by pressing the small arrow button to the right of the toolboxes title.

To hide and show the properties window directly, press **Ctrl + F2**.

When the Toolbox is collapsed, it can be temporarily shown by clicking on the collapsed toolbox in any location other than the arrow button used to restore the toolbox.

To temporarily show a specific toolbox pane, click the corresponding icon.

DELETING AND RESTORING ITEMS

If a toolbox allows the deletion of its contents, normally using the right-click context menu and selecting **Delete**. The most recently deleted item may be restored clicking on the **Unremove** button that is either displayed in a yellow pop-up at the bottom of the application window, or the **Unremove** link shown to the left of the clock at the top right of the application window. Please note, only the most recently deleted item may be restored in this way.

> **Note:** If an item that is deleted has a corresponding file (for example workspace, indicators, strategies, functions and templates), the deleted file will be moved to the system Recycle Bin if it was stored on a file system that supports the Recycle Bin function.

NAVIGATING TO AN ITEM IN WINDOWS EXPLORER

If an item or folder in the Toolbox has a corresponding file (e.g. workspaces and indicators), the right-click context menu for the item or folder will have an option called **Open In Windows Explorer**. Clicking on this option will open the file or folders location in Windows Explorer.

SELECTING MULTIPLE ITEMS AT ONCE

To perform an operation on multiple items at once, first select the items by either:

→ holding down the Ctrl key and clicking on each item, or

→ clicking on the first item to select, then hold down the **Shift key** and click on the last item to select all items between these two items.

Once multiple items have been selected, the right-click context menu will show only those operations that are applicable to multiple selected items. Typically allowed operations include: deleting the selected items, moving the selected items between folders, color tagging all the items, or opening the items in various ways within a workspace.

AVAILABLE TOOLS IN THE TOOLBOX

SYMBOL LISTS

Here you can find the list of symbols for the available securities. Read the chapter "Symbol Lists" on page 62 for more information.

INDICATORS

Here you can find all indicators that were delivered in the Tradesignal data folder, as well as all indicators you may have saved in other packages. Read the chapter Indicators for more information. A search box at the top of the pane allows searching by title keywords or indicator short code.

STRATEGIES

Here you can find all strategies that were delivered in the Tradesignal data folder, as well as all strategies you may have saved in other packages. Read the chapter Strategies for more information. A search box at the top of the pane allows searching by title keywords or strategy short code. Strategies are by default filtered based on the content, so that e.g. are for Portfolios only Portfolio strategies shown. To see all strategies please disable the filter at the top of the list.

FUNCTIONS

Here you can find all functions that were delivered in the Tradesignal data folder, as well as all functions you may have saved in other packages. Read the chapter Functions for more information. A search box at the top of the pane allows searching by title keywords.

TEMPLATES

Here you can find templates, in which graphical properties and information about indicators and trading systems are saved. Via the context menu, you can directly

call up a template. It will contain the security data with which it was originally saved. Read the chapter "Using Templates" on page 223 for more information. A search box at the top of the pane allows searching by title keywords.

WORKSPACES

Here you can find saved workspaces. Via the context menu you can assign up to ten "Keyboard Shortcuts" on the next page. Read the chapter "Workspaces" on page 31for more information. A search box at the top of the pane allows searching by title keywords

HELP

The help is divided into categories that are displayed as main entries. Under most main entries, sub-topics are available. At the top of the help window you can find an input box. Here you can enter a search term for a full-text search in the help. Alternatively, double-click on a list entry to open the topic in the browser window. Via the context menu, you can open the help topic in a new browser window. For this, click on **Open Link in new Browser**. The new browser window is then stacked upon the first one (see also the section Move Documents in the Workspace).

COLOR-TAGGING ENTRIES

Except for symbols and properties, you can color-tag entries in the Toolbox. Color-tagged entries will appear on top of the list, sorted by the three colors yellow, red, and blue.

To assign a color tag, right-click on an entry and select **Yellow Tag** (red, blue) from the context menu.

To remove the tag again, click on **No Tag**.

If a color-tagged indicator or strategy also has a Short Code set, this item will be displayed in the Toolbar in the Home > Favorites group. Options to configure this feature can be found in the options under *File > Options > Advanced > Indicators & Strategies*.

DEFAULT SETTINGS

SAVING, RESTORING AND RESETTING DEFAULT SETTINGS

Saving default settings is easy possible in the context menu of every property which have a default setting.

↑ DEFAULTS IN MINI-TOOLBAR
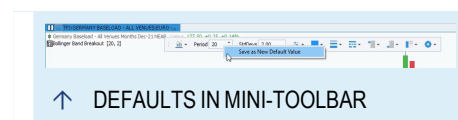
Most of the time inputs can be saved as defaults right away in the "Mini Toolbar" on page 45. Colors are saved as default in the mini toolbar after chosen from the color picker.

In other dialogs like "Money Management" on page 236 or "Settings" on page 157 please also save defaults via the context menu.

DEFAULT SETTINGS IN THE TRADESIGNALOPTIONS

Not all settings can be saved like this:

→ Some chart settings are done in the "Tradesignal Options" on page 319, like the history length, the default chart type etc.

→ The standard period and other user interface settings are entered in the Tradesignal Options.

↑ DEFAULTS IN MONEY MANAGEMENT
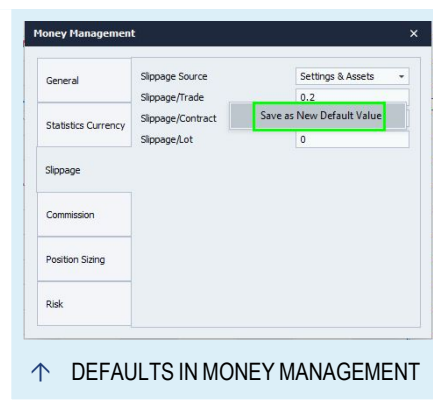
Some settings also do not make much sense as a default, like the value for a stop line.

To restore the original default settings of your Tradesignal installation, click on the **Restore Default Settings** button in the Tradesignal Options.

KEYBOARD SHORTCUTS

Many functions in Tradesignal can be called up by using keyboard shortcuts. You can find a complete list of all shortcuts in the following tables.

GENERAL APPLICATION

Description	Keyboard Shortcut
Help	F1
Jump to Command Line	F2
Start Symbol Search	F3
Start Print Preview	Ctrl + P
Open / Close the toolbar	Ctrl + F1
Delete text, documents, or elements in documents	Del

NAVIGATING IN THE CHART

Description	Keyboard Shortcut
Move up value axis	Arrow up or Alt + mouse wheel up
Move down value axis	Arrow down or Alt + mouse wheel down
Move date axis to the right	Arrow right or mouse wheel up
Move date axis to the left	Arrow left or mouse wheel down
Zoom in value axis	Shift + Arrow up or Alt + Shift + mouse wheel down
Zoom out value axis	Shift + Arrow down or Alt + Shift + mouse wheel up
Zoom out date axis	Shift + Arrow right or Ctrl + mouse wheel down
Zoom in date axis	Shift + Arrow left or Ctrl + mouse wheel up
Page up value axis	Ctrl + Arrow

Description	Keyboard Shortcut
	up
Page down value axis	Ctrl + Arrow down
Page date axis to the right	Ctrl + Arrow right
Page date axis to the left	Ctrl + Arrow left
Toggle between subcharts	Page up / Page down
Jump to the beginning of the chart	Pos1
Jump to the end of the chart	End
Magnetic mode for drawing tools	F6
Show standard time span	F8
Show complete time span	Shift + F8

WORKSPACES

Description	Keyboard Shortcut
Arrange workspaces	F9
Go to previous workspace	Ctrl + Q
Go to next workspace	Ctrl + W
Toggle between full view (maximized) and normal view	F4
Reload data (e.g. chart, scanner, browser)	F5
Reload data for all workspace elements	Ctrl + F5
Go to next workspace element	Ctrl + Tab
Go to previous workspace element	Ctrl + Shift + Tab
Open new workspace	Ctrl + N

Description	Keyboard Shortcut
Create new Equilla strategy	Ctrl + Shift + N, S
Create new Equilla indicator	Ctrl + Shift + N, I
Create new Equilla function	Ctrl + Shift + N, F
Open dialog for opening workspaces or packages	Ctrl + O
Save workspace	Ctrl + S
Close active workspace element	Ctrl + F4
Close active workspace	Ctrl + Shift + F4

CLIPBOARD

Description	Keyboard Shortcut
Select all (for text, Equilla code, tables)	Ctrl + A
Copy selected document, text, Equilla code or table element	Ctrl + C
Cut selected document, text, Equilla code or table element	Ctrl + X
Insert clipboard contents into active document	Ctrl + V
Repeat last clipboard action	Ctrl + Y
Undo last clipboard action	Ctrl+ Z

PROGRAMMING AND DEBUGGING

Description	Keyboard Shortcut
Compile Equilla code	F7
Toggle comments for the selected code	Ctrl + K, C

Description	Keyboard Shortcut
Search for text	Ctrl + F
Search and replace text	Ctrl + H
Jump to a specific line	Ctrl + G
Pause debugger	Pause
Resume debugger	F5
Restart debugger	Ctrl + Shift + F5
Step over	F10
Step in	F11
Step out	Shift + F11
Quick watch	Shift + F9
Toggle breakpoint	F9
Enable/disable breakpoint	Ctrl + F9
Open related function	F12
Save indicators, strategies or Equilla functions	Ctrl + Shift + S
Show all available functions	Ctrl + Space
Show all available variables for a function	Ctrl + Shift + Space

FINDING AND HANDLING SYMBOLS

SYMBOL SEARCH

The symbol search is a useful tool to keep an overview of all the securities available on markets around the world.

QUICK SYMBOL SEARCH

A quick symbol search is accessible above of the "Symbol Lists" on page 62 in the "Toolbox" on page 49 on the right side. The search finds symbol folder as well as single symbols. First please select the datafeed where you want to search the symbol.

↑   QUICK SYMBOL SEARCH
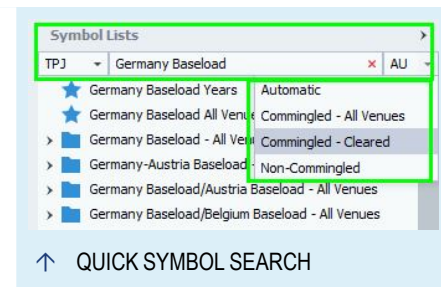
In addition, a filter can be applied to the results: Automatic, Commingled - All Venues, Commingled - Cleared and Non-Commingled.

SYMBOL SEARCH IN THE TOOLBAR

The following options are directly available from the Symbol Search button menu:

↑   SYMBOL SEARCH BUTTON MENU

→ **Add Symbol** Search for a single symbol or assemble symbol lists with securities of similar categories, see below.

→ **Add Formula Symbol** Add a symbol based on an Equilla formula, see "Create Formula Symbols" on page 67.

→ **Add User-defined Continuation Symbol** See "User-defined continuations" on page 84

→ **Add Rolling Forward Symbol** See also "User-defined continuations" on page 84. (For this option to be available, you need to have a DataConnect-based feed.)

→ **Add Combined Symbols** Assemble a new symbol from several existing symbols, see "Create Combined Symbols" on page 68.
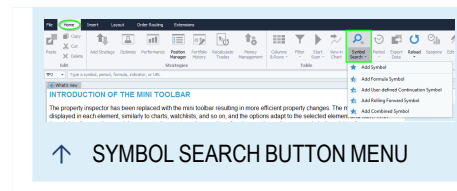
THE LOOKUP SYMBOL WINDOW

There are several ways to open this window:

→ Click the **Symbol Search** button in the toolbar and select **Add Symbol**.

→ Press **F3**.

→ Open the context menu of a symbol list and select the entry **New Symbol**, then the option **Standard Symbol**.

→ In the toolbox, select the datafeed and type in your search term. You can use the whole name or even only parts of it.
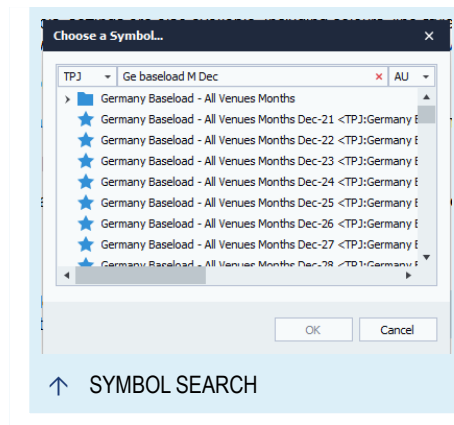
The Lookup Symbol window opens in which you can further define your search terms. Please note that the available search options depend on the used data provider.

↑ SYMBOL SEARCH

USING THE SEARCH RESULT

In the next window, you have the choice of actions to perform with the symbol. Note that depending on the selected symbol, not all actions might be available.

In principle, you can open the following new documents: "Chart" on page 96, "Forward Curve" on page 153, "Seasonal Chart" on page 155, "Market Depth" on page 90.

↑ SYMBOL ACTIONS
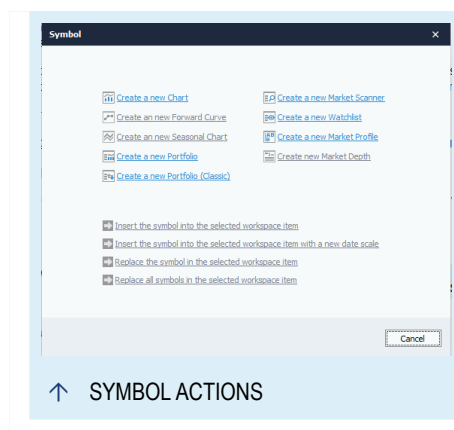
Alternatively, you can insert the symbol into the selected element of the workspace, e.g. a chart. This can be done in the following four ways:

Insert the symbol into the selected workspace item Select this to add the found item as a second symbol in a chart, for example.

Insert the symbol into the selected workspace item with a new date scale Select this to add the new symbol, for example as a subchart with its own date scale.

Replace the symbol in the selected workspace item Select this to substitute the new symbol for the original symbol.

Replace all symbols in the selected workspace item Select this to substitute the new symbol for the original symbols, for example in several charts.

ADDING A FORMULA SYMBOL

To start adding a symbol based on an Equilla formula, click the **Symbol Search** button in the toolbar and select **Add Formula Symbol**.

Enter the template, a name, and two legs.

After clicking Ok, the Symbol action window opens. Depending on the selected instruments, not all actions might be available.

↑ ADDING A FORMULA SYMBOL

> **Note:** Please keep in mind these symbols are not automatically saved in your symbol lists.

ADDING USER-DEFINED CONTINUATION AND ROLLING FORWARD SYMBOL

To create a user-defined continuation or rolling forward symbol right-away via the symbol search, please use these options. For more information about the creation of these symbol types, please see "User-defined continuations" on page 84.

> **Note:** Please keep in mind these symbols are not saved automatically in your symbol lists.

ADDING COMBINED SYMBOL

To create a combined symbol right-away via the symbol search, please use this option. For more information about combined symbols, please see "Create Combined Symbols" on page 68.

> **Note:** Please keep in mind these symbols are not automatically saved in your symbol lists.

SYMBOL LISTS

Symbol lists include the symbols and names of traded securities. A symbol list corresponds to a category, a branch or index or is assembled by the trader. You can use the symbol lists for the following:

→ As an "extended memory" for a high number of symbols

→ Sorting symbols according to branches, countries or other criteria

→ As a basis for "Chart" on page 96, "Scanner" on page 71 and other documents

→ For filing symbols from the Scanner or "Symbol Search" on page 59

→ For filing formulas or other calculations with which to generate charts

Tradesignal offers a symbol list manager in which you can administrate and sort a large number of lists. You can find it in the toolbox under the **Symbol Lists** button.
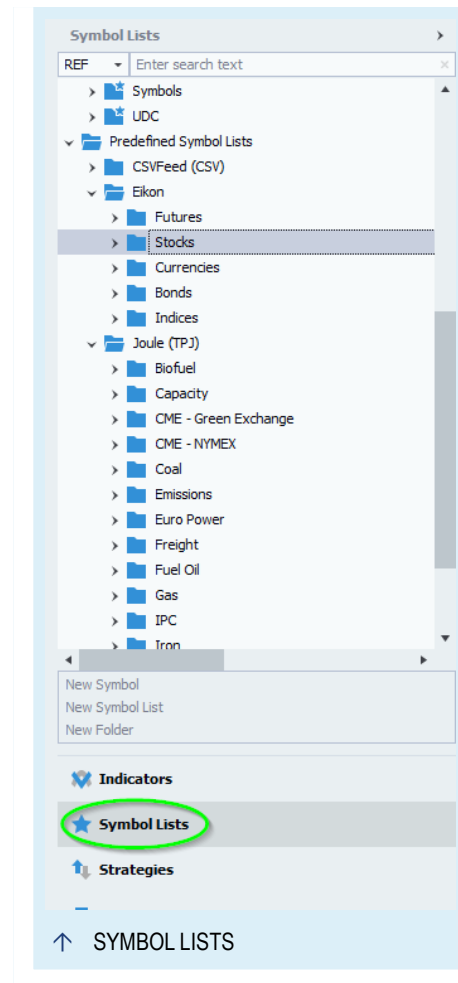
Since single symbols are always managed as part of a symbol list, the special functions for those are also described in this chapter, see "Starting a New Symbol List" below.

Note: Symbol lists that can be reloaded are indicated by the *Reload Icon* .

STARTING A NEW SYMBOL LIST

When starting Tradesignal for the first time, you are asked if you want to receive lists from your data provider. If you confirm this, you will use the Symbol List wizard for the first time. However, you can start the wizard any time to create a new list.

01. In the toolbox, click the **Symbol Lists** button.

02. Select the top entry for your own symbol lists. New symbol lists can only be created below this folder.

03. In the *Related Task* area, click on **New Symbol List**.

The Symbol List wizard opens. Two options are available:

Search for a predefined symbol list Receive standard lists, for example NASDAQ indexes.

Manually create a symbol list (or import from a file) Start a new, empty symbol list to which you can add symbols or symbol lists, also by importing.

The New Symbol List window opens.

Use **Search** to start the "Symbol Search" on page 59.

Alternatively, you can:

Import symbols from a local symbol list... Import a local symbol list.

Import symbols from a CSV... Import a symbol list from a file in CSV format (comma separated values) or XML format. The expected separators for CSV in Tradesignal are comma or semicolon. One way to create files in such a format is to save your data in Excel as CSV text file or use export on a symbol list.
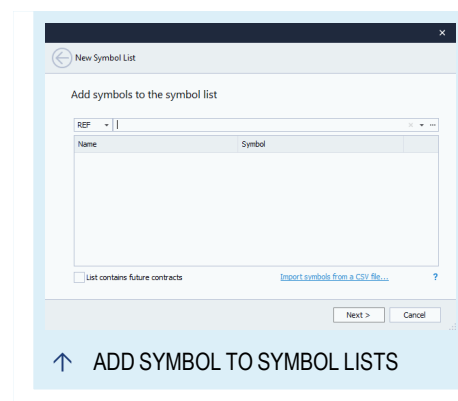
Select the option **List contains future contracts** if this is the case, to enable features like "Forward Curve" on page 153 and "Seasonal Chart" on page 155.

MANAGING SYMBOLS AND SYMBOL LISTS

EDITING VIA THE CONTEXT MENU

You can manage Symbols and Symbol Lists with the functions offered in the context menus.

→ **Open** single symbols in a "Chart" on page 96, "Scanner" on page 71, "Portfolio" on page 251, "Watchlist" on page 77, "Market Depth" on page 90, "Market Profile" on page 148 or "News" on page 365.

→ **Open** a symbol list in a Scanner, Watchlist or Portfolio.

→ You can **open** a symbol from a list in an "Equilla Editor" on page 399 as long as it is a composite symbol.

→ You can **add** a new symbol to your existing list.

→ A symbol list can be **refreshed**. This option is only available for predefined symbol lists from the data provider. Tradesignal will update changes of the predefined lists after restart of the application, unless you do a manual refresh.

→ You can **rename** a symbol or symbol list.

→ You can **delete** a symbol or symbol list from the list.

→ You can **duplicate** a list. A one-to-one copy will be created, which can be modified and renamed.

→ You can **print** a symbol or symbol list. With this function, all information for each symbol is printed. This can take a while if you print a long list of symbols. For more information, see the chapter "Publish to Office" on page 346.

→ Select **Optimize** to start the optimizer for the symbol or symbol list. This starts the "Optimizer" on page 274. In the case of a symbol list, all symbols included in the list will be optimized. The results will be displayed in a table, sorted by total net profit.

→ You can also **sort** a symbol list, see the section "Sorting Symbol Lists" on page 66.

→ You can **export** a symbol list in either CSV or XML format. The XML format supports all symbol types, whereas CSV only supports standard symbols.

→ When you select the option **List contains future contracts**, the options **Open in Forward Curve** and **Open in Seasonal Chart** become available. For these to work, all symbols in the list need to have an expiry date.

Note: Shared symbol lists are read-only.

ADD A SYMBOL TO A SYMBOL LIST

Single symbols are always managed in symbol lists. Therefore please create at first a symbol list where you can create a new symbol. If there is no symbol list in the folder, Tradesignal creates a new default symbol list automatically, see "Drag-And-Drop and Copy-And-Paste Symbols" on the next page. To add a new

symbol, open the context menu of a symbol list and select **New Symbol**. The New Symbol menu opens. It shows the same options as the "Symbol Search" on page 59.

New Symbol A standard symbol from the data provider.

New Formula Symbol A composite symbol calculated from a formula. This way you can add a formula, which refers to other securities, as a symbol itself. You can find more information below in the section "Create Formula Symbols" on page 67.

New User-Defined Continuation Here you can set up continuations for futures in which the history of the instrument is continuously growing by adding each new contract's history on rollover. For more information see the chapter "User-defined continuations" on page 84.

New Rolling Forward Symbol Here you can set up continuations for futures in which the history of the instrument is replaced completely by the history of the new contract. The option is only available for DataConnect-based feeds. For more information see the chapter "User-defined continuations" on page 84.

New Combined Symbol This option allows you to create a combination of standard symbols, e.g. the same security traded on multiple exchanges. For more information see the section "Create Combined Symbols" on page 68.

DRAG-AND-DROP AND COPY-AND-PASTE SYMBOLS

→ Symbols have to be part of a symbol list. If you move a symbol via drag-and-drop into a folder without a symbol list, Tradesignal creates automatically a default symbol list in this folder. These default symbol lists are always shown at the top of the folder and automatically expanded, when the folder is used. The name of the symbol list is fix and is only updated, when the folder itself gets renamed.

→ You can move single symbols into another symbol list by drag-and-drop or copy-and-paste.

→ You can drag a symbol into a document in the workspace, for example to add the symbol to a Scanner table.

→ Drag a symbol into an existing chart to create a subchart or drag a symbol while holding CTRL to replace the chart.

→ You can also go the other way round and drag a symbol from an open document (like a Chart, Scanner, Watchlist or Portfolio) into a symbol list. To do this, click into the chart

legend or - in case of tables - click into a table cell until a plus symbol and a rectangle appear under the mouse cursor. Then drag the symbol into the symbol list.

→ If you drag a symbol to an open editor, its symbol shortcut will be inserted enclosed in single quotes. This can be used for "Inline Instruments and Data Inputs" on page 431.

DRAG-AND-DROP AND COPY-AND-PASTE SYMBOL LISTS

→ Symbol lists can be moved between folders. To do this, simply drag the list into the target folder. You can even copy-and-paste symbol lists.

→ Symbol lists can also be dragged into an open Scanner, Watchlist or Portfolio. They can also be dragged to an open Chart, this will open all contained symbols.

→ If you drag a symbol list to an open editor, its symbol list shortcut will be inserted in double quotes. This can be used for lists of Equilla inline instruments. For further details see the Equilla help in Tradesignal.

SETTING UP A SYMBOL LIST WITH SEVERAL SYMBOLS

When creating a new symbol list, you can add symbols in the process.

01. In the symbol list manager, click on the folder in which the new list should be created.

02. Select New Symbol List in the context menu of the folder. The Symbol List wizard opens.

03. Enter a name for the list and click the Add button to start the symbol search for finding and adding symbols.

SORTING SYMBOL LISTS

You can sort a symbol list in two ways.

→ Sort from A-Z via the entry **Sort** in the context menu of a symbol list.

→ Sort manually by dragging the symbol to another position in the list.

A changed order only affects the current symbol list, not all.

CREATE NEW FOLDER

When you are handling many different symbol lists, it may be useful to structure them further. To do so, create new folders in your symbol list area by clicking on **New Folder** in the *Related Task* area.

CREATE FORMULA SYMBOLS

Formula symbols (previously called "composite symbols)" are artificial instruments calculated from Equilla formulas that refer to other symbols. You can save formula instruments as symbols if the relevant references to symbols and their prices are included in the formulas.

↑   CREATING A FORMULA SYMBOL

→ For a simple formula instrument, a formula can be entered directly into the command line to create a new chart.

→ To create a more formula instrument, choose **New Symbol** in the context menu of a symbol list and select **New Formula Symbol**. Enter the Equilla code and a name. The new formula symbol is added to the current symbol list.

→ If symbols in the symbol toolbox are selected, these symbols will be filled into the templates when creating a new formula symbol. The order will be the same as the order of the selection.
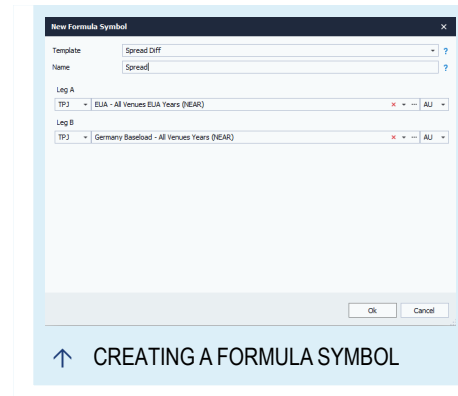
In Tradesignal you can use the symbol picker to quickly add a symbol to the formula as an inline instrument.

EXAMPLE FOR A SIMPLE FORMULA SYMBOL

We want to calculate the difference between the open and close of each trading period. The Equilla code for this is

```
Open - Close
```

Since we want to save the formula as a formula symbol in a symbol list, references to a security have to be included in the formula, for example .DJI (Dow Jones Industrial). The resulting code is

```
Open .dji - Close .dji
```

Enter this formula in the Command Line and select the option New Formula Chart in the drop-down menu. The formula is instantly calculated and ready for use. Save the formula as a symbol by dragging its name from the chart legend into a symbol list.

Example for a more complex formula symbol

The following code would result in a formula symbol that includes the spread between the Intel symbol and the Dow Jones Industry index.

```
Variables: openRatio, closeRatio;

openRatio = Open of 'intc nas' / Open of '.dji';
closeRatio = Close of 'intc nas' / Close of '.dji';

DrawForest( openRatio, closeRatio );
```

Copy this code into the editor window of a composite instrument, enter a name, and generate the symbol. Afterwards you can display the spread by calling up the composite symbol.

CREATE COMBINED SYMBOLS

Combined symbols are synthetic instruments created by combining the input values of an ordered list of standard symbols and cumulated to a target period from a specified base period.

A combined symbol is very useful when you have a similar product traded at multiple different sources (e.g. Forex and Commodity Brokers) and you would like a combined view of the whole market for that product.

↑   CREATING A COMBINED SYMBOL
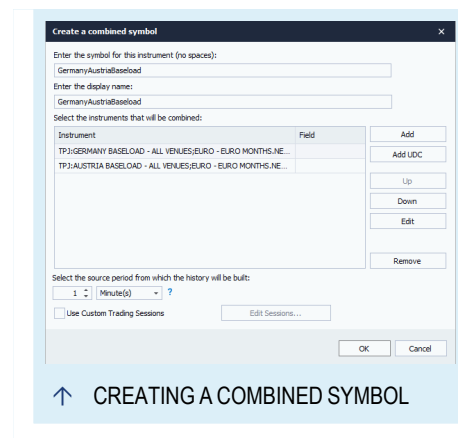
In the editor you can define the instruments with the used field for the combined symbol. You can use any field which is provided by the datafeed.

When a combined symbol is created, a base period must be specified, the data from this base period for each of the component symbols will be combined to make the new instrument. Obviously, for periods other than tick there is likely to be some overlapping of data; in this case the values from the component symbol that is specified earlier in the list will be used.

It is recommended to only use tick as a base period when absolutely necessary. The calculation time of the composite will be excessively long and it is unlikely

there will be a suitable quantity of tick data to create a daily chart of reasonable length.

At the end you can define a custom session for the combined symbol.

CREATE MULTI-VENUE SYMBOL LISTS

The *Multi-Venue Symbol List* dialog allows an entire set of lists of combined symbols and continuations for a related set of products to be easily created in a single action.

> **Note:** Multi-Venue Symbol Lists are only available for the datafeed Trayport Trading Gateway (TGW).

↑   CREATING MULTI-VENUE SYMBOL LISTS
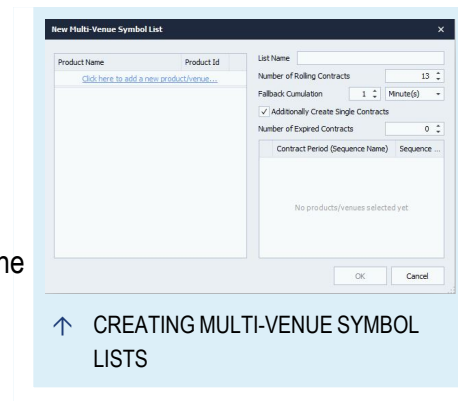
To create a set of multi-venue symbol lists:

01. Right-click on the top folder My Symbol Lists and select **Create Multi-Venue Symbol Lists** to show the *Multi-Venue Symbol List* dialog

02. For each venue, click **Click here to add a new product/venue...** and select the products from each venue to aggregate

03. **Choose** a combined product name for the resulting symbols

04. **Specify** how many continuation symbols should be generated (the default is normally sufficient)

05. **Choose** a fallback cumulative period (what period data to use to combine the various instruments, the default option is normally sufficient)

06. **Select** if individual contracts should be generated in addition to continuations (available from version 8)

07. **Select** how many expired contracts should be generated (available from version 8)

08. **Select** which contract periods to generate symbols for

09. Click **OK** to generate the symbol lists

> **Note:** Generating the lists may take some time.

To edit the generated lists (for example to add another venue), right-click on the root folder of the multi-venue lists, in the symbol lists sidebar, and select **Edit**.

SYMBOL REPLACEMENT

Symbols can be easily replaced by any symbol via the context menu **Replace Symbol** in the symbol search/list or using the command line.

SPECIAL REPLACEMENT OPERATIONS FOR JOULE SYMBOLS

Tradesignal offers special replacement operations for Joule symbols. As Joule symbols all use the same logic, you can replace parts of it like the product or replace a single contract with a compatible rolling contract.

Select **Replace > Replace Product**, **Replace > Replace Calendar Period** or **Replace > Replace Rolling** in the context menu of the symbol.

For each replacement action you gets a separate wizard. Each wizard shows you the compatible replacements like other gas symbols for the product or other periods for the calendar period.

If one symbol is used multiple times in the same workspace, you can perform a bulk replacement operation for the other instances of the same symbol at once. Activate the check boxes of the additional symbols in the lower section.

For spreads you can also replace the legs.

↑   REPLACE SYMBOL VIA SYMBOL LISTS

↑   REPLACE PRODUCT

↑   REPLACE CALENDAR PERIOD

SCANNER

A Scanner (also sometimes called screener) is used for searching large symbol lists according to defined criteria. You can use the Tradesignal Scanner for:

↑ SCANNER

→ Searching certain indicator constellations in symbol lists

→ Searching for chart patterns in symbol lists

→ Searching for technical analysis patterns in price lists

→ Backtest of trading systems for several symbols

→ Obtaining statistical data like annual high in price lists

→ Optimizing trading systems based on a group of symbols

The easiest application, for example, is using the Scanner to search a certain constellation of indicators. Use a relative strength indicator (RSI) > 70 to find the strongest symbols in a list.

The document type scanner has the following design parameters:

→ The maximum history length is 5000.

→ The maximum number of instruments is 5001.

→ The maximum number of indicators/strategies is 32.

→ Indicators and strategies are processed sequentially, i.e. they are applied in the given sequence to each instrument, before the next instrument is processed.

STARTING THE SCANNER

You can fill the Scanner with symbols in various ways.

→ Click on the **Scanner** button in the Insert tab of the toolbar.

→ Open the context menu of a symbol list in the toolbox and choose the entry **Open in Scanner**.
The Create new Scanner wizard opens, in which you can select indicators and strategies in two more steps. (If selecting this for a single symbol, it opens without a wizard.)

Click on **Finish** to close the wizard and save the settings.

ADDING ONE OR MORE SYMBOLS MANUALLY

You can also add single symbols or open a new market scanner without using the wizard.

01. Open the context menu of a symbol or symbol list in the toolbox and choose the entry **Insert Symbo**l to add it to the active market scanner.

02. In the command line, enter a symbol shortcut, e.g. "DD NYS" and select **Add Symbol** to add it to a scanner, or **New Market Scanner** for a new one.

03. Via the "Symbol Search" on page 59. For this, click on the search button and select **Insert the symbol into the selected workspace item** to add it to the scanner, or **Create a new Market Scanner** for a new one.

> **Tip:** You can also add symbols to a scanner via drag-and-drop from the toolbox or other documents.

The History Length (candles/bars) that is regularly taken into account is 3. When you add an indicator, the length may be increased if necessary for the indicator calculation. E.g., the Chande Momentum Oscillator sets the length to 16. If you go below this necessary length, indicators may not give results anymore. In this case, increase the length again.

When you select a symbol list (e.g. the Nasdaq), please ensure that the index itself is not included in the Scanner. It makes no sense to include an index in a list of symbols when scanning for optimal trading parameters. (It is different if you trade in certificates and the scanner is filled with index values.)

SCANNER PROPERTIES

The properties for the scanner are available via "Settings" on page 157 in the home tab. Important parameters are:

History Length Enter the length of the history here (max. 5000).

Only Closed Bars Set to "True" if only closed bars should be used. The default is "False". This option is useful in daily periods to ensure the scan uses the data from the close of the prior session for all instruments. When using indicators with lower period inline data, it will most likely be necessary to increase the Scanner's history length, to ensure there is sufficient intraday data to span back to the prior session.

Min. Referenced Bars Enter the minimum number of bars that should be used for calculating the values of indicators and strategies.

With a click on the row of an indicator or symbol, the "Mini Toolbar" on page 45 for the selected item is shown. Changes in the mini toolbar are applied live in the watchlist.

DELETING SYMBOLS FROM A SCANNER

You can delete symbols from a scanner.

01. Select the symbols. You have the following options:

→ Press **Ctrl+A** to select all.

→ Press **Ctrl** and click on single instruments to select them.

→ Press **Shift** and click on two instruments to select the instruments between them..

02. Press the **Del** key to delete the selected instruments.

SCANNER BUTTONS IN THE TOOLBAR

Start Scan Start the Scanner.

Stop Scan Stop the scanning process. All table fields filled at this point are saved.

Period Here you can set the period that is to be used in the Scanner (this corresponds to the period settings for a chart). The symbols in the Scanner are always called up with the default period at first.

Columns Open the menu for the column settings of the Scanner.

Set Group Here you can group the parameters for better overview. Select a number of rows in the table and click on the button. You can now enter a name for the group. A button appears on top of the table that allows you to open/close the group views like a folder tree in Windows Explorer.

COLUMNS IN THE SCANNER

The table shows different columns depending on the indicators and strategies you are using. The number of columns added for each indicator or strategy depends on the number of output data.

→ For each indicator, all columns with a non-static output are displayed. For example, for the "Bollinger Band" indicator

there are three columns, for the "Elder Ray" indicator two columns (and two invisible columns with static values).

→ For strategies, the two columns "Position" and "Position Size" are displayed over all strategies. The parameters of the single strategies are usually set to invisible in the Equilla code ("visuals" are "inactive"). If they were displayed, they might also interfere with the statistics, which is usually not desired. When at least one strategy is available, you can add columns for statistical output like "Total Net Profit".

SORTING THE COLUMNS

You can sort the columns in the scanner by clicking on the column header. A little triangle appears, pointing up or down depending on the sorting direction. To change the direction, click on the column header again.

Alternatively, right-click into the column and select the sort direction in the context menu.

COLUMN GROUPING

This function in the Columns button menu leads to a new row in the table top. If groups are already defined, a button appears for them.

You can start a group by dragging a table row in this new row at the table top, or by selecting a row and clicking on Set Group in the toolbar under Home > Table > Columns.

ADD/REMOVE COLUMNS

With this function in the Columns button menu, you can set columns in the table to visible or invisible.

In the list, all available columns are sorted by categories. Standard columns like price or symbol information are available; so are a large number of statistical values for trading systems. If an indicator offers additional information, it appears as an entry here too.

Select the entries for all columns you want to display, or click on **Show All** to select all entries.

MANAGE STRATEGIES AND INDICATORS

With this function in the *Columns* button menu, you can

→ set the processing order of the selected indicators and strategies. To do so, select an entry and click the Move up/Move down buttons. The indicators and strategies are applied in this order to every single symbol (sequential processing).

→ remove indicators or strategies from the scanner by selecting them and clicking the Remove button.

FORMATTING OPTIONS

In the Scanner, the following buttons are available in the toolbar.

Styles Here you can set the display options of the table, e.g. gray background with orange and yellow text.

Sessions Here you can set the trading times. You can find more information in the chapter "Sessions, Holidays and Properties" on page 508.

Price Editor Here you can manually edit prices of symbols. You can find more information in the chapter "Price Editor" on page 523.

SCANNING RESULTS

The Scanner fills the table with the results from the indicators for all symbols in the table. This may take awhile. If you stop the scanning while it is in progress, the results up to that point are saved and available in the table.

FILTERING RESULTS

To get a better overview of important results, you can filter the scan result display.

→ Click on the **Edit Filter button** in the toolbar under *Home > Table > Filter* to open the menu for the filter criteria. There, you can set up e.g. a filter with which you search for an RSI >1 to find the strongest symbols.

Tip: You can find more information in the chapter "Filter" on page 94.

USING THE RESULTS WITH DRAG-AND-DROP

USING SYMBOLS IN ANOTHER TABLE

You can reuse symbols from a Scanner in a Watchlist, a Portfolio or another Scanner.

→ If you want to start with a new table, open one by clicking the button **Scanner** (or Portfolio or Watchlist) in the *Insert* tab of the toolbar and closing the wizard with **Done**.
An empty table is opened.
Alternatively, you can use existing tables.

→ In the Scanner, click into a table cell of the symbol you want to reuse. A little plus sign and a rectangle appear under the mouse cursor. Now drag the cursor into the other table. The symbol is copied into the table.

In a similar way, you can drag symbols from a Portfolio or Watchlist into a Scanner.

SAVING SYMBOLS IN A SCANNER AS SYMBOL LIST

From within the Scanner, you can save interesting symbols as a new symbol list.

01. To save the symbols as a new list, click on the entry **New Symbol List** in the Related Tasks area of the symbol manager in the toolbox. Choose the option **User-Defined Symbol List** and name the list but keep it empty.

02. In the Scanner, click into a table cell of the symbol you want to reuse. (By pressing **Shift** or **Ctrl** while clicking with the mouse, you can select more than one row.)
A small plus sign and a rectangle appear below the cursor.

03. Since a first click opens the properties tab, click again on the button **Symbol Lists** in the toolbox to open the symbol manager.

04. Drag the selected symbols to the new symbol list. The symbols are added to the list.

OPENING A CHART FROM THE SCANNER AND PAGE THROUGH CHARTS

To view the chart for a symbol from within the Scanner, open the context menu of the table row and select **Open** for the entry **Chart**. The Chart is drawn with the history length and period of the Scanner and includes all indicators and strategies you have set up in the Scanner. The Chart will be linked automatically to the Scanner via symbol linking.

If you want to go through the whole list of symbols in a Scanner to see each chart, use the small, green arrow buttons to the right of the Command Line. As soon as

you open one chart of a Scanner entry, you can page through the full list of symbols this way.

EXPORTING SCANNER DATA

The table contents of the Scanner can be copied to other programs.

Tip: For more information, see the chapter "Publish to Office" on page 346.

EXAMPLE: HOW TO FIND THE STRONGEST VALUES IN THE NASDAQ

The following parameters can be used for finding the strongest Nasdaq values with the Scanner.

Symbol list:

→ All symbols of the *NSD.X* (take care that the index itself is not part of the list)

→ **History Length** in the chart properties to "500"

Indicator:

→ **Relative Strength Levy** with **Period** 100 days

Start the scanner for the symbols. After the scanning process, sort the table by the RSL column by clicking the RSL column header (if necessary, repeat until the sorting direction is correct). At the top, the strongest Nasdaq value should be displayed.

WATCHLIST

The Watchlist in Tradesignal offers various functions for monitoring stocks in realtime. It is especially helpful for monitoring "ticking" instruments, i.e. instruments with currently changing quotations. Delayed instruments will also be updated automatically.

↑ WATCHLIST

Watchlists are useful for:

→ monitoring symbol lists for their current price development

→ monitoring symbol lists for certain constellations of indicators and trading systems

→ receiving alerts via mail or acoustic signal when pre-defined triggers are set off

With the Tradesignal Watchlist, you get an overview of symbol data in easily manageable tables. Starting from them, you can open symbol charts and page through them for the whole symbol list. The cells with the latest changed values are displayed with colored background.

The document type Watchlist has the following design parameters:

→ The maximum history length is 5000.

→ The maximum number of instruments is 501.

→ The maximum number of indicators/strategies is 32.

→ Indicators and strategies are processed sequentially, i.e. they are applied in the given sequence to each instrument, before the next instrument is processed.

WATCHLIST SETUP

You can open a Watchlist with symbols in various ways.

USING THE WIZARD

When choosing one of the following methods, the wizard will open:

→ Click on the **Watchlist button** in the Insert tab of the toolbar.

→ Open the context menu of a symbol list in the toolbox and choose the entry **Open in Watchlist**. (If selecting this for a single symbol, it opens without a wizard.)

The Create Item wizard opens, in which you can select indicators and strategies in two more steps. Click on Done to close the wizard and save the settings.

ADDING ONE OR MORE SYMBOLS MANUALLY

You can also add single symbols or open a new Watchlist without using the wizard.

→ Open the context menu of a symbol or symbol list in the toolbox and choose the entry **Insert Symbol** to add it to the

active Watchlist.

→ In the command line, enter a symbol shortcut, e.g. "DD NYS" and select **Add Symbol** to add it to the active Watchlist, or New Watchlist for a new one.

→ Via the "Symbol Search" on page 59. For this, click on the search button and select Insert the symbol into the selected workspace item to add it to the Watchlist, or Create a new Watchlist for a new one.

Tip: You can also add symbols to a Portfolio via drag-and-drop from the toolbox or other documents.

The **History Length** (candles/bars) that is regularly taken into account is 3. When you add an indicator, the length may be increased if necessary for the indicator calculation. E.g., the Chande Momentum Oscillator sets the length to 16. If you go below this necessary length, indicators may not give results anymore. In this case, increase the length again.

When you select a symbol list (e.g. the Nasdaq), please ensure that the index itself is not included in the Watchlist. It makes no sense to include an index in a list of symbols when searching for optimal trading parameters. (It is different if you trade in certificates and the Watchlist is filled with index values.)

WATCHLIST PROPERTIES

The properties for the watchlist are available via "Settings" on page 157 in the home tab. Important parameters are:

History Length Enter the length of the history here (max. 5000).

Min. Referenced Bars Enter the minimum number of bars that should be used for calculating the values of indicators and strategies.

In the *Indications* area, you can enter the colors for changing values in the table.

Update Indications Set the background color for table cells with values that changed since the last update, e.g. gray. Up Move and Down Move – Set the colors for increasing/decreasing values, e.g. green for up, red for down.

With a click on the row of an indicator or symbol, the mini toolbar for the selected item is shown. Changes in the mini toolbar are applied live in the watchlist.

DELETING SYMBOLS FROM A WATCHLIST

You can delete symbols from a Watchlist.

Select the symbols. You have the following options:

→ Press **Ctrl+A** to select all.

→ Press **Ctrl** and click on single instruments to select them.

→ Press **Shift** and click on two instruments to select the instruments between them..

→ Press the **Del** key to delete the selected instruments.

PLACING ORDERS

To place orders directly from the watchlist, through "Manual Order Routing" on page 317, click **Order Entry Form** from the context menu and click the desired option.

WATCHLIST BUTTONS IN THE TOOLBAR

Period Here you can set the period that is to be used in the Watchlist (this corresponds to the period settings for a chart). The symbols in the Watchlist are always called up with the default period at first.

Columns Open the menu for the column settings of the Watchlist. For activation or deactivation of several columns select the columns and use *check* or *uncheck* at the bottom.

Set Group Here you can group the parameters for better overview. Select a number of rows in the table and click on the button. You can now enter a name for the group. A button appears on top of the table that allows you to open/close the group views like a folder tree in Windows Explorer.

COLUMNS IN THE WATCHLIST

The table shows different columns depending on the indicators and strategies you are using. The number of columns added for each indicator or strategy depends on the number of output data.

→ For each indicator, all columns with a non-static output are displayed. For example, for the "Bollinger Band" indicator there are three columns, for the "Elder Ray" indicator two columns (and two invisible columns with static values).

→ For strategies, the two columns "Position" and "Position Size" are displayed over all strategies. The parameters of the single strategies are usually set to invisible in the Equilla code ("visuals" are "inactive"). If they were displayed, they might

also interfere with the statistics, which is usually not desired.
When at least one strategy is available, you can add columns
for statistical output like "Total Net Profit".

SORTING THE COLUMNS

You can sort the columns in the Watchlist by clicking on the column header. A
little triangle appears, pointing up or down depending on the sorting direction. To
change the direction, click on the column header again.

Alternatively, right-click into the column and select the sort direction in the context
menu.

COLUMN GROUPING

This function in the Columns button menu leads to a new row in the table top. If
groups are already defined, a button appears for them.

You can start a group by dragging a table row to this new row at the table top, or
by selecting a row and clicking on **Set Group** in the toolbar under Home > Table >
Columns.

ADDING/REMOVING COLUMNS

With this function in the Columns button menu, you can set columns in the table to
visible or invisible.

In the list, all available columns are sorted by categories. Standard columns like
price or symbol information are available; so are a large number of statistical
values for trading systems. If an indicator offers additional information, it appears
as an entry here too.

Select the entries for all columns you want to display, or click on **Show All** to
select all entries.

MANAGE STRATEGIES AND INDICATORS

With this function in the Columns button menu, you can

→ set the processing order of the indicators and strategies by
selecting an entry and clicking on **Sort Ascending** or **Sort
Descending**. The indicators and strategies are applied in this
order to every single symbol (sequential processing).

→ delete indicators and strategies by selecting an entry and
clicking on **Remove**.

FORMAT OPTIONS

In the Watchlist, the following Format buttons are available in the toolbar.

Styles Here you can set the display options of the table, e.g. gray background with orange and yellow text. You can find more information in the chapter "Styles" on page 224.

Sessions Here you can set the trading times. You can find more information in the chapter "Sessions, Holidays and Properties" on page 508.

Price Editor Here you can manually edit prices of symbols. You can find more information in the chapter "Price Editor" on page 523.

ANALYZING THE WATCHLIST RESULTS

The watchlist shows a table of the results of the indicator analysis over all symbols in the list. The data is displayed in real time. Therefore, it is not necessary to explicitly scan the Watchlist to see the current data.

OPEN A CHART FROM WITH THE WATCHLIST AND PAGE THROUGH CHARTS

To view the chart for a symbol from within the Watchlist, open the context menu of the table row and select **Open** for the entry **Chart**. The chart is drawn with the history length and period of the Watchlist and includes all indicators and strategies you have set up in the Watchlist. The Chart will be linked automatically to the Watchlist via symbol linking.

If you want to go through the whole list of symbols in a Watchlist to see each chart, use the small, green arrow buttons to the right of the Command Line. As soon as you open one chart of a Watchlist entry, you can page through the full list of symbols this way.

USING AND REUSING THE RESULTS WITH DRAG-AND-DROP

You can reuse symbols from a Watchlist in a Portfolio, a Scanner or another Watchlist.

If you want to start with a new table, open one by clicking the button **Watchlist** (or Scanner or Portfolio) in the **Insert** tab of the toolbar and closing the wizard with **Done**. An empty table is opened. Alternatively, you can use existing tables.

In the Watchlist, click into a table cell of the symbol you want to reuse. A little plus sign and a rectangle appear under the mouse cursor. Now drag the cursor into the other table. The symbol is copied into the table.

In a similar way, you can drag symbols from a Scanner or Portfolio into a Watchlist.

SAVING SYMBOLS IN A WATCHLIST AS SYMBOL LIST

From within the Watchlist, you can save interesting symbols as a new symbol list.

01. To save the symbols as a new list, click on the entry New Symbol List in the Related Tasks area of the symbol manager in the toolbox. Choose the option User-Defined Symbol List and name the list but keep it empty.

02. In the Watchlist, click into a table cell of the symbol you want to reuse. (By pressing Shift or Ctrl while clicking with the mouse, you can select more than one row.) A small plus sign and a rectangle appear below the cursor.

03. Since a first click opens the properties tab, click again on the button Symbol Lists in the toolbox to open the symbol manager.

04. Drag the selected symbols to the new symbol list.
The symbols are added to the list.

EXPORTING WATCHLIST DATA

The table contents of the Watchlist can be copied to other programs. For more information, see the chapter "Publish to Office" on page 346.

EXAMPLE: PARAMETERS FOR A WATCHLIST

The following parameters could be used for a Watchlist for index values:

Symbol list:

→ all symbols of the .NDX.X (make sure that the index is not part of the list)

Indicators:

→ Net Change (Change)

→ Net % Change (Change in %)

Thus configured, the Watchlist offers all important information at a glance. Save the workspace to keep the Watchlist settings.

USER-DEFINED CONTINUATIONS

User-defined continuations (UDC) are constructed price time series for futures. Futures are forward contracts offered on basis of commodities, stocks, indexes, currencies or assets. All futures have a fixed expiration date. Therefore, the history length of futures is limited and ends on the day of expiration. For analysis and testing of trading systems this poses a problem since the available data for each contract is too small.

↑ CONTRACT SELECTION
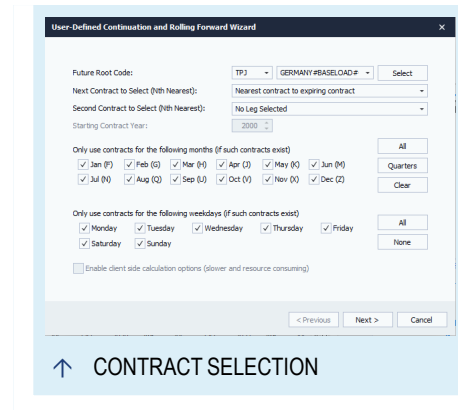
The solution to this problem is continuous contracts, which include the concatenated price data of expired contracts. You can use continuous contracts for

→ long-term analysis of future markets

→ searching seasonal trends in future markets

→ trading system tests over longer histories

Tradesignal offers several ways to set up continuous contracts. Depending on your data provider, you have the choice between several adjustment and adaptation functions. This way, you can add your own creations to the continuous contracts offered by your data provider. The result and all its included calculations is saved as a symbol, which allows further handling and analysis.

A variant of the user-defined continuation is the rolling forward symbol. The difference is that in case of the rolling forward symbol, the history of the old contract is replaced by the history of the new one. So it is less a continuation per se as a forward-writing of the contract. For this option to be available, you need to have a DataConnect-based feed.

SETTING UP A USER-DEFINED CONTINUATION OR A ROLLING FORWARD SYMBOL

Both these options act like a normal symbol, and they can be set up via the context menu of a symbol list.

01. Select New Symbol in the context menu of one of your own symbol lists, or open the Symbol Search button menu.

02. Choose the option **New User-defined Continuation** or the **New Rolling Forward Symbol**.

The User-Defined Continuation and Rolling Forward wizard opens.

> **Tip:** Depending on your data provider, some of the following options and adaptation methods might not be available (grayed out).

Setting up a continuous contract is done in four steps.

CONTRACT SELECTION

Future Root Code Enter a Future Root Code, for example "S" for soybeans. If a symbol is already selected in the symbol toolbox and the data provider submits the data, the Future Root Code is already filled.

Next Contract to Select If no special specifications have to be met for the contracts, select an entry from the list.

Second Contract to Select*(Only available for some datafeeds)* If the continuous contract should be period spread, select an entry from the list.

Starting Contract Year Enter the starting year for the futures.

Some contracts are not handled the same way at all times of the year and therefore should be exempted from the history. The options are:

→ *Only use contracts for the following months (if such contracts exist)* For this option, select or deselect the check boxes in front of the months' names. You can also click the All button for all months, or the Quarters buttons to select contracts from March, June, September and December. Please note that this options only applies to contracts of a monthly expiring nature.

→ *Only use contracts for the following days (if such contracts exist)* For this option, select or deselect the check boxes in front of the days' names. Please note that this option only applies to contracts of a daily expiring nature.

As of version 6.2 of Tradesignal if you use the TMDS as your data provider you can additionally select whether the adjustment calculation should be done on the server or on the client, what until now was the only possible way. Server side calculation is used by default if available because it is faster and less resource consuming. Some options will not be available in this case. Therefore it is possible to switch back to client side calculation by selecting the checkbox **Enable client side calculation options**. All other data providers do not offer this option thus the client side calculation will always be used and cannot get switched off.

ROLLOVER METHOD

Here you can define the rollover method. You can either use fixed intervals or let the market define the rollover moment. For the latter, conditions based on open interest and trading volume are available.

ROLLOVER TRIGGER

Rollover strictly on the expiration day of the contract The history of the new contract is connected to the history of the expiring contract on the expiration date.

Rollover strictly on a specific day of the expiration month of the contract For this method, you can define on which day of the expiration month the rollover will take place.

Rollover a number of days before the expiration day of the contract For this method, you can define a number of days before the expiration day on which the rollover will take place.

Rollover a number of days before the expiration month of the contract For this method, you can define a number of days before the expiration month on which the rollover will take place.

Rollover when Open Interest of the next contract exceeds the current contract The rollover date is controlled by the market. When the open interest of the next contract exceeds that of the current contract, the rollover takes place.

Rollover when Volume of the next contract exceeds the current contract The rollover date is controlled by the market. When the trading volume of the next contract exceeds that of the current contract, the rollover takes place.

Rollover when Open Interest OR Volume of the next contract exceeds the current contract This is a hybrid of the two previous methods. The rollover takes place when either the open interest or the trading volume of the new contract exceeds that of the current contract. The rollover date is controlled by the market.

Rollover when Open Interest AND Volume of the next contract exceeds the current contract This is a hybrid of the two previous methods. The rollover takes place when both the open interest and the trading volume of the new contract exceed that of the current contract. The rollover date is controlled by the market.

ROLLOVER TRIGGER OPTIONS

The volume or open interest conditions can be tracked for several days.

Trading days before expiry Set the number of days for tracking. Select all (*) or the number of days (0-31) from the list.

Consecutive trigger occurrences Select the number of triggers that have to be set off (1-4).

ROLLOVER ADVANCED OPTIONS

For some methods, the **Advanced** button is available. It opens another dialog in which you can set rollover intraday details for trading periods shorter than a day.

Use data only from the expiring contract On the expiration date, only contract data of the expiring contract are taken into account for the calculation.

Use data only from the continuing contract On the expiration date, only contract data of the new contract are taken into account for the calculation.

Combine data from both contracts into a single candle The data of both contracts is used to calculate a combined value.

Include non-trading days in all interval calculations Select this option to include non-trading days into the calculation for intervals of the rollover triggers.

Force rollover to occur at the following time For trading periods shorter than a day, you can set the time. Enter the hours and minutes in the respective fields.

DATA ADJUSTMENT

User-defined contracts are constructed by mathematical concatenation of price histories of single contracts. This is done to avoid the so-called rollover gaps, price differences between the expiring and the new contracts. However, this may result in side effects like extreme price divergence in past histories of continuous contracts as compared to the originally traded contracts. Choose the data adjustment method depending on your preferences or to avoid certain side effects.
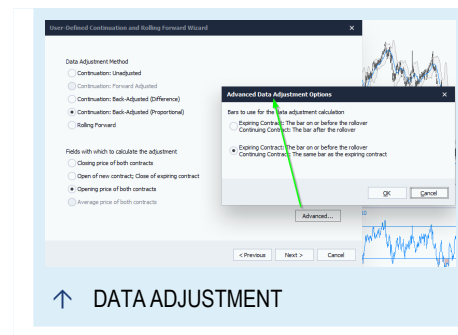
↑   DATA ADJUSTMENT

DATA ADJUSTMENT METHOD

Continuation: Unadjusted The data of the contracts is simply concatenated without further adjustments. This results in a large price gap at each rollover date. However, the advantage is that even histories in the distant past still show the real traded prices.

Continuation: Forward Adjusted The history of the new contract is adjusted to the price of the expiring contract.

Continuation: Back-Adjusted (Difference) The history of the expiring contract is adjusted to the price of the next contract, i.e. either raised or lowered. For each additionally concatenated contract, the complete past history is adjusted this way. Therefore, the resulting data for the distant past is very different from the actually traded prices. It is also possibly to receive negative (nonsensical) values in the process.

Continuation: Back-Adjusted (Proportional) For this, the complete history is calculated anew. All past prices are multiplied with the ratio of the input fields (see below). This way, no negative values can result since the values are multiplied instead of subtracted.

Rolling Forward The history of the expiring contract is replaced by the history of the next contract.

FIELDS WITH WHICH TO CALCULATE THE ADJUSTMENT

Select which fields the chosen adjustment method should be based on.

Closing price of both contracts The calculation is based on the closing prices.

Open of new contract; Close of expiring contract The calculation is based on the close of the expiring and the open of the new contract.

Opening price of both contracts The calculation is based on the opening prices.

Average price of both contracts The calculation is based on an average, namely (Highest High + Lowest Low / 2) of both contracts.

ADVANCED OPTIONS FOR THE ADAPTATION

For some settings, an additional dialog is available under Advanced.... Here you can define which contract data should be used for calculating the price difference.

→ The bar after the rollover day

→ Same day as the rollover day

SUMMARY

In the summary you can see an overview of your settings. After finishing with Done, you are asked to enter a name for the UDC.

In the last step, all available options for symbols at this point are offered, e.g. Create a New Chart using this UDC.

MANAGE CONTINUOUS CONTRACTS

Via the context menu of the contract symbol you can reach all other functions for the contract:

→ You can use continuous contracts in the documents "Chart" on page 96, "Market Profile" on page 148, "Watchlist" on page 77, "Scanner" on page 71 and "Portfolio" on page 251.

→ You can copy, rename or delete contracts.

→ You can open the user-defined continuation wizard to edit the adjustment and calculation methods. To do so, select Edit Continuation Symbol in the context menu.

EXAMPLE: CREATING A CONTINUOUS CONTRACT FOR FUTURES

IN THE TOOLBOX

01. Click on **Symbol Lists**.

02. Click on **New Symbol** to open the Symbol wizard.

03. Select **user-defined continuation** and click on **Next**.
The user-defined continuation (UDC) wizard opens.

IN THE UDC WIZARD

01. For **Future Root Code**, enter a symbol/shortcut, e.g. "S" for soybeans. (Futures are not automatically available for all account types. Contact Tradesignal for an upgrade, if necessary.)

02. From the list of contract series, select the top entry so that all available contracts will be taken into account.

03. Click on **Quarters** to select the four months in which quarters end, then click **Next**.

04. As trigger for the concatenation, select **Next contract's volume exceeds current**, then click **Next**.

05. Select **Continuation: Back-Adjusted (Proportional)** and **Closing prices of both contracts** as fields for the calculation, then click **Next**.

06. Confirm the resulting settings with **Done**.

07. Enter a name for the contract and confirm with **Ok**.

08. Select **Create a New Chart** when the wizard finishes.

The continuous contract now appears as symbol in the symbol list.

MARKET DEPTH

The market depth data offer a list of the best bid and ask orders in streaming view and are instrumental for assessing the current state of stocks. This kind of information is also called Level II. It is especially important for day and intraday trading.

↑   MARKET DEPTH
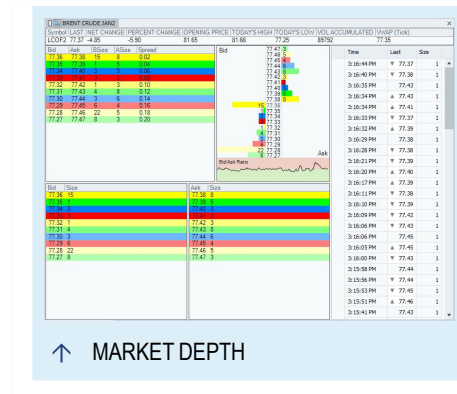
→ Most of the data and charts in Tradesignal offer *Level I* data, i.e. you receive price information based on the last trade (or ask price, if no trade has taken place).

→ In case of *Level II* data, however, you can see current bid and ask orders for a stock. This way, you have an immediate insight into the order books of the traders or ECN. The available details depend on the data provider.

The market depth data provides you with

→ insight into current bid and ask prices.

→ insight into upcoming trades.

→ insight into the liquidity of the market.

→ the ability to see and judge current trends, accurate to the second.

→ the ability to learn about support and resistance price levels (lower and upper limit of price movements).

→ insights into the activity of individual market makers (if source given by the data provider).

In Tradesignal, three views are available for market depth analysis:

→ Level II displays the current status of the order books (available data depends on data provider).

→ Price Ladder gives a visual overview of the Level II data, as size bars for each offered bid/ask price as well as a bid/ask ratio curve.

→ Time and Sales displays the current prices, sizes and actual transactions in real time.

OPENING THE MARKET DEPTH VIEWS

01. To open one or all of the available market depth views, click on the **Market Depth** button in the Insert tab of the toolbar.

02. Choose a view in the pull down menu or choose **Full Market Depth view** for all.

Note: In most cases you can display market depth data for all traded stocks. However, in the case of rarely traded stocks, the views may remain empty or may be updated infrequently.

PROPERTIES

The properties for the Market Depth are available via "Settings" on page 157 in the home tab. Settings for the symbols themselves are accessible in the "Mini Toolbar" on page 45.

Display Units Here you can set up the way the prices should be displayed (default: 2 decimal places). When you choose fraction display, the new field 'Fraction Precision" appears. Here you can set the maximum number of decimal places to be used in case the fraction cannot be expressed by an integral numerator.

Layout Here you can switch between the available market depth views.

LEVEL II

In the Level II view you can see the bid (buying) and ask (selling) orders and their respective size for the chosen stock. The price levels are color-coded. Besides the price ladder (see below) there are three areas:

↑ LEVEL II

Overview On the upper left, you can find a compressed overview of the bid and ask prices, the respective sizes and the spread between the prices.

Bid / Size Here you can see the offered bid prices and their size. The best price (highest selling price) is shown on top.

Ask / Size Here you can see the offered ask prices and their size. The best price (lowest selling price) is shown on top.

On top of the Level II window, you can find a line with the Level I data (open, high, total, et al.).

The first line of the two areas, with the highest bid and lowest ask, is called "inside market" and traditionally displayed in yellow. The market depth corresponds to the number of visible price levels (default: 10). You can change the default in the properties.

The details of the Level II data depend on the data provider.

PROPERTIES

The properties for the Level II are available via "Settings" on page 157 in the home tab. Settings for the symbols themselves are accessible in the "Mini Toolbar" on page 45.

Show Bid/Ask Size When this is set to true, the offered sizes are displayed as numbers in the bars of the price ladder.

Bid/Ask Ordering Allows you to toggle the order of bid and ask in the price ladder (has no effect on the ratio field below the price ladder).

Highlight Source When this is set to true, orders by the same source in the bid/ask areas are highlighted when clicking on one of the orders (only available if source given).

Smoothing Here you can enter how many successive ticks should be averaged in the bid/ask ratio to generate a smoother curve in the display.

Levels Here you can set how many price levels should be displayed in the bid/ask areas.

Depth Shows the data base used for each line in the overview (e.g. "2*4" for 2 summarized bids and 4 summarized asks).

Source Displays the individual market maker or ECN in the first column of the bid/ask areas (available data depending on the data provider).

Time If set to visible, the time column is displayed in the bid/ask areas (available data depending on the data provider).

PRICE LADDER

The price ladder offers a visual overview of the Level II data. The price ladder is a regular part of the Level II view but can also be displayed individually. In the case of individual display, a line with the Level I data (open, high, total, et al.) is displayed on top.

The price ladder view consists of:

↑   PRICE LADDER

→   The price ladder itself. In it, the sizes of bid and ask orders are displayed as colored bars for each price. This way, you can easily see any existing imbalance between selling and buying orders and also estimate in which direction the price is likely to move. The display order of bid and ask can be set in the properties.

→   A curve display for the bid/ask ratio (below the price ladder). The upper red area corresponds to the bid orders, the lower green area to the ask orders. In case of bid overbalance, the curve moves into the red area and prices are likely to move up. In case of an ask overweight, the curve moves down into the green area and prices are likely to drop. A curve on the border between the areas shows a balanced market.

Tip: For the price ladder properties, see the section "Level II" on page 91.
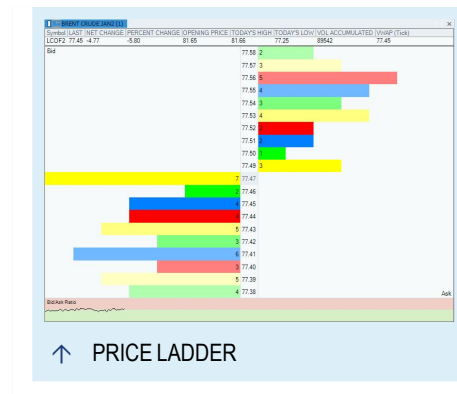
TIME AND SALES

Time and Sales shows a streaming display of price and size of orders and trades as a table. It allows you to see the up and down ticks of the stock price at a glance. Individual market makers or ECN are not available here.

↑   TIME AND SALES

The default color settings of the text are:

→   Price changes to best bid price ("To Bid") are shown in red.

→   Price changes to best ask price ("To Ask") are shown in green.

→ Last, i.e. real trades that correspond to Level I information, are shown in black.

→ If the price changes in comparison to the previous bid/ask price, its background color changes accordingly and an additional plus/minus sign is displayed.

PROPERTIES

The properties for Time & Sales are available via "Settings" on page 157 in the home tab. Settings for the symbols themselves are accessible in the "Mini Toolbar" on page 45.

History Length Here you can enter the maximum number of transactions to be stored in the table. Note: Upon changing this value, there might be a noticeable wait while the system updates the historical information.

Date When this is set to visible, the current date is shown in an additional column.

Condition Codes When this is set to visible, the conditions are written out in an additional column (e.g., "At Ask").

FILTER

The filter is an important instrument for filtering the results of the optimizer and scanner for certain values.

↑ FILTER BUTTONS IN THE TOOLBAR

FILTER VALUES

The filtering proceeds in two steps:

Click the **Edit Filter** button in the Toolbar under Home > Table > filter to set up a filter.
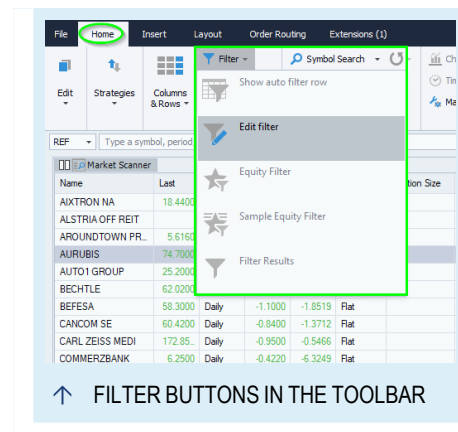
FILTER SET UP

When setting up the filter, you define one or more criteria that form the filter. You have the following options:

New Starts a new filter. An existing filter will be deleted. It is not possible to set up and save several filters. However, you can enter parallel filters combined by **OR**. A dialog opens. Here you can enter which column should be tested with which operator (=, >, <...) Confirm with **OK**.

Edit Opens the dialog as explained above, in which you can edit the selected filter criteria.

Delete Deletes the selected line in the filter.

OR Choose this to enter other possible criteria sets. This way, you may avoid setting up new filters. Enter all important filters with **OR** between them. The ones that don't apply are ignored.

Move up/Move down With these buttons you can move a criterion up and down in the appliance sequence.

ADVANCED FILTER OPTIONS

→ Click on **Show Advanced Options** to display additional options:

Show all filtered rows All rows of the table are shown. An additional column named Filter appears, in which rows are labeled "true" or "not true". Alternatively you can combine the row display with another condition by selecting an Equilla formula in the list or entering a new one. In this case, only filtered rows that fulfill the second condition are displayed.

Note: This option is only available for Scanner documents.

EXAMPLE - FILTERING FOR STRONGEST VALUES

01. Open a new scanner and fill it with the 50 symbols of the "Dow Jones Industry", for example. Add the indicator *Relative Strength Levy*.

02. Perform the scan.

03. Click the **Edit Filter** button in the "Toolbar" on page 42 to open the filter criteria dialog.

04. Click the **New** button and choose the column *RSL* for testing. This is the relative Strength Levy indicator we have entered in the scanner.

05. Select the operator > and enter the number *1* as the value to be tested against.

06. Confirm your settings.

A filtered list that includes only stocks with a Relative Strength Levy of more than 1 is displayed.

CHARTING

CHART

Charts are graphical displays of prices for stocks, commodities, indexes or funds. They can be used for:

↑ A CHART

→ Supporting trading decisions by following price development.

→ Making trading decisions solely on the basis of price development.

→ Gathering information about possible future price developments.

→ Preparing analysis for past price developments.

→ Visually following symbol positions.

→ Systematically developing signals for portfolio trading.

→ Graphically displaying trading system results.

→ Graphically displaying mathematical and statistical calculations.

→ Visualizing the performance development of a symbol.
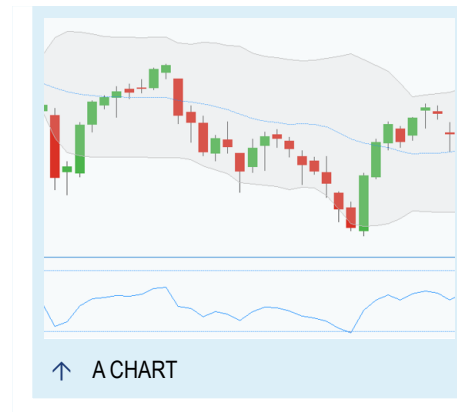
With the help of simple methods it is possible to process price developments from the past to allow prognosis for the future. These methods are known by the term "chart analysis".

Charts have the following design parameters:

→ The maximum number of tools per charts is 250 (e.g. text elements, chart tools.

→ The maximum history length is 500000.

→ The maximum number of instruments per chart is 12 (including the subcharts, e.g. 6 instruments with one indicator each).

For additional information, also see these related topics:

→ In the chapters "Using Indicators" on page 372 and "Using Strategies" on page 381, you can find information on how to add these to the chart for chart analysis. It is also possible to change their output using the available chart types. See "Equilla Graphs, Outputs and Alerts" on page 440 for more information.

→ In the chapter "Chart Tools" on page 161 you find information on how to add and use these drawing tools for your chart analysis.

→ In the chapter "Time Spans and Periods" on page 218 you can find information on how to toggle quickly between different trading periods, how to define your own periods and how to set the visible time span and which pre-defined time spans are available.

→ In the chapter "Settings" on page 157 you can find information about layout settings that define the appearance of the chart and the displayed symbols. You can also find out about "Styles" on page 224 and "Using Templates" on page 223 that allow you saving your own configuration and applying them to other charts.

→ In the chapters "Print" on page 340 and "Publish to Office" on page 346 you can find information on how to print your chart, save an image of it, or send it via E-mail.

→ In the chapter "Manual Order Routing" on page 317 you can find information on how to place orders directly from your Tradesignal workspace.

AVAILABLE CHART TYPES

Type	Description
"Bar Chart" on page 109	Plots price movement; vertical bars indicate range; markers on the bar show open and close prices
"Candlestick Chart" on page 110	Price chart that shows the open, high, low and close prices over a given time period
"Line Chart" on page 124	Plots a line connecting consecutive

Type	Description
	prices
"Stepped Line Chart" on page 125	Similar to a line chart where price levels are connected to form a sequence of discrete steps
"Symbol Chart" on page 126	Plots symbols at each price
"Filled Area Chart" on page 127	Plots a filled region between two prices
"Forest Chart" on page 128	Plots a histogram between prices by time
"Linked Forest Chart" on page 132	A forest chart with a line joining the columns
"Candle Volume Chart" on page 132	A candlestick chart with the width of each candle representing volume
"Equi Volume Chart" on page 134	Plots vertical bars showing price movement with the width representing volume
"Kagi Chart" on page 136	Plots lines with different line width, independent of the time line
"Renko Chart" on page 137	Plots a sequence of ascending and descending bricks to indicate price movement, independent of the time line
"Three Line Break Chart" on page 139	Plots a sequence of bricks based on close prices, independent of the time line
"Heikin Ashi Chart" on page 141	Similar to candlesticks, but uses average prices
"Point and Figure Chart" on page 144	Plots price increases and decreases as a series of stacked Xs and Os
"Market Profile" on page 148	Inserts a market profile chart (various price and turnover data) into the workspace
"Range Bar Chart" on page 151	Plots price movement with a fixed price range; markers on the bar show

Type	Description
	open and close prices

WAYS OF CALLING UP A CHART

There are three main routes for calling up a chart for a commercial paper:

- → If you know the ticker symbol, enter it in the command line. (Tip: You can find ticker symbols in the "Symbol Search" on page 59.)

- → If you don't know the ticker symbol of the commercial paper, you can find it in the "Symbol Lists" on page 62.

- → If you receive an E-Mail with charts, you can save them and call up the charts.

Tip: You can also open symbols in subcharts.

CALLING UP A CHART VIA THE COMMAND LINE

01. Type the ticker symbol (e.g. CAT) in the command line.

02. Press **Enter**. Alternatively, you can choose the entry **New Chart** from the pull-down menu.

CALLING UP A CHART FROM A SYMBOL LIST

For this you need to have a symbol list, e.g. one for the USA Dow Jones.

01. Click on Symbol List in the tool bar.
The symbol list manager opens.

02. Double-click on the symbol list to open it. There are two ways to open a chart for a list entry:

- → If the working area doesn't display a chart, or if you want to substitute the symbols in an existing chart, double-click on the list entry.

- → If you want to open a new chart, right-click on the list entry and choose **New Chart** from the context menu.

03. Use the two green arrow buttons right next to the command line to move through the list and get each entry displayed in the chart.

Tip: You can also open the symbol list as a table in the "Scanner" on page 71, the "Watchlist" on page 77 and as "Portfolio" on page 251 and call up a new chart by right-clicking on a table entry and choosing New Chart from the context menu.

CALLING UP A CHART FROM AN E-MAIL

Tradesignal offers you the option to send charts or whole workspaces by E-Mail. In a similar way, you can import these sent objects into the program.

01. If you receive an E-mail with a workspace, save it locally. We recommend that you choose the folder Tradesignal Files which is located in Personal Folder.

02. Update the list of workspaces by right-clicking in the toolbar on the folder Tradesignal Files and choosing **Update**.

The saved workspace appears in the list of workspaces and can be opened from there.

COPYING, PASTING AND DELETING CHARTS

You can edit charts with the functions in the Edit group in the toolbar:

Copy Copy the current chart configuration into your Windows clipboard.

Paste Paste the copied chart configuration into a currently opened chart, a new workspace, an office document or an image processing application.

Delete Delete the currently active chart.

NAVIGATING IN THE CHART

To activate a chart, click on its tab. In the active chart, the small plug symbol on the lower right of the chart or a portfolio is visible, see the chapter "Automatic Order Routing" on page 307.

The axes and visible areas can be set up relatively flexible. To return to the default settings, you can either press the key **F8** or click on the axes symbol on the lower right of the chart. More information you can find in the chapter "Time Spans and Periods" on page 218.

↑ CHART WITH SHORTENED AXES

MOVING (SCROLLING) AXES

You can move (scroll) the x- and y-axes (usually time and price axes) by clicking on them with the mouse and keeping the mouse button pressed while moving it up/down or left/right.

Alternatively, you can scroll the axes by pressing the cursor keys (up/down, left/right). To speed up the scrolling, press the **Strg**key in addition to the cursor keys.

STRETCHING/SHRINKING AXES

You can change the scale of the axes, so that more or less of the range is shown. To do this, click on it with the right mouse button and keep it pressed while moving the mouse left/right or up/down.

Alternatively, keep the **Shift** key pressed while pressing the cursor keys (up/down, left/right).

USING THE X-AXIS SCROLLBAR

You can also scroll the x-axis by using the scrollbar, which is situated on the lower right corner, to the left of the axes symbol. Click on it and keep the mouse button pressed to drag the scrollbar to the left or right. The scroll speed depends on how much the time axis is currently stretched or shrunk.

PANORAMIC SCROLLBAR

In Tradesignal you can use the panoramic scrollbar to move (scroll) the x-axis by dragging it or clicking on the axis itself. The background always shows all available data as a "Filled Area Chart" on page 127 to give you additional information about your current viewport. It is possible to stretch/shrink (zoom) the axis by dragging the grippers of the new panoramic scrollbar. New buttons replacing the axes button makes it easy to toggle between normal and panoramic scrollbar or show recent/all data. In the chart properties you can change the height of the panoramic scrollbar or switch to the normal one.

↑ CHART WITH PANORAMIC SCROLLBAR

CHANGING SCALE ALIGN

You can change the scale align for the y-axis via the mini toolbar (left, right, left/right), or via the chart legend (left and right).

For the latter, click on the chart legend and keep the mouse button pressed while dragging it to the left or right side of the chart, until a little arrow symbol appears. Then release the mouse button. This way, you can drag and drop the scale to the left or right side of the chart.

USING THE ZOOM FUNCTION

If you want to take a closer look at certain chart regions, price patterns or signals of trading systems, the Zoom function is the right tool.

01. Activate the Zoom tool by clicking on the small icon with a magnifying glass and a plus symbol in the Chart area of the toolbar.

02. Click on the first corner of the area you want to enlarge.

03. Draw the rectangle around the area.

04. Release the mouse button. The area is zoomed.

→ To reset the Zoom and return to the previous view, click into an empty area of the chart with the activated Zoom tool.

→ To deactivate the Zoom tool, click on another tool like the select tool or target cursor. Alternatively, right-click into the chart and then click with the left mouse button into the empty area next to the context menu. This way, you return to the select mode. Although the second variant may sound complicated, it's a lot faster than the first one.

↑ CHART WITHOUT SCALES

↑ CHART WITH ZOOM APPLIED

USING THE TARGET CURSOR

To retrieve detailed information about the region below the mouse cursor, you can use the Target Cursor.

Activate the Target Cursor by clicking on the small cross-hairs icon in the Chart area of the toolbar. When you click into the chart now, information about that

position, the trading period, prices, indicators, etc. is displayed in a pop-up window. This window remains visible as long as the Target Cursor is active.

To return to the select mode, click on the select mode button in the toolbar. Alternatively, right-click into the chart and then click with the left mouse button into the empty area next to the context menu. This way, you return to the select mode. Although the second variant may sound complicated, it is a lot faster than the first one.

You can change the appearance of the Target Cursor in the chart properties, **Target Cursor Style**. Select Thin Line or **Whole Column**.

To have a temporary "target cursor" with an information pop-up, click and keep pressed the left mouse button in the select mode. The mouse pointer changes into a target cursor and a pop-up window with information appears. The window disappears when you release the mouse button.

CONTEXT MENUS IN THE CHART

If you right-click on an element in the chart, a context menu opens, offering you various functions for this element. The most important functions are:

→ Delete the selected element

→ Show properties of the selected element

→ For the symbol: starting the price editor and trading time manager, changing the period, saving chart as template, report bad ticks, trade symbol (automatically opens the order bar).

→ For user-defined continuation, formula and combined symbol: edit the settings of the symbol

→ For the indicators / trading systems: starting the program editor, request online information.

→ Placing order directly from the chart through "Manual Order Routing" on page 317.

SUBCHARTS

Subcharts are a special form of chart. They can be recognized by not having their own tab. Subcharts can have the same date axis or a different one than the main chart. As subcharts, the following documents can be displayed: symbols, indicators, strategies, equity curves (e.g. of the portfolio).

OPENING A SUBCHART

To open an instrument as a subchart, proceed as follows:

01. Click on Symbol List in the toolbox.

02. Double-click on the symbol list to open it.

03. Right-click on a symbol in the list to open the context menu.
     You have two options:

     → If you want to open the subchart with the same
        time axis as the main chart, select Insert
        Symbol from the context menu.

     → If you want to open the subchart with its own
        time axis, select Insert Symbol with new Date
        Scale from the context menu. (The y-axes are
        always independent of each other.)

     The subchart opens below the main chart in the same tab.

Note: This action also depends on the option Open symbols in their own subchart. This
defines how the program reacts to Insert Symbol. If the option is selected, symbols are
opened in a subchart. Otherwise, the symbol gets added to the existing chart.

MINIMIZING A SUBCHART

To minimize a subchart, click on the minimize button ▬ in the upper right corner of
the subchart.

If there are one or more minimized subcharts, a restore button ▭ will appear in the
top-most visible subchart (for each block of subcharts with their own date scale).
Click on it to see the list of minimized subcharts. Then click on an item to restore
the subchart at its original location, or select **Restore All** to restore all minimized
subcharts.

CLOSING A SUBCHART

To close a single subchart, click on the **x** button in the upper right corner of the
subchart. Alternatively, right-click into the subchart and select **Delete subchart**
from the context menu.

Note: When you close a chart, all its subcharts are closed automatically.

NAVIGATING IN SUBCHARTS

To maximize a subchart click on the button with the window symbol in the upper right corner of the subchart. Two little arrow buttons appear (right/left). Click on them to move between subcharts.

To display all subcharts again click on the button with the staggered windows.

To activate a subchart click on the subchart legend. In the active subchart, the small plug symbol is visible on the lower right, just like for the chart. (See the chapter Automatic Order Routing).

EDITING SUBCHART PROPERTIES

When you change the trading period for a chart via the **Period** button of the command line (see the chapter "Time Spans and Periods" on page 218), the period for all subcharts is changed accordingly.

To change the period for a single subchart, right-click into the subchart and select another **Period for Object** in the context menu.

MOVING INSTRUMENTS BETWEEN (SUB-)CHARTS

If an instrument is opened in a chart and you would like to move it into a subchart, you can drag and drop the instrument.

01. Click on the instrument in the legend and drag the instrument down. A little down-pointing arrow is added to the mouse cursor.

02. Drop the legend into another subchart or pull it down until the edge of the window, so that a new subchart is opened.

In the same way, you can move instruments from one subchart into another or into the main chart. This way, you can display two symbols together in one chart even though the option **Open Symbols in their own Subchart** in the "Tradesignal Options" on page 319 is active.

INDICATORS AND STRATEGIES IN SUBCHARTS

Whether an indicator is opened in a subchart depends on their Equilla programming. You can move indicators by dragging them into other (sub-)charts, as described above. To which instrument an indicator is applied to is given in the indicator legend and is independent from the arrangement on the user interface. (See also the chapter "Using Indicators" on page 372.)

For strategies, the same rules apply in principle. However, usually their graphic output are only a few arrows at the instrument curve. As this doesn't make not

much sense in a subchart, most strategies are opened in the same (sub-)chart as the instrument they are applied to.

SETTING A NEW DEFAULT CHART STYLE

When Tradesignal is first installed, the default chart style is the candlestick chart. However, you can also set the bar and line chart as default. Proceed as follows:

01. Open the File menu.

02. Select the Tradesignal Options.

03. Open the Chart settings.

04. In the Default Chart Style area, select whether you want the candlestick, line, or bar chart as standard. Confirm the new settings by clicking OK.

All new charts are now displayed according to the new default setting.

COMPARING SYMBOLS

If you want to compare several symbols in the chart, it may be essential to normalize their measuring unit to get meaningful results. Tradesignal offers you different possibilities to achieve this goal. The following examples use Tradesignal Realtime as data provider:

CURRENCY CONVERSION

If you are trading the same symbol on different exchanges you may encounter the problem that they are displayed in different currencies. The following example shows you how to unify the currency in the chart:

01. Open a chart with Microsoft, **MSFT NAS**, a symbol traded on the American market in US Dollars.

02. Add another Microsoft symbol traded on a different exchange, e.g. **MSF GER**, which is traded in Germany in Euro.

03. Select the symbol traded in Germany in the chart and change the currency to **US Dollars** in the instrument properties.

04. Select the first Microsoft symbol and add the **Spread Diff** indicator from the Tradesignal package. In the dialog, choose the symbol traded in Germany as second input.

Note: The currency conversion is not available for all symbols, such as indices which are displayed in index points. The list of available currencies depends on the selected data provider.

UNIT CONVERSION

Unit conversion can be interesting for comparing symbols that are traded in different measurement units, e.g. barrel, bushel, tons, etc. This information and the list of available units and used abbreviations depends on the data provider .

Example for soy beans and soy oil:

01. Create a "User-defined continuations" on page 84 for soy beans and choose **S** as Future Root Code. The future is traded in US Cent per **Bushel (Bsh)**.

02. Create another Continuous Contract for soy oil and choose **BO** as Future Root Code. This one is traded in US Cent per **Pound(Lbs)**.

03. Add both continuous contracts to a chart and select the soy oil symbol.

04. Change the unit in the instrument properties from **Lbs** to **Bsh**.

05. Add one of the **Spread** indicators from the Tradesignal package to display the difference.

DISPLAY UNIT

Symbols can have different display units which refer to the displayed numbers of decimal places. For example, the Dow Jones index has two decimal places while the Euro has four decimal places. This is how you normalize the display of symbols in the chart:

01. Create a chart with the Dow Jones, **.DJI**.

02. Add the Euro (**EURUSD**) symbol to the chart and select it.

03. Open the properties and change the instrument property **Display Unit** to **0.01** to display the Euro with two decimal places.

The default value is provided by the data provider. It can be changed in the session properties for each symbol by opening the Session Manager via the context menu or the toolbar.

Tip: You can change the display unit also for indicator and strategy outputs. Select the element in the chart and change the value in the properties. The default value of the output is based on the underlying symbol display unit.

Tip: The display unit is also available in the "Scanner" on page 71, "Watchlist" on page 77 and "Portfolio" on page 251 and can be used to align the display units for multiple selected symbols at once.

SEASONAL CHARTS

With the seasonal mode in the chart properties, Tradesignal offers you the ability to overlay the prices of different years for one or more symbols. Comparing the symbols this way emphasizes seasonal pattern, e.g. if used with commodities that have seasonal variations. See the article "Seasonal Chart" on page 155 for more details

PERCENT PERFORMANCE CHARTS

You can display the price movements of a symbol as percentage increase/decrease relative to a start price by using percent performance transformation. This makes it easier to compare the performance of symbols since their absolute price values are converted to relative price movements. See the article "Percent Performance" on page 154 for more details.

SEMI-LOGARITHMIC DISPLAY

The value axis can be displayed using a logarithmic scale. This is mainly used for symbols with a long history, to emphasis fluctuations in prices. The changes are not displayed linearly but perceptually, therefore the increase from 1 to 10 is identical to the increase from 10 to 100.

↑   SCALE VALUE CONTEXT MENU

Example for changing the Dow Jones display from linear to logarithmic:

01. Open a chart with the Dow Jones, '.DJI.'

02. Open the context menu for the symbol (see picture) and choose Logarithmic.
To return to the linear display, repeat this action but select Linear instead.

You also have the option of inverting the value scale by selecting Inverted, this will cause the lowest values to be displayed at the top.

Note: The left value axis can be changed separately if you have a second symbol in the chart.

BAR CHART

Bar charts are among the most common chart types and give information about open, high, low and close prices, price developments and the magnitude of price movements.

The bar chart can be set as the default chart type in Tradesignal, see chapter "Chart" on page 96.
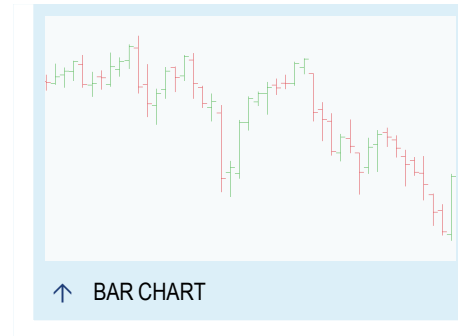
↑ BAR CHART

TRADING INFORMATION IN BAR CHARTS

The following information is available in a bar chart:

→ The highest price, given by the top point of the bar

→ The lowest price, given by the lowest point of the bar

→ The open price, given by the left vertical line

→ The close price, given by the right vertical line

→ The direction of the price movement, given by the relative positions of the left and right vertical lines. If the left one is below the right one, prices have risen during the trading period. Otherwise, prices have fallen.

→ The direction of the price movement, given by the color of the bars. The usual color setting is red for falling and black for rising prices. The colors can be edited in the chart properties.

→ The strength of the price movement, given by the total length of the bar (difference between high and low).

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the trading period, see the chapter "Time Spans and Periods" on page 218. Note that it is not possible to use bar charts when using ticks as periods.

→ change the time span. In this case, several bars of a time span are combined to a "meta bar" to display the trading activity of several periods. For example, if you choose "Current Quarter", three meta bars based on the monthly dates are displayed.

→ change the chart look, see the chapter Chart Properties.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

Bars Properties

Bullish Color Here you can select a color and transparency for upward bars.

Bearish Color Here you can select a color and transparency for downward bars.

CANDLESTICK CHART

Starting in the 17th century, the candlestick chart pattern was used in Japan. Used by Charles Dow in 1900, it was the American trader Steve Nison who brought candlestick charts back to the awareness of western traders. Today, candlestick charts are one of the most common chart types.

↑ CANDLESTICK CHART

Candlestick charts give information about the open, high, low and close prices and about the direction and magnitude of the price movement. It is this wealth of information and the distinct patterns that make the candlestick charts so interesting. The direction and movement of prices can be better perceived than by using bars. More complex candlestick patterns are often used as the basis for trading decisions.

The candlestick chart is the default chart type in Tradesignal. See chapter "Chart" on page 96.

TRADING INFORMATION IN CANDLESTICKS

The following information is available in the candle body and the shadows (the lines on bottom and top, also called wicks):

→ The high of the trading period, given by the end of the upper shadow.

→ The low of the trading period, given by the end of the lower shadow.

→ The open price, given by the body edge; either the bottom line in the case of an upwards development, or the top line in the case of a downwards development.

→ The close price, given by the body edge; either the top line in the case of an upward development, or the bottom line in the case of a downward development.

→ The direction of the price movement, given by the body color. Colors are usually red or black for falling and green or white for rising prices. The color settings can be changed.

→ The magnitude of the price movement, given by the length of the body and the shadows. The total length of a candlestick between the wicks is the difference between high and low.

More information can be gathered when several candlesticks are seen in context. Patterns of up to three candles are used to take a closer look at the price movements and their quality. For example, candles with bodies of the same color show more pronounced trends. Trading is often done based on a mixture of candlestick pattern analysis and other methods.

TWO SIMPLE CANDLE EXAMPLES

THE HAMMER

The hammer was named for its characteristic shape and the relationship to the Japanese sign for "hammering a floor". It has a large lower shadow with a small body on top, meaning a long downward movement stopped (and changed direction) during the trading period.

An ideal hammer has a small white or green body, showing that a bullish trend won out. The hammer should have no upper shadow, meaning that the close corresponded to the high in the trading period. In combination with analysis methods like moving average and other support signals, a hammer may be a good entry signal.

THE DOJI

A doji is a common candle that has a very small or no body at all. If the body is small, the color can be ignored. A distinct doji has very large shadows of similar size.

A doji signals that for all the trading over the day, the market and its forces are in equilibrium. The opening and close price are almost the same.

The doji itself only shows a kind of "frozen" state, of indecision. However, it gathers importance depending on the surrounding patterns. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the trading period and timespans, see the chapter "Time Spans and Periods" on page 218.

→ change the chart look, see the chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

Candles Properties

Border Color Here you can select a color for the border.

Show Frame Here you can select whether the candle frame will be displayed or hidden.

Bullish Color Here you can select a color and opacity for upward candles.

Bearish Color Here you can select a color and opacity for downward candles.

INDICATORS AND STRATEGIES

In the indicator overview, you can find the indicator *Candle Pattern* which includes a long list of typical candlestick patterns to choose from. You can edit these patterns in the graph properties in the toolbox. The set pattern is displayed in the graph.

In the strategies overview, you can find strategies such as *Candle Bearish Engulfing - Exit*, *Candle Big White Candlestick - Exit*, and many more that you can apply to your candlestick chart.

USING CANDLESTICK PATTERNS

A "Candlestick Chart" on page 110 already delivers a lot of information inside the candles itself, but their real trading power are candlestick patterns. Patterns of up to three candles and more are used to take a closer look at the price movements and their quality. For example, candles with bodies of the same color show more pronounced trends. Candle patterns involving more than one candle are most of the time more powerful than one candle patterns.

Trading is often done based on a mixture of candlestick pattern analysis and other methods. Candlestick Patterns can identify tops, bottoms, reversals and therefore create buy and sell signals.

Candle Patterns can be confirmed or failed. Both scenarios creates trading signals. Furthermore, you can also trade without waiting for the confirmation. The quick trade can result in a higher profit but is also riskier.

In Tradesignal are white rising candles in green and black falling candles in red drawn. The definitions of the candle patterns are based on the original colors of candlestick. In the description are therefore the traditional colors white and black used.

ONE CANDLE PATTERNS

BIG BLACK/WHITE CANDLE

The body of big candles are at least 1/3 bigger as the previous candles in the defined period. Big bodies implies strong buy or sell pressure depending on the color. White bodies show a strong buy pressure, while black bodies show a strong sell pressure.

HAMMER

The hammer was named for its characteristic shape and the relationship to the Japanese sign for "hammering a floor". It has a large lower shadow with a small body on top and only appears in a downtrend.

An ideal hammer has a small white body, showing that a bullish trend won out. The hammer should have no upper shadow, meaning that the close corresponded to the high in the trading period.

The counterpart of the hammer is the "Hanging Man" below.

HANGING MAN

Hanging man looks like a man hanging from a gallows. It indicates a trend reversal and the end of a uptrend. The bearish counterpart is a "Hammer" above.

The candle itself has a small body with a long lower shadow, but with a short or even no upper shadow at all. The color of the body is not important for the signal.

The hanging man needs a confirmation within the next candles to be a strong signal.

STAR/RAINDROP

Stars are candles with a small body, either white or black. They build a gap with the prior large candle. If a star appears in a downtrend it is called raindrop.

↑ HAMMER

↑ HANGING MAN

DOJI

A doji is a common candle that has a very small or no body at all. If the body is small, the color can be ignored. A distinct doji has very large shadows of similar size.

A doji signals that for all the trading over the day, the market and its forces are in equilibrium. The opening and close price are almost the same.

The doji itself only shows a kind of "frozen" state, of indecision. However, it gathers importance depending on the surrounding patterns. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

↑   DOJI

Special formations of a doji are gravestone and dragonfly. They are defined by the distance between open and close in relation to the trading range. The names suggest already the appearance. A gravestone doji has a longer upper shadow and a dragonfly has a longer lower shadow.
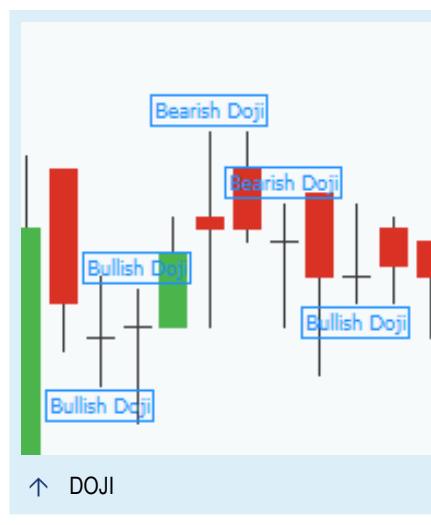
SPINNING TOP

Spinning tops are candles with a small body and shadows which are longer than the body. If no body at all is drawn, it is a "Doji" above. The pattern shows like the doji the indecision of the market.

SHOOTING STAR/INVERTED HAMMER

A shooting star is a candle with a small body and very long upper shadow.

A shooting star is a classic bearish signal because the long upper shadow shows that trades are also made in the higher levels.

The counterpart of the shooting star is the inverted hammer. If in a downtrending market a candle with a long upper shadow and a small real body occurs, is that bullish trend reversal signal.

↑   SHOOTING STAR AND INVERTED HAMMER
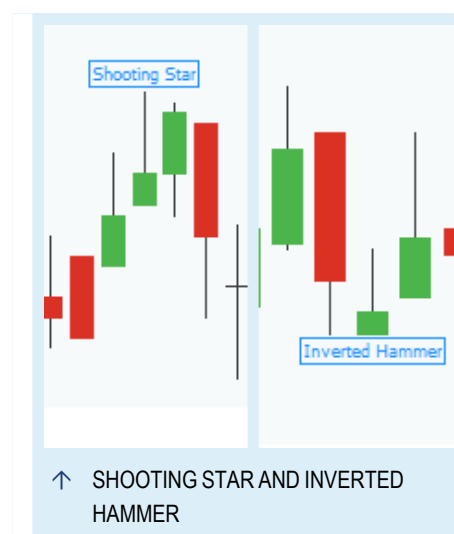
WINDOW

Windows are gaps and they are a continuation and resistance pattern. A rising window is a gap in upwards direction and a falling window is a gap in downwards direction. The color of the candle is not meaningful.

DUMPLING TOP AND PAN BOTTOM

These candle patterns are similar to the Western rounding top. For the bullish dumpling top you need a gap in the lower direction during an uptrend. For the bearish pan bottom you need a gap in the upper direction during a downtrend.

MARUBOZU

A candle with a long body and without any shadows is a marubozu, also known as Marabozu. The body has to be longer than the usual candles. The marubozu is a one of the strongest bullish or bearish candle. It clearly represent the victory for one side because high and low values are equal to the open and close values.

The color of the body defines if it is a bearish or a bullish signal. A white body is a bullish signal and a black body is a bearish signal on the other side.

↑   BEARISH AND BULLISH MARABOZU

BELT HOLD

A belt hold can appear as bullish and bearish signal and indicates a trend reversal. This pattern is similar to "Marubozu" above because the significant candle has no lower shadow and only a short upper shadow.

A bullish belt hold occurs if during a uptrend with a series of bullish candles a big long black candle appears. The open of this candle is lower than the close of the prior candle.

In the other direction, a bearish belt hold occurs if during a down trend with a series of bearish candles a big long white candle appears. The open of this candle is lower than the close of the prior candle.

COUNTERATTACK

A counterattack can be bullish and bearish. Both patterns are signals for trend reversals.

A bullish counterattack occurs when a white candle occurs in a downtrend after a series of a black candles. The open is lower than the prior open but the close and the prior close are the same.

In the other direction, a bearish counterattack occurs when a black occurs in a uptrend after a series of a white candles. The open is higher than the prior open but the close and the prior close are the same.

CANDLESTICK PATTERNS WITH TWO CANDLES

ENGULFING PATTERN

Engulfing patterns occur on both sides, so as bearish and bullish engulfing pattern. Engulfing patterns are in both directions a signal for a trend reversal.

If in a rising market a black real body appears which envelopes the prior small white candle, is that a bearish engulfing pattern.

A bullish engulfing pattern appears in a descending market, if a large white body envelops the prior black candle.

↑ BEARISH AND BULLISH ENGULFING PATTERN

The second big candle does not have to engulf the shadows in both cases, but at least the whole bodies have to be engulfed.

SEPARATING LINE

Separating lines can be bullish and bearish. The relation between the close and open of the two candles is important. If the second open is the same as the open of the first white candle and the second close is lower as before, a black candle is formed and therefore it is a bearish signal. It is a bullish signal, if the second open is the same as the open of the first white candle and the second close higher as before. The second candle is then a white candle.

IN NECK AND ON NECK

In neck and on neck patterns are similar to "Separating Line" above but it focuses on the close or low values, which are the same or at least almost the same.

For the on neck pattern a black candle with long body is followed by a smaller white candle. The high of the white candle should be the low of the black candle or almost the low.

The in neck pattern is also build from a long black candle followed by a small white candle. The high of the white candle should be the close of the black candle or almost the close.

PIERCING PATTERN AND DARK CLOUD COVER

Both patterns are signals for trend reversals. The dark cloud cover is the bearish signal and the piercing pattern, also known as piecing line, is the bullish signal.

The piercing pattern occurs at the bottom of a downtrend. The first candle is a long black candlestick. The following white candle opens with a gap and closes more than halfway into the body of the prior black candle.

A dark cloud cover is performed if the first candle in a uptrend is white and is followed by black candle whose close is also more than halfway into the body of the prior candle.

↑   PIERCING LINE AND DARK CLOUD COVER
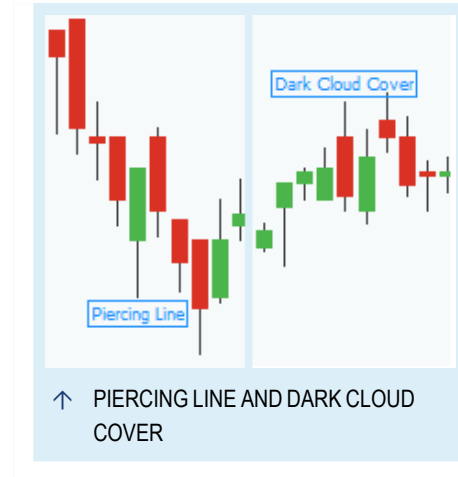
THRUSTING

A thrusting pattern starts with a long black candle. The following white candle closes above the first close but not above the midpoint of the first body.

The interpretation of this pattern is not so easy. Traditional it is a confirmation for the bearish trend, but there are also some evidence that it can be a bullish reversal as well. So, you can combine this pattern with other patterns or wait for the confirmation of this pattern within the following candles.

PITFALL

Pitfall is a trend reversal pattern. After a big candle, which is going with the current trend, one candle with a gap against the current trend appears. The second candle shows the new trend.

In a downwards trend the first candle is black and is followed by a big white candle with a rising "Window" on page 116. In a upwards trend the first candle is white followed by a big clack candle with a falling window.

↑   BEARISH AND BULLISH PITFALL

If there is no window between the candles, are the names of this pattern sunrise and sunset. Sunrise is the bullish pattern and sunset the bearish.

HARAMI

A Harami pattern can be bullish and bearish. If it is bullish or bearish, is controls by the color of the candles and the current trend. It shows the imbalance of the market's health.

For both signals the first candle has an unusually big body and the second candle's body is within the first candle's body.

For a bullish signal you need a market with a down trend. The first candle is black and the second smaller one is white.

↑ BEARISH AND BULLISH HARAMI

For a bearish signal you need the opposite. While the market is in a downtrend, the first candle should be white and second small candle should be black.

If the second candle is a "Doji" on page 115, is the pattern called Harami Cross.
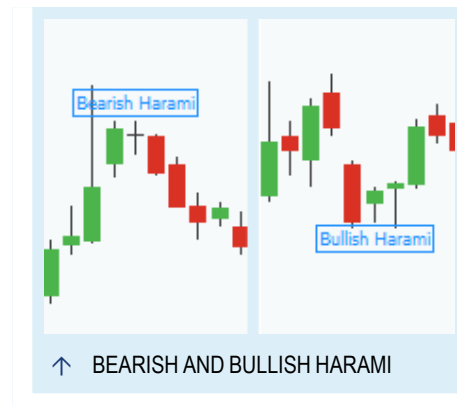
TWEEZER BOTTOM/TOP

Tweezer patterns appear in down- or upwards trends. The same lows or highs are tested on back-to-back sessions. The first candle is a big candle and the second one is a smaller one or even a "Doji" on page 115.

For a top pattern the first candle has to white and the second candle black. For the bottom pattern is it the other way around.

↑ TWEEZER BOTTOMS AND TOPS
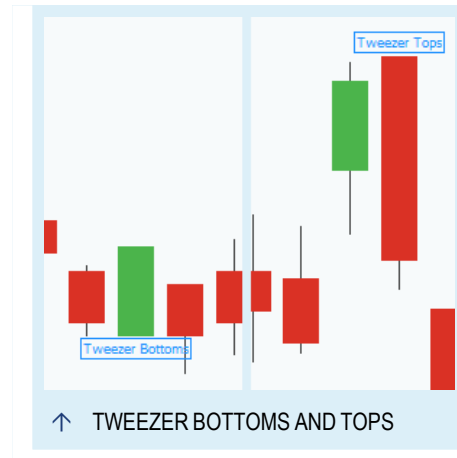
CANDLESTICK PATTERNS WITH THREE CANDLES

THREE WHITE SOLDIERS/THREE BLACK CROWS

Both patterns consists of three candles with the same color.

Three white soldiers consists of three white consecutive candles in a upwards trends. The open of each following candle has to be inside the body of the previous one and the high of each following candle has to be higher than the previous one. If found at the bottom are the three white soldiers a sign for a stability of the upcoming trend.

↑   THREE WHITE SOLDIERS AND THREE BLACK CROWS

Three black crows consists of three black consecutive candles in a upwards trends. The open of each following candle has to be inside the body of the previous one and the close of each following candle has to be lower than the previous one. If it is found at the top of an uprising trend it is reversal pattern.

TWO LITTLE BULLETS/SPINNINGS

Two little bullets is a bearish pattern which occurs in upwards trends. The first candle has a long body and is followed by a candle with a small body or even a "Doji" on page 115. This candle has to open with a rising "Window" on page 116. The last candle has a small body.

The opposite pattern are the two little spinnings, which is a bullish pattern. The only difference is that the "Window" on page 116 between the first and second candle has to be a falling window. The first candle has a long body followed by the second candle with a small body or a "Doji" on page 115. The last candle has also a small body.

MORNING/EVENING STAR

Morning star and evening star are two opposite patterns. The morning star is the bottom reversal and the evening star is the top reversal pattern. The second candle which is a star, see "Star/Raindrop" on page 114, can show both colors or can be a "Doji" on page 115 as well in both patterns.

A morning star is formed, if the first candle has a long black body, following by the star with a gap below. At the end a white candle follows which closes is within the first body. The star rises from the black night to the bright day.

↑   MORNING OR EVENING STAR
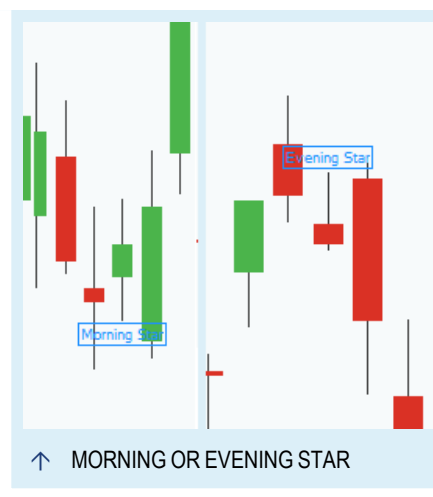
A evening star is the opposite and stars rises from the bright day into the dark night. So the first tall candle has white body. The second is the star and opens with a gap above. The last candle is a black candlestick which closes is within the first body.

DELIBERATION

The deliberation pattern consist out of three candles that confirm the current trend and its continuation. It can be bearish and bullish. The relation between three candles is important.

The bullish deliberation is build when three black candles appear in a row in a current downtrend. The second candle's open has to be inside the body of the first one and the close has to be below the close of the first. The last candle is short or even a "Spinning Top" on page 115 or a "Doji" on page 115 which opens with a gap down. It shows the continuation of the downtrend.

The bearish deliberation is build when three white candles appear in a row in a current uptrend. The relation between the candles is important. The second candle's open has to have the same relation as for the bullish deliberation. The body of the second candles has to be within the body of the first and the close has to be above the first close. The last candle confirms the uptrend. It is short or even a "Spinning Top" on page 115 or a "Doji" on page 115 and opens with a gap up.

TASUKI GAP

Tasuki gap is formed by three candles, whereby the second following candles opens with a gap from the first one. The last two candles have the same size. The direction of the gap or "Window" on page 116 and the colors of the candles define if the pattern is bullish or bearish. The bullish variation starts with a white candles followed by a white candle

↑ BEARISH AND BULLISH TASUKI GAPS

which opens with a rising window. A black candles closes the pattern. The bearish variation is built from two black and one white candles and the gap is a falling window.

TWO WHITE LINES

Two white lines can be a bullish or a bearish pattern and the characteristic depends on the "Window" on page 116 between the first and second candle and the colors of the first candle.

The bearish pattern starts with a black candle followed by a white candle which opens with a falling window. The high of the second candle is higher than the low of the first candle. The last candle is a white and the low is higher than the high of the second candle.

On the opposite, the bullish pattern starts with a white candle followed by a white candle which opens with a rising window. The high of the second candle is higher than the low of the first candle. The last candle is a white and the low is higher than the high of the second candle.

BEARISH UPSIDE GAP TWO CROWS

This pattern is a bearish trend reversal pattern. The first white candle is big and the second black candle opens with a rising "Window" on page 116. The last black candle opens at or above the open of the prior candle. The close is below the close of the prior candle, but still above the close of the first candle, so the gap to the first candle is still open. The two black candles show that the trend is not strong enough anymore.

CANDLESTICK PATTERNS WITH MORE THAN THREE CANDLES

FALLING THREE/RISING THREE

The falling three and rising three are two opposite patterns. Both of the them consist out of five candles and confirms the continuation either of a bearish trend or a bullish trend.

For a bearish trend, two black candles surround three small white candles. The first black candle is long. The three white candles are within the high-low range of the first candle. The last candle is black and theirs close builds a new low.

For a bullish trend the colors are the other way round. The first and last candles are white and the candles in the middle are black. The middle black candles are within the high-low range of the first candle. The close of the last white candle builds a new high.

TRADING ALONG WITH CANDLE PATTERNS

Candle Patterns often predict trend reversal and are therefore a useful tool for swing traders. Western technical analysis tools are behind the trend and only indicate a trend change with a delay. The disadvantage of candles is that the signal is only shown, when the candle is finished and closed. So for daily candles you will get the result only at the end of the day. There is no unanimous recommendation with which period candle patterns work at best. Different traders use candle pattern on different periods simultaneous or individually.

When interpreting candle patterns please consider the current market situation in addition. Several patterns have bullish and bearish variations, which are only valid in down- or upwards trends. As long as no valid trend is established in the market, the signals are invalid. In addition some candle patterns work better in a certain market as in another.

You can also combine the signals of multiple candle patterns. Multiple patterns indicate a trend reversal whereas a single candle pattern indicates often a support or resistance line. As a "Candlestick Chart" on page 110 uses the same values as a normal "Bar Chart" on page 109, you can use western technical analysis tools in addition. Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

If you use our build-in strategies please ensure that you use strategies that complement each other, short entry and short exit. Most of the time a bullish strategy has to be combined with a bearish strategy and vice versa, to build a complete system.

LINE CHART

Line charts are a classic type of chart, in which data points are connected by a line, e.g. physical data in axes of coordinates. The line chart can be set as the default chart type in Tradesignal.
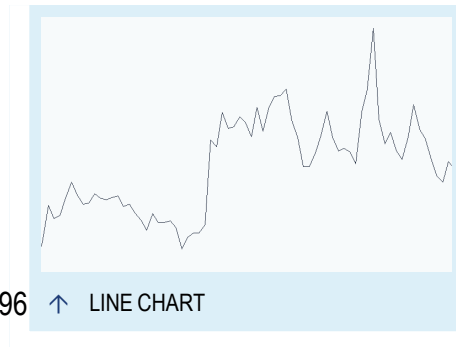
↑ LINE CHART

Tip: For more information see chapter "Chart" on page 96

In Tradesignal, line charts are used for displaying

- → time lines for symbols, e.g. for Open, High, Low or Close
- → indicator results
- → performance development of a trading system
- → additional information like fundamental data and market depth indices.

The line chart is the simplest chart type for stocks. From trading period to trading period, the line is extended for new prices.

For symbols, the lines are usually drawn for closing prices.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

- → set the period and time span, see the chapter "Time Spans and Periods" on page 218.
- → change the chart look, see the chapter "Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Apart from the Standard Properties you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

LINE PROPERTIES

Color Here you can select a color for the line.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing the line with a 3D effect. Four settings are available.

For more information see chapter

STEPPED LINE CHART

The stepped line chart is a variation of the normal line chart. The price levels are connected not by direct lines but at right angles. Stepped line charts can only be used for stocks.
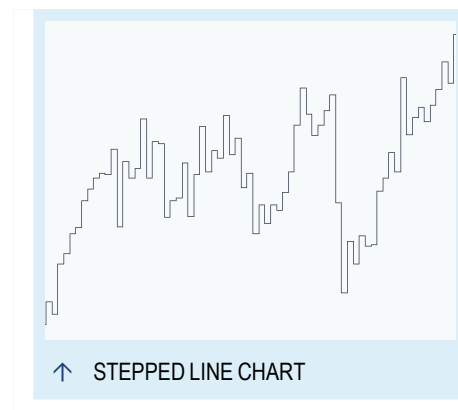
↑   STEPPED LINE CHART

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→   set the period and time span, see the chapter "Time Spans and Periods" on page 218.

→   change the chart look, see the chapter "Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

STEPPED LINE PROPERTIES

Color Here you can select a color for the line.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing the line with a 3D effect. Four settings are available.

SYMBOL CHART

The symbol chart is a variation of a normal line chart, displaying the chosen input (open, close, high...) as unconnected symbols. Several symbol types can be set for the display.
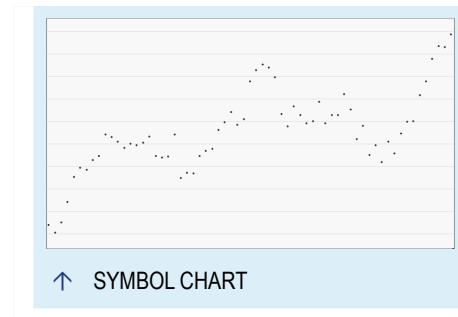
↑   SYMBOL CHART

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→   set the period and time span, see chapter "Time Spans and Periods" on page 218.

→   change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Beside the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

DOTTED LINE PROPERTIES

Style Here you can select a symbol style, e.g. circles, squares etc.

Size Here you can set the symbol size.

Border Color Here you can select a border color for the symbol.

Fill Color Here you can select a fill color for the symbol.

Connect Here you can select whether the symbols should be connected.

Anchor Here you select to what the symbols should be aligned to.

FILLED AREA CHART

Filled area charts, as indicated by the name, are charts in which filled areas between selected input data is displayed. You can use filled area charts for:

↑ FILLED AREA CHART

→ Drawing a filled area between the prices and the base line (default)

→ Drawing a filled area between different price levels
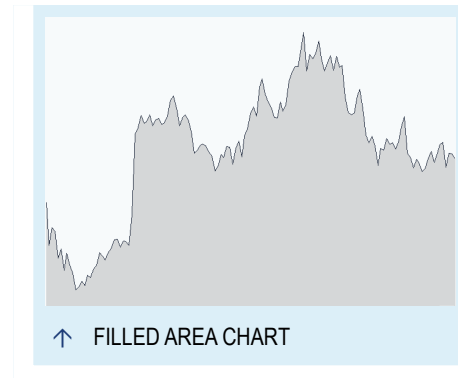
Filled area charts are not useful for detailed symbol analysis, as too much information is lost in this kind of charting.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter "Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Baseline Here you can set a value for the price baseline, e.g. raise the baseline to "40".

Input A Select the data to be used as upper line of the area (Open, High, Close, Low or Volume).

Input B Select the data to be used as lower line of the area (Open, High, Close, Low, Volume or Baseline).

FILLED AREA PROPERTIES

Color 1 Here you can select a color for the top line.

Color 2 Here you can select a color for the bottom line.

Area Color Here you can set a color and transparency for the filled area.

FOREST CHART

Forest charts are histograms. For each input value in the timeline, a bar (also called "needle") is drawn.

Forest charts are not useful for detailed symbol analysis, as too much information is lost in this kind of charting. They are more commonly used for indicators, where relative changes per day can be emphasized by needles in different colors.
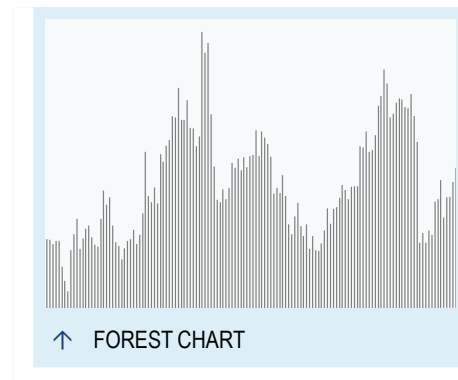
↑ FOREST CHART

In Tradesignal, forest charts can be used for:

→ symbol prices (by selecting the entry in the chart menu)

→ the trading Volume (in the stock properties in the toolbox; this is available as an addition for every chart type)

→ indicators; however, for those, the equilla scripts have to be adapted. You can find a tutorial for doing so in the "Tutorial: Indicator as Forest" on the next page.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

HISTOGRAM PROPERTIES

Histogram Color Here you can select a color for the histogram bars.

TUTORIAL: INDICATOR AS FOREST

To display indicators as a forest chart, the indicator code has to be adapted accordingly. In the following tutorial, we show you how to set up a Momentum indicator as a forest chart with the needles in two different colors, depending on their direction.

↑   FOREST CHART
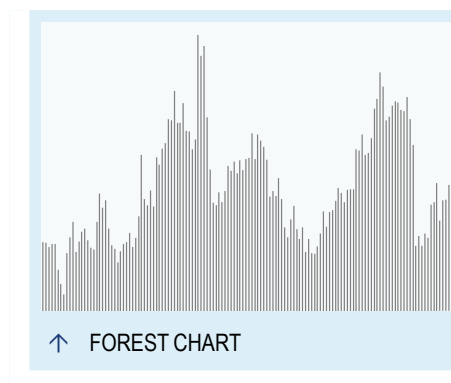
THE TRADITIONAL MOMENTUM INDICATOR

You can find the traditional Momentum Indicator in the list of all indicators in the Toolbox. Right-click the indicator to open the context menu and choose **Edit**. The editor with the indicator's equilla code opens.

```
Meta:
    Synopsis( "The Momentum indicator utilizes price and volume statistics
for predicting the strength or weakness of a current market and any
overbought or oversold conditions, and may indicate turning points within
the market." ),
    ShortCode( "MOM" ),
    SubChart( True );

Inputs:
    Price( Close ),
    Period( 10, 1 ),
    ShowAlerts( False );

DrawLine( Momentum( Price, Period ), "MOM" );
DrawLine( 0, "Zero Line", StyleDot );

CheckForCrossAlert( Plot1, 0, "Momentum", "Zero Line", ShowAlerts );
```

COPY THE MOMENTUM INDICATOR CODE AS BASIS FOR THE NEW INDICATOR

01. Click on **New Indicator** in the Related Tasks area of the toolbox to start a new indicator.

02. Name the new indicator *Momentum Forest*.

03. Select the complete code by clicking **CTRL+A**.

04. Copy the contents by clicking **CTRL+C**.

05. Click in the new, empty editor window and press **CTRL+V** to insert the copied contents.
     Alternatively, you can find all these functions in the context menu of the editor, which you can open by right-clicking the editor window.

EDITING THE MOMENTUM FOREST INDICATOR FOR DISPLAY AS A FOREST CHART

First, you have to delete some lines in the code we do not want to use:

```
ShowAlerts( False ); (make sure that the line above ends with a semicolon
";")
```

```
CheckForCrossAlert( Plot1, 0, "Momentum", "Zero Line", ShowAlerts );
```

Then you need two variables for your indicator:

→ one variable to save the momentum calculation

→ one variable to save the color setting for the forest display

For this, enter the following lines beneath the Inputs area:

```
Variables:
momValue, forestColor;
```

Below, enter the formula for the momentum calculation:

```
//Calculate Momentum
momValue = Momentum( Price, Period );
```

Now you need the condition for the needle colors. If the Momentum rises in comparison to the previous day, the needle should be displayed in green; otherwise, the needle should be red.

```
//Set color depending on the change in comparison to the previous day
if momValue > momValue[1] then
    forestColor = DarkGreen
else
    forestColor = Red;
```

To display the result as forest chart, you have to substitute the first DrawLine line with the following:

```
//Drawing command with color variable
DrawForest(0, momValue,"Zero","MomentumUp",thick,forestColor,true);
```

The color of the needle is given by the dynamically set variable forestColor. The base line remains unchanged.

In the META area of the code you can now edit the synopsis and enter a specific ShortCode. With the latter, you can later call up your new indicator from the command line.

COMPILING AND APPLYING THE MOMENTUM FOREST INDICATOR

```
Meta:
    Synopsis( "The Momentum Forest is a variation of the Momentum Indicator,
displaying the values in Forest fashion with color coding for up/down
development. The Momentum indicator utilizes price and volume statistics for
predicting the strength or weakness of a current market and any overbought
or oversold conditions, and may indicate turning points within the market."
),
    ShortCode( "MOMF" ),
    SubChart( True );

Inputs:
    Price( Close ),
    Period( 10, 1 );

Variables:
    momValue, forestColor;

//Calculate Momentum
momValue = Momentum( Price, Period );

//Set color depending on the change in comparison to the previous day
if momValue > momValue[1] then
forestColor = DarkGreen
else
forestColor = Red;

//Drawing command with color variable
DrawForest(0, MomValue,"Zero","MomentumUp",thick,forestColor,true);
DrawLine( 0, "ZeroLine", StyleDot)
```

Compile the indicator by pressing the **F7** key or by clicking the **Compile Script** button in the Equilla menu in the toolbar.

The indicator is now available in the indicator list in the toolbox. From there, you can apply it to a chart by either pulling it into a chart via drag-and-drop or by selecting **Apply** from the context menu.

LINKED FOREST CHART

The linked forest differs only marginally from the Forest Chart. The top of the needles are connected by a line. Other than that, the chart is identical to the forest chart.

This chart is less helpful for symbol charting, as the connection with the baseline can lead to distorted values for longer histories.
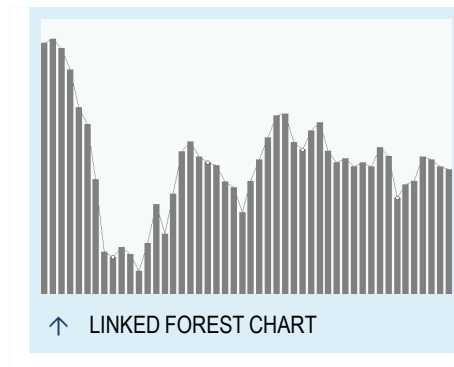
↑   LINKED FOREST CHART

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→   set the period and time span, see chapter "Time Spans and Periods" on page 218.

→   change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

You can find the symbol parameters in the properties of the displayed stock (symbol), see the chapter "Forest Chart" on page 128.

CANDLE VOLUME CHART

Candle volume charts combine charts of prices and volumes. The following information is available:

↑   CANDLE VOLUME CHART

→   The high of the trading period, given by the end of the upper shadow.

→   The low of the trading period, given by the end of the lower shadow.

→ The open price, given by the body edge; either the bottom line in the case of an upwards development, or the top line in the case of a downwards development.

→ The close price, given by the body edge; either the top line in the case of an upward development, or the bottom line in the case of a downward development.

→ The direction of the price movement, given by the body color. Colors are usually red or black for falling and green or white for rising prices. The color settings can be changed.

→ The magnitude of the price movement, given by the length of the body and the shadows. The total length of a candlestick between the wicks is the difference between high and low.

→ The trading volume, given by the width of the candle body.

Candle volume charts are a mixture of candlestick and equi volume charts. The candle interpretation is the same as for Candlestick Charts, but the width of the candle depends on volume, not on time. The difference to an "Equi Volume Chart" on the next page is that, as opposed to that chart type, the open and close prices are still available in the candle volume charts.

LIMITATIONS

At each end of the quarter, there is an expiration date on which futures of stocks, indices and commodities expire and/or new futures are issued. On these days, there are often extremely high trading volumes for symbols. Candle volume charts may be overly influenced by them, resulting in no sensible values for these dates. To avoid this issue, ignore these dates.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

CANDLE VOLUME PROPERTIES

Border Color Here you can select a color for the border.

Show Frame Here you can select whether the candle frame will be displayed or hidden.

Bullish Color Here you can select a color and opacity for upward candles.

Bearish Color Here you can select a color and opacity for downward candles.

EQUI VOLUME CHART

Equivolume charts are a combination of price movement and trading volume charts. The chart gives information on high, low, volume and price direction per trading period.

↑ EQUI VOLUME CHART

Equivolume charts were introduced by Richard W. Arms Jr. It was well-known that the trading volume was an important criterion for assessing the current and future situation in the market. Arms consequently introduced the volume - which up to that date was only displayed as an additional histogram - into the chart itself by plotting price versus volume. This way, information about open and close prices and the normal time line are lost.
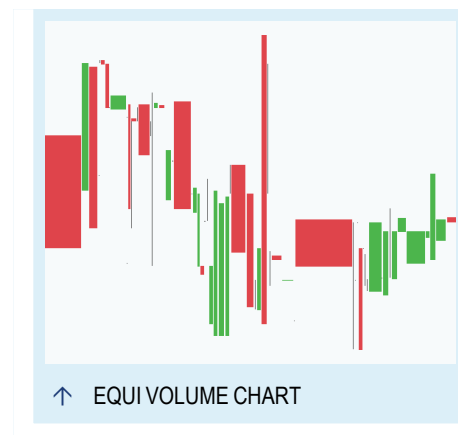
TRADING INFORMATION IN EQUI VOLUME CHARTS

The following information is available in the boxes:

→ The high per trading period, given by the top line of the box

→ The low per trading period, given by the bottom line of the box

→ The trading volume, given by the width of the box. Because of this display choice, the timeline information is distorted.

→ The direction of the price movement, given by the box color. Colors are usually red or black for falling and green or white for rising prices. The color settings can be changed.

→ The open and close prices are not given in this chart type. However, this limitation is compensated by the strong visual display of buying powers and selling pressures within a market.

EQUI VOLUME CHART PATTERNS

In equi volume charts, four typical patterns can be found that give information on the current market and trends, similar to single candles in candlestick charts. See the graphic for more details.

NARROW BARS

Usually seen in balanced markets. The price movements result from relatively small trading volumes. Several consecutive narrow bars may signal a distinctive trend setting in, though not as strong as one indicated by power bars, see below.

SQUARES

The price spans are small although there is significant trading activity. The pattern may indicate resistance areas in the chart or appear exactly at the point of trend or resistance lines. Insecurity rules the market, and the resulting wins and losses were achieved under counter pressure.

OVERSQUARES

Both sides of the market are strongly into trading. Large ask volumes have met large bid volumes. The price span is very small. The pattern can be interpreted as trend reversal and be combined with other triggers in charts.

POWER BARS

Named after the snack food. In an equivolume chart, Power Bars result from a large price movement based on an active market. They can be interpreted as important breaks and be combined with other triggers in charts.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

- → set the period and time span, see chapter "Time Spans and Periods" on page 218.
- → change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

EQUI VOLUME PROPERTIES

Border Color Here you can select a color for the border.

Show Frame Here you can select whether the candle frame will be displayed or hidden.

Bullish Color Here you can select a color and opacity for upward boxes.

Bearish Color Here you can select a color and opacity for downward boxes.

KAGI CHART

Kagi charts originated in Japan like the Candlestick Charts. They are related to "Renko Chart" on the next page and "Three Line Break Chart" on page 139.

↑ KAGI CHART

A Kagi chart consists of vertical lines that are connected by horizontal lines. The direction of the vertical lines is drawn depending on the price movements. The time relation, trading volume and chart information such as high and low prices are not taken into account.
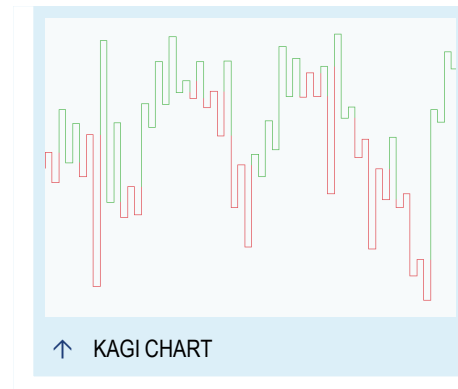
Kagi charts display the bid and ask, i.e. the trend of the market.

CONSTRUCTION AND INFORMATION IN A KAGI CHART

In a Kagi chart, a vertical line is drawn as long as the current price direction is maintained. If a trend reversal takes place in the price development, the price has to be at least as large as the defined reversal amount to cause a trend reversal in the chart. In case of a trend reversal, a horizontal line is drawn to the next "column" and a vertical line is started in the other price direction.

The time elapsed is unimportant for this kind of charting. The time axis is not linear.

Increasing and decreasing prices are shown in different colors, e.g. black/red. The colors can be set in the properties.

When trading with Kagi charts, remember that the filtering effect inherent to the method leads to delayed signal generation.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Reversal Enter a reversal value here. In case of a trend change, the price has to move by at least the reversal amount before a new vertical line in the opposite direction is drawn in the Kagi chart.

KAGI PROPERTIES

Bullish Color Here you can select a color for the bullish line.

Bullish Width Here you can set a bullish line width by entering a number.

Bearish Color Here you can select a color for the bearish line.

Bearish Width Here you can set a bearish line width by entering a number.

RENKO CHART

Renko charts originated in Japan like the Candlestick Charts. They are related to "Kagi Chart" on the previous pageand "Three Line Break Chart" on page 139. The name derived from the Japanese word Renga for bricks.

↑ RENKO CHART

A Renko chart consists of bricks. Only one input, e.g. the daily close is necessary for drawing a Renko chart. The time relation, trading volume and chart information such as high and low prices are not taken into account.

Renko charts show the trend of the market.

CONSTRUCTION AND INFORMATION IN A RENKO CHART

In a Renko chart, a brick is drawn if the price moved by a defined amount, called the bricksize. The price of the current day is always compared to the price of the last brick (which can be much older than a day). The Renko chart drops all price movements smaller than the bricksize. Therefore, only major trends of a stock are visible in the Renko chart. Small movements fall out of the graph.

The time elapsed is unimportant for this kind of charting. The time axis is not linear.

Bricks of downward and upward direction are displayed in different colors, e.g. black/red. The colors can be set in the properties.

When trading with Renko charts, remember that the filtering effect inherent to the method leads to delayed signal generation.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

- → set the period and time span, see chapter "Time Spans and Periods" on page 218.
- → change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

Bricksize Enter how many ticks give a brick, or enter a percentage value (e.g. "10%"). The bricksize works like a noise filter. It defines how much the input has to move from the last given brick value before a new brick is drawn.

Reversal Enter the number of bricks that have to be generated in the reverse direction to cause a change in trend. The higher the value, the stronger the trend reversal has to be to be displayed in the Renko chart.

Compress Bricks Here you can select whether bricks of the same price will be merged.

Daily Restart Here you can select whether the Renko chart calculation should start anew each day.

Startvalue from Open Here you can select whether instead of the input given above, the open value should always be used as start value.

RENKO PROPERTIES

Color Here you can select a color for the line border.

Bullish Color Here you can select a color and opacity for the bullish brick.

Bearish Color Here you can select a color and opacity for the bearish brick.

Open Color Select the color for open bricks, i.e. if no close price is available yet.

Show Thresholds Here you can select whether the price levels that have to be crossed to result in new bricks should be displayed as small, right-aligned lines in the chart.

Artificial Brick Highlight Here you can select whether bricks that were artificially created due to price gaps between bricks should be highlighted by transparent colors. Select a transparency from the list.

THREE LINE BREAK CHART

Three Line Break charts originated in Japan like the Candlestick Charts. They are related to "Kagi Chart" on page 136 and "Renko Chart" on page 137.

A Three Line Break chart consists of vertical lines ("boxes") connected to each other. The direction of the lines is drawn based on price movements. The time relation, trading volume and chart information such as high and low prices are not taken into account.

↑　THREE LINE BREAK CHART
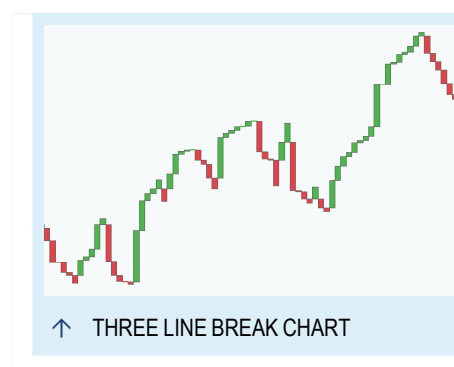
Three Line Break charts are especially useful for detecting changes in trends.

CONSTRUCTION AND INFORMATION IN A THREE-LINE-BREAK CHART

A Three Line Break chart differs from traditional chart types.

→ In principle, a new line is drawn when the price exceeds the previous price's high or low. If the price does not exceed the price benchmarks of the day before, no line is drawn.

→ For a "Three Line Break", the same rule applies; however, after three lines of the same color, the price must reverse the amount of the last three lines to cause a trend change in the graph. Price movements that lead neither to a reversal nor to a line of the current direction are ignored.

The number of lines taken into account for the break is given by the **Reversal** parameter. For short-term trades it might be smaller than 3, for long-term trades 4 or higher. The setting "3" is the default value that gave the method its name. Please note that the Reversal parameter gives the number of lines to be taken into account, not a fixed price value as for the related methods Kagi and Renko. Therefore, the price at which the trend change occurs in the chart is relative.

The time elapsed is unimportant for this kind of charting. The time axis is not linear.

Lines (boxes) of downward and upward direction are displayed in different colors, e.g. black/red. The colors can be set in the properties.

For a Three Line Break chart, a typical 'buy' signal is a trend change after three downwards lines, while a 'sell' signal is a trend change after three upwards. Remember that the filtering effect inherent to the method leads to delayed signal generation.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Reversal Enter the number of lines to be taken into account for determining trend reversals.

Input Select which data to use for calculating the chart (Open, High, Close, Low, Volume).

THREE LINE BREAK PROPERTIES

Border Color Here you can select a color for the line border.

Bullish Color Here you can select a color for the bullish line.

Bearish Color Here you can select a color for the bearish line.

HEIKIN ASHI CHART

At first glance Heikin Ashi charts are very similar to "Candlestick Chart" on page 110. It is also a charting style originally from Japan and uses candles to visualize prices and their movement. Heikin Ashi charts are based on averaged prices, a result of this is the noticeable absence of gaps between candle bodies which makes it easier to recognize price trends.

↑   HEIKIN ASHI CHART

Like other candlestick charts it gives information about the open, high, low and close prices and about the direction and magnitude of the price movement. It is this wealth of information and the distinct patterns that makes the candlestick charts so interesting. The direction and movement of prices can be better perceived than by using bars. More complex candlestick patterns are often used as the basis for trading decisions.

FORMULAS

The Heikin Ashi chart type uses the following formulas to compute each candle's values.

In the following equations let open, close, high, low denote the input values and haOpen, haClose, haHigh and haLow the corresponding Heikin Ashi values.

$$
haOpen_t = \begin{cases} open & t = 1 \\[2mm] \dfrac{haOpen_{t-1} + haClose_{t-1}}{2} & t > 1 \end{cases}
$$

$$
haClose_t = \frac{open + close + high + low}{4}
$$

$$
haHigh_t = \text{MAXIMUM}(high, haOpen_t)
$$

$$
haLow_t = \text{MINIMUM}(low, haOpen_t)
$$

For the first candle Heikin Ashi uses for its haOpen-value the open-value of the input, subsequent candles use the arithmetic average of the previous candle's haOpen and haClose-values.

TRADING INFORMATION IN HEIKIN ASHI

The following information is available in the candle body and the shadows (the lines on bottom and top, also called wicks):

→ The high of the trading period, given by the end of the upper shadow.

→ The low of the trading period, given by the end of the lower shadow.

→ The open price, given by the body edge; either the bottom line in the case of an upwards development, or the top line in the case of a downwards development.

→ The close price, given by the body edge; either the top line in the case of an upward development, or the bottom line in the case of a downward development.

→ The direction of the price movement, given by the body color. Colors are usually red or black for falling and green or white for rising prices. The color settings can be changed.

→ The magnitude of the price movement, given by the length of the body and the shadows. The total length of a candlestick between the wicks is the difference between high and low.

More information can be gathered when several candlesticks are seen in context. Patterns of up to three candles are used to take a closer look at the price movements and their quality. For example, candles with bodies of the same color show more pronounced trends. Trading is often done based on a mixture of candlestick pattern analysis and other methods.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

CANDLES PROPERTIES

Border Color Here you can select a color for the border.

Show Frame Here you can select whether the candle frame will be displayed or hidden.

Bullish Color Here you can select a color and opacity for upward candles.

Bearish Color Here you can select a color and opacity for downward candles.

INDICATORS AND STRATEGIES

In the indicator overview, you can find the indicator *Candle Pattern* which includes a long list of typical candlestick patterns to choose from. You can edit these patterns in the graph properties in the toolbox. The set pattern is displayed in the graph.

In the strategies overview, you can find strategies such as *Candle Bearish Engulfing - Exit*, *Candle Big White Candlestick - Exit*, and many more that you can apply to your candlestick chart.

POINT AND FIGURE CHART

Point and Figure Charts (P&F charts) are an old charting type that is independent of time.

P&F charts show two kinds of symbols. Depending on the price movement and range, a number of symbols are drawn. The time relation and trading volume are not taken into account.

↑ POINT AND FIGURE CHART

Point and Figure charts are helpful for trend detection, as they show trends as well as easily identifiable resistance and support zones.
There are also Equilla indicators for 45 degree trend lines and support resistance levels.

For more information see chapter "Using Indicators" on page 372.
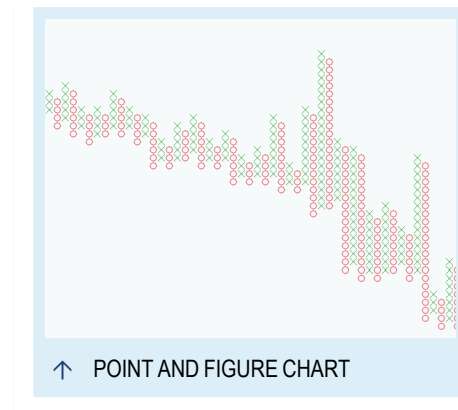
TRADING INFORMATION IN A P&F CHART

A P&F chart consists of columns of symbols of the same type.

→ Rising prices are drawn with crosses (also called Xs).

→ Falling prices are drawn with circles (also called Os).

In a P&F chart these symbols are called boxes and cover a certain price range known as the box size. A new symbol is added to a column once the price movement of the instrument exceeds the box size of the box in trend direction, i.e. in an X-column (rising prices) a new box is drawn when the prices reaches a value above the new box's price range. Movements below that value are ignored. This way, the box size determines how much the price movements are filtered. Large box sizes filter many movements. Small box sizes show movements better, but also have a smaller filter effect.

The reversal parameter of a P&F chart dictates by how many box sizes the price movement has to change in order to establish a new trend which also entails drawing a new column of the opposite type of boxes. For example: for a Reversal value of "3", after a breakout, the counter trend has to exceed three box sizes to change the trend in the chart. Please note that the Reversal parameter gives the number of boxes to be taken into account, not a fixed price value as for the related methods Kagi and Renko. Therefore, the price at which the trend change occurs in the chart is relative. Price movements that lead neither to a reversal nor to a new symbol of the current direction are ignored.

The time elapsed is unimportant for this kind of charting. The time axis is not linear.

Alternating months are displayed in different colors, e.g. black/red. The colors can be set in the properties. (The months are not relevant for the method, but are displayed for a better overview.)

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the period and time span, see chapter "Time Spans and Periods" on page 218.

→ change the chart look, see chapter"Settings" on page 157.

Select the grid style Graph Paper in the "Settings" on page 157 if you want the boxes of a P&F chart to be enclosed by grid lines.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed instrument, you can find additional parameters. Besides the Standard Properties, you can find specific parameters for this chart type.

INSTRUMENT PROPERTIES

Boxsize Mode Enter a method to calculate the box size

→ Constant price

→ Constant points

→ Percentage of close, close value on *Base Date* is used

→ Average True Range, values up to *Base Date* are used

→ Logarithmic, i.e. box size increases for rising prices, initial box size is based on the open value on Base Date

Boxsize Dependent on the selected *Boxsize Mode* this value is interpreted as

→ Constant price: a price

→ Constant points: a number of points

→ Percentage of close: a percentage value

→ Average True Range: the period of the ATR, i.e. a weighting factor applied to the EMA

→ Logarithmic: the percentage by which box sizes increase for rising prices

→ For the percentage based values, note that the % sign is implied.

Recalculate Boxsize This controls whether the suggested box size is recalculated in case the underlying instrument changes. Designed for situations where the *Boxsize Mode* is set to *Constant Price* or *Constant Points*. Upon instrument change the scale of value will adapt to the new instrument and the boxsize will be recalculated, e.g. if you switch from an index to one of its constituents. If the property is set to *After Instrument Replace* and the instrument in the chart is replaced, the box size will be recalculated to a suitable value to fit the price range of the new instrument. If the property is set to *Never* the Box Size will keep its automatic or manually set value irrespective of other changes to the chart.

Base Date This property is used for Percentage of close, Average True Range and Logarithmic. If an invalid date is specified or the date is no longer available, it will be adjusted.

Reversal Enter the number of boxes to be taken into account for a trend reversal.

1-Box reversal If the reversal property is set to one, this property determines if one-box reversals are compressed into the next column (Standard option), or if a new column is always created (New Column option).

High-Low Select if boxes and reversals should be calculated against the high and low values instead of the close value.

Initial Trend Here you can choose how the to establish the initial trend. Possible methods are:

→ High-Low Range: At least *reversal* boxes must be spanned by the highest high and lowest low to establish a trend. If this happens on the first bar, the close value is compared to the midrange of high and low to determine if an X or O is drawn. If the trend is established on a later bar, the most recently updated extreme value (highest high or lowest low) determines whether the first column contains X or O. This will always draw at least *reversal* boxes in the first column.

→ High-Low Range (simplified): This is similar to High-Low Range, but establishes a trend on the first price movement, so

it may start a column with just one box. (note: this mode was called Traditional in previous versions)

→ Close Range: This mode also requires *reversal* boxes to be spanned by the highest and lowest value, but only considers close prices. This will always draw at least *reversal* boxes in the first column. (note: this mode was called Smoothed in previous versions)

→ Two Box Method: This method compares the high and low prices of the first bar against high and low prices of subsequent bars. If the high values are found to be at least one box apart, Xs will be drawn. If this is not the case the lows are compared and if they are at least one box apart, Os will be drawn. This will always draw at least two boxes in the first column.

P&F PROPERTIES

Color Change Specifies under which circumstances the colors alternate. This property is available in Tradesignal 7.3 and above.

→ Yearly: The color changes as soon as a new year starts

→ Monthly: The color changes as soon as a new month starts.

→ Weekly: The color changes as soon as a new week starts.

→ Daily: The color changes as soon as a new day starts.

→ Hourly: The color changes as soon as a new hour starts.

→ Every Column: The color changes for every column. X columns are drawn using Color 1 and O columns are drawn using Color 2.

Color 1 / Color 2 Set the symbol colors for alternating months. The displayed symbols toggle between *Color 1* and *Color 2*. In Tradesignal 7.3 and above the *Color Change* property controls how the colors alternate.

INDICATORS IN POINT & FIGURE CHARTS

Indicators and strategies can be applied to a Point & Figure chart like any other chart type. The main issue to be aware of is how the values for Open, High, Low and Close are interpreted. The box value at the top and bottom of a column will determine the high and low respectively. The open will be equal to the low value for an X column and equal to the high for an O column. The close will be equal to the high value for an X column and equal to the low for an O column. An additional field called *Midpoint* is available for input to an indicator, this will be the value of

the middle box in a column, or the mean value between the two middle boxes if a column has an even number of boxes.

To apply a Simple Moving Average to a Point & Figure chart using the column Midpoint

01. Drag and drop the indicator *Moving Average Simple* from the Indicator Toolbox onto the point and figure chart.

02. Click on the moving average line in the chart (or the legend), to select the average.

03. In the mini toolbar, locate the *Price* property for the moving average and change it to *Midpoint*.

MARKET PROFILE

Market Profile charts were invented in the 1980s. The goal was to offer a better analysis method to traders at the US commodity markets. The development was done in cooperation between the trader Peter Steidlmayer and the Chicago Board of Trade (CBOT).

Market Profile charts are different from the normal display of the price movements versus the time line. While the prices are still given on the x-axis, the time line is given in units of "Time Price Opportunities" (TPO) that are marked with letters. This results in a more or less bell-shaped distribution of the TPOs over the price span of the trading day.

Use the Market Profile chart for

→ Analyzing the distribution of trading activity

→ Analyzing the "Fair Value" span with most of the trading activity

→ Analyzing the volume distribution over the trading day

→ Analyzing of trend movements

Tradesignal offers you Market Profile charts as a designated chart type. However, it is not available for all versions. As an alternative for displaying the volume/price correlation, you can use the indicator "Price Volume Profile" that is delivered with Tradesignal.

Due to the special focus of the tick-based Market Profile, it is usually only displayed for one or two trading days. If you want to display more than two trading days, the history length has to be set to the maximal value of 500000 ticks. If your

data provider offers this history length, you can display up to eight days as Market Profile.

CREATING A MARKET PROFILE

For a Market Profile, stocks, futures, commodities, currencies etc. can be used as long as they show a high trading frequency per day.

For a quick look at the chart type, right-click on an index in the symbol list and select **Open in Market Profile**.

CONSTRUCTION AND INFORMATION IN A MARKET PROFILE

The time units for the graph are fixed intervals called "Time Price Opportunities" (TPOs). They are basically trading periods. The standard setting is 30 minutes but can also be set to one hour.

For each TPO, a letter is used, starting with a capital "A". When the start of the trading is entered correctly, the "A" is displayed in the chart for the first price in the first TPO. For each new price level traded in that TPO, the letter "A" is added. The size of each price level is set in the **Scale factor**. For example, for a scale factor of "2", the price has to change 2 points (or cents) to open a new price level.

After the first TPO, the price levels traded in the second TPO are displayed in the chart with a "B", in the third with "C" and so forth.

The result of this continuous recording is a pictorial representation of the trading activity in relation to the time line. In the chart given as example below, the price had a very small range for a while until it broke out. The large protrusion for the letters D and E shows that in the range of 6370 points, an equilibrium was formed. Such an equilibrium is called the Fair Value Area. At the end of the trading day, the position of the Fair Value Areas in regard to their position in the total price range can be evaluated.

As additional information, a brown and a black bar are displayed. The black bar spans 70% of the time with the highest trading activity. The brown bar spans 70% of the highest trading activity (in volume). The two rectangles mark the respective maxima.

ELEMENTS IN A MARKET PROFILE CHART

BLACK FRAMED AREA IN THE EXAMPLE GRAPH

Here, the price versus time is displayed. Each letter stands for a TPO (Time Price Opportunity). Above this area, in the header of the chart, the following data is displayed (from top to bottom):

→ The highest price level traded

→ The lowest price level traded

→ The ratio of number of letters and the high/low span

LIGHT-GREEN FRAMED AREA IN THE EXAMPLE GRAPH

Here you can find the number of traded contracts (contract volume) or the tick volume for each price level. In the example, 1302 contracts were traded (bought and sold) in the price span 6381-6382. The displayed volume is specified with the parameter **Volume Type** in the properties.

DARK-GREEN FRAMED AREA IN THE EXAMPLE GRAPH

Here you can find a brown bar that marks the range of 70 % of volume activity. The small rectangle marks the price level with the highest volume activity. This point is called *Volume Point of Control*. Above this area, in the header of the chart, the following data is displayed (from top to bottom):

→ Volumes traded above the Point of Control

→ Volumes traded below the Point of Control

→ Total trading volume

LIGHT-BLUE FRAMED AREA IN THE EXAMPLE GRAPH

Here you can find the sum of TPOs (periods) in which the respective price levels were traded. For example, the range 6376-6377 was traded in a total of six periods.

DARK-BLUE FRAMED AREA IN THE EXAMPLE GRAPH

Here you can find the black bar that marks the range of 70% activity in the time line. The small rectangle marks the price level with the highest trading activity. This point is called TPO Point of Control.

MARKET PROFILE CHART PROPERTIES

The general properties are available via "Settings" on page 157 in the home tab.

History Length The Market Profile is created on a tick basis. Enter the number of ticks to be loaded into the Market Profile. The history length determines how many days will be displayed as Market Profile.

Interval This is the interval that each TPO represents in the chart. The default value is 30 minutes but can also be set to 1 hour.

Scale Factor Enter the price span units. When the price moves by this span during a TPO, the current letter is drawn at that price level. For example, if the scale factor is "2" and the current price is at "6370" in the TPO "C", a new "C" is drawn in the line above the original one if the price moves up to 6372.

Show Gaps Select here whether gaps in the trading (TPOs without trades) are to be displayed.

Initial Balance Enter the number of TPOs that should be part of the start period. TPOs in the start period are labeled in a special color.

Start Time Here the time for the market start has to be entered, i.e. "9:30" for stock trading. This is important for a correct display of the Market Profile.

Volume Type Select here whether the volume should be displayed as Contract Volume (number of traded contracts) or as Tick Volume (number of ticks = trades for this price span; necessary for currencies, for example). The traded volumes are displayed to the left of the letters (light-green area in the example chart).

Zoom Factor Here you can enter an optical zoom factor. The higher the number, the more the profile is magnified.

RANGE BAR CHART

Range bar charts are a version of "Bar Chart" on page 109 with a fixed price range for each bar. The bars contains only ticks within the set price range. Due to this behavior the time axis is not linear.

↑   RANGE BAR CHART

The range bar chart can be set as the default chart type in Tradesignal, see chapter "Chart" on page 96.
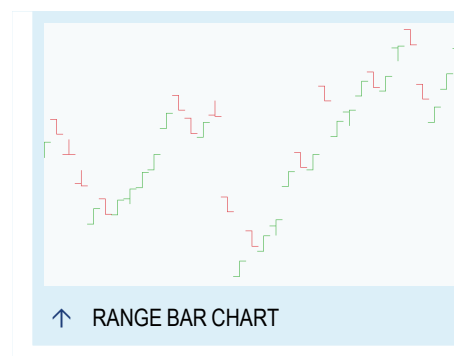
TRADING INFORMATION IN RANGE BAR CHARTS

The following information is available in a range bar chart:

→   The highest price, given by the top point of the bar within the set price range

→   The lowest price, given by the lowest point of the bar within the set price range

→   The open price, given by the left vertical line

→   The close price, given by the right vertical line

→ The direction of the price movement, given by the relative positions of the left and right vertical lines. If the left one is below the right one, prices have risen during the trading period. Otherwise, prices have fallen.

→ The direction of the price movement, given by the color of the bars. The usual color setting is red for falling and black for rising prices. The colors can be edited in the chart properties.

→ The length of the bar is defined by the fixed price range.

GENERAL CHART PROPERTIES

When the chart is active, you can edit the chart properties in the toolbox, for example the history length, the axes and legends.

You can also

→ set the trading period and time span, see the chapter "Time Spans and Periods" on page 218.

→ change the chart look, see the chapter "Settings" on page 157.

CONTENT-DEPENDENT CHART SETTINGS

In the properties of the displayed stock (symbol), you can find additional parameters. Besides the standard properties, you can find specific parameters for this chart type.

Input Here you can select the input for the range bars, e.g. Close.

Range Here you can define the difference between High and Low which closes the bar.

Restart Period Here you define whether and when the calculation of the bars should be restarted, e.g. never, daily.

Phantom Bars Here you can define whether phantom bars should be drawn. If true, the new bars will always open one tick above or below the close of the previous bar, so there will be no gaps between the bars.

↑ RANGE BAR CHART WITH PHANTOM BARS

RANGE BAR PROPERTIES

Chart Style Here you can select whether bars or candlesticks should be drawn.

Bullish Color Here you can select a color and transparency for upward bars.

Bearish Color Here you can select a color and transparency for downward bars.

Shown Prices Here you can define which prices should be used for the bars.

FORWARD CURVE

A Forward Curve in Tradesignal allows commodity traders to obtain a visualization of the forward or futures prices on a given date for a given commodity.

The Forward Curve plots the current price of a given forward contract against the expiration date of the contract. The current prices or prices from any previous day may be plotted in such a way.
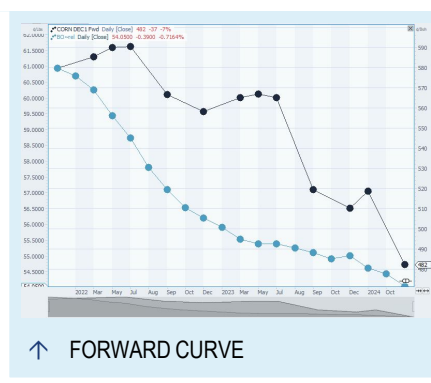
↑ FORWARD CURVE

Forward Curves are available in Tradesignal, making them usable in the same way as other charts, i.e. you can apply indicators and strategies to them.

> **Tip:** For more information see chapter "Using Indicators" on page 372 and "Using Strategies" on page 381.

FORWARD CURVES IN TRADESIGNAL

CREATING A FORWARD CURVE CHART

You can access the Forward Curve Wizard from the Toolbar by clicking on the **Forward Curve button** in the **Insert** tab. It allows you to select symbol lists containing commodities or other futures and the contracts, which are included. Additional set the **Date alignment** and **Displacement** properties.

You can also drag a symbol list of commodities onto a chart, this will prompt you if you want to create a Forward Curve or insert all symbols contained in the list into the chart. If you enter the symbol shortcut for a continuous contract, e.g. "Sc1" for a contract series for soy beans, into the "Command Line" on page 38, you can select the option **New Forward Curve** from the drop-down menu.

You can also create a forward curve from a user-defined list of forward contract symbols. Please be aware that for this feature to work, it will be necessary to manually mark existing user-defined lists as supporting forward curves using the **Allow Forward Curves** option in the list's context menu.

If you want to display the names of each contract as a label near each price point, you can apply the supplied Forward Curve Label indicator.

PROPERTIES OF A FORWARD CURVE CHART

You can edit the properties of a Forward Curve chart either during its creation in the wizard or in the "Mini Toolbar" on page 45.

There are two properties specific to Forward Curves:

Date Alignment The expiry date of each contract will be aligned according to this setting, useful if you want to align multiple different forward curves.

Displacement The displacement property governs what value to show for each contract in the forward curve. A value of 0 means use the current value, 1 means use the value of the previous bar, etc.

PERCENT PERFORMANCE

A percent performance chart offers an easy way to "Comparing Symbols" on page 106 the performance of multiple symbols.

It shows the percentage increase or decrease of a symbol relative to its price at a given **start date**, which may be selected globally in Chart Properties in the section "Global Percent Performance Properties" on the next page or for each symbol in the "Symbol Percent Performance Properties" on the next page .

↑   PERCENT PERFORMANCE CHART
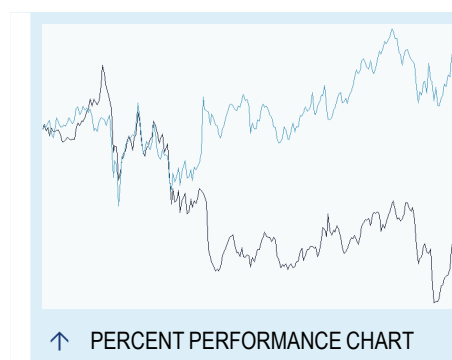
You can create a percent performance chart either by setting the properties on an existing chart or by using the percent performance wizard in the toolbar to create a new chart.

PERCENT PERFORMANCE WIZARD

The Percent Performance Wizards allows you to select up to 50 symbols from your symbol lists and to choose between several chart styles for your new chart.

You can also set the global start date in the wizard. If you do not select a start date, the first available price will be used.

GLOBAL PERCENT PERFORMANCE PROPERTIES

Found in the "Chart Settings" on page 158 this group of properties allows you to enable/disable the percent performance transformation for all symbols in your chart and to select a new start date.

% Performance Can be set to Active or Inactive.

Start Date The price at this date will be used as a base value from which the percent increase/decrease is calculated. If none is selected the first price is used.

SYMBOL PERCENT PERFORMANCE PROPERTIES

The properties in the group % performance of the "Symbol Properties in the Mini toolbar" on page 46 apply only to the selected symbol.

% Performance - Default This uses the global setting, *On/Off* are always on/off ignoring the global setting, *On* (Custom Start Date) uses the Start Date below.

Custom Start Date The price at this date will be used as a base value from which the percent increase/decrease is calculated if in On (Custom Start Date. Otherwise the global Start Date is used.

Base Value Select which price field (close, open, ...) you want to use.

SEASONAL CHART

With the seasonal mode, Tradesignal offers you the ability to overlay the prices of different years for one or more symbols. Comparing the symbols this way emphasizes seasonal pattern, e.g. if used with commodities that have seasonal variations.

↑ SEASONAL CHART

While seasonal charts are commonly only used for future/forward contract series, they can also be used for a single instrument. This will create

a seasonal chart based on the single instrument, using the Seasonal Projection indicator to overlay historic years and the seasonal average.

CREATE A SEASONAL CHART

Click the **Seasonal Chart** button in the toolbar.

The Seasonal Chart Wizard opens, allowing you to select monthly futures/forward contracts, a single instrument or contract spreads. Depending on your selection, more steps follow before the seasonal chart is created.

To see an average, apply the indicator "Seasonal Average" afterwards.

PROPERTIES OF A SEASONAL CHART

If enabled, the seasonal properties group will be displayed in the chart properties, allowing you to customize the seasonal view:

End Month The end month on the seasonal date scale.

End Day The day of the month to be the final day on the seasonal date scale.

Preceding Months The number of preceding months to be displayed on the seasonal date scale.

Displacement Displays the symbols displaced, so that they align to the selected end day with/without any weekend gaps closed.

Legend Controls whether the offsets or the contract years are displayed in the chart legend.

If using the Seasonal chart for futures, the input options are:

ContractMonth The month in which the contract is written forward.

NumberOfYears The number of years to be used in the projection.

If using the Seasonal chart for a single instrument, only the number of years can be selected. Beyond that, the options come from the recommended indicator "Seasonal Projection" on page 768.

EXAMPLE

Example on how to compare expired wheat future contracts in seasonal mode:

01. Open a chart with the expired December wheat contract from 2007, **W 2007Z**.

02. Add a previous year contract which also expired in December, e.g. **W 2006Z**.

03. Select the chart. In the chart properties of the date axis, change the Mode property to **Seasonal**.

The symbols will now be displayed below each other.

↑   SEASONAL CHART FOR A SINGLE INSTRUMENT

SETTINGS

Just as every chart analysis is governed by the individual preferences of each trader, the chart properties like colors, fonts and other optical settings can be adjusted to personal likings. You can use the chart properties and the "Styles" on page 224 and "Using Templates" on page 223 functions to do the following:

↑   CHART SETTINGS

→ Adapt the charts to personal color and font preferences

→ Optimize charts for usage in print or web media

→ Re-use the settings for other charts

→ Enhance the recognition factor of your work in publications

→ Define and use templates for the chart configuration

→ Define and use Style properties for Charts and other documents like "Scanner" on page 71, "Watchlist" on page 77 or "Portfolio" on page 251.
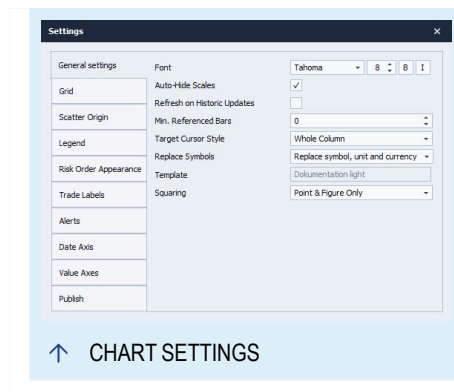
SETTING THE CHART PROPERTIES

As "Chart Properties", the following options should be included here:

↑   SETTINGS IN THE TOOLBAR

→ You can edit the chart properties. To do this, click on **Settings** in the upper toolbar to see the parameters for axes, grid, legend, history length etc. In case of strategies, more settings are available.

→ Some settings of the symbols, like volume, are also reflected in the chart. To access these settings, click on the symbol in the chart to see the "Mini Toolbar" on page 45.

→ You can set up the optical chart properties by using styles (pre-set or your own). If you have saved templates, you can also apply those to new charts.
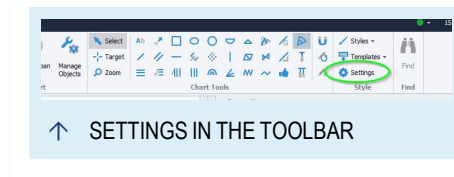
CHART SETTINGS

Beside the color selectors for the background, date and value axis, you can also find parameters for the grid and the chart legend.

GENERAL SETTINGS

Font Here you can select a font type (Tahoma, Arial...), font style (bold, italic...) and font size. Click on the entry to open the dialog in which you can edit the values.

↑   GENERAL SETTINGS

Auto-Hide Scales If activated, the scales are hidden if the chart is displayed in a very small size.

Refresh on Historic Updates Set to Yes if the indicators/strategies should be recalculated when changing the data history.

Min. Referenced Bars Enter the minimum number of bars that should be used for calculating the values of indicators and strategies.

Target Cursor Style Here you can edit the style of the target cursor, Thin Line or Whole Column.

Replace Symbols Control how a symbol replace operation is performed with regard to unit and currency conversion.
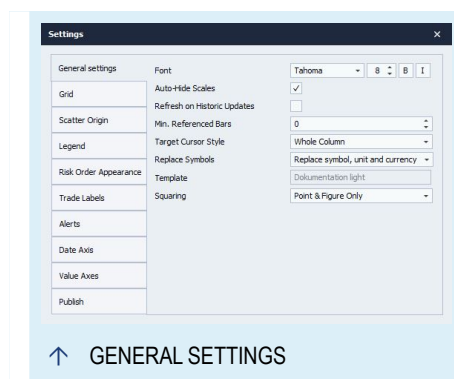
Template Shows if this chart is currently linked to a template file.

SquaringAs default Point &Figure chart are squared. The squared mode can be disabled here.

GRID

A grid can be set up in the background of the chart. You can define the grid properties like line art, style (points, vertical, horizontal...), and mode of the grid (plain or every second column colored). You can also set the background and column colors.

SCATTER ORIGIN

Here you can define settings for a scatter chart like style and color.

LEGEND

Here you can define the font settings and the way symbols, indicators and strategies are to be displayed in the legend. The available parameters depend on the selected chart type. You also have the option to display net and percent change (relative to previous bar).

RISK ORDER APPEARANCE

If strategies are applied to the graph, you can define the optical qualities of the trading system signals here. You can set the colors of the arrows (pointing at events in the curve) and also define how much information should be displayed for the trades.

TRADE LABELS

Here you can define settings for trend labels: font, vertical distance and trade arrow size.

ALERTS

Here you can enable and disable e-mail alerts for the respective chart. You can also enter an e-mail address to which alerts will be sent.

> **Note:** Configuring the alert settings locally, i.e. for individual charts, will override the "Global Alert Settings in Tradesignal" on page 333.

DATE AXIS

For the date axis, you can set the history length, preference for gaps, the background color and font properties. In addition, you can also set whether the scrollbar should be active. In Tradesignal you can toggle between the panoramic scrollbar and the normal one or adjust the height of the panoramic scrollbar.

↑ CONTEXT MENU OF DATE AXIS

In addition, common used parameters like preference for gaps, history length and color settings are also available via the context menu. All changes are applied live to the chart.
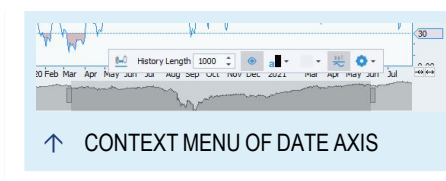
VALUE AXIS

For the value axis, you can set the background color, font properties and further settings like compact prices and thousand separator. In addition, you can set the axis to invisible to have more room for your graph. Percent Performance allows you to set global percent performance properties which are used by all symbols in your chart. Percent performance charts allow you to easily compare the relative performance of multiple symbols.

↑ CONTEXT MENU OF VALUE AXIS

In addition, common used parameters like inverted or logarithmic scale, auto scale and color settings are also available via the context menu. All changes are applied live to the chart.
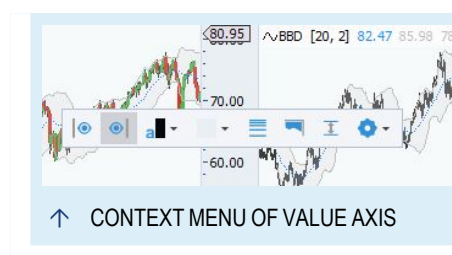
STYLES AND TEMPLATES

Tradesignal offers two functions for saving and re-using settings for the contents and display of charts.

→ Use styles to save the optical settings only.

→ Use templates to save optical settings as well as indicators, strategies and history length. Even the symbol is saved too, but only applied to empty charts.

For more information see chapter "Styles" on page 224 and "Using Templates" on page 223.

SETTINGS FOR OTHER ITEMS

General settings for items like tables e.g. "Scanner" on page 71 and "Watchlist" on page 77 are also available in the Settings. The settings are then adapted to the selected item. For more details about the properties, see the help article of the specific item.

CHART TOOLS

Chart tools are the basic tools for your chart analysis. Tradesignal offers you a wide variety of chart tools that are flexible and can be individually configured. Many of the tools offer additional features like duplicating, extending, mirroring and free positioning. You can also change the graphic display settings of tools.
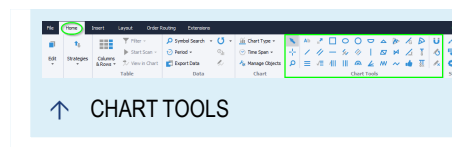
↑ CHART TOOLS

> **Tip:** The right-click context menu for a chart will always show a mini toolbar containing the available chart tool. This way, even if the Toolbar is hidden, tools are easily accessible.

Name	Description
"Text" on page 167	Text object in the chart.
"Fibonacci Retracements" on page 199	Grid consisting of retracement and projection lines on the basis of two anchor points spaced by Fibonacci numbers.
"Fibonacci Extensions" on page 202	Grid consisting of extension lines on the basis of three anchor points.
"Fibonacci Time Projection" on page 205	Grid projection of the distance between two anchor points in the future (time axis).
"Fibonacci Time Zones" on page 207	Vertical grid of line spaced by Fibonacci numbers.
"Fibonacci Arcs" on page 209	Arc above a base line with two anchor points whose spacing corresponds to Fibonacci ratios.
"Fibonacci Fans" on page 210	Fan above a base line with two anchor points whose angle spacing corresponds to Fibonacci ratios.

Name	Description
"Trend Line" on page 168	Line between two freely settable anchor points.
"Trend Channel" on page 171	Trend channel between two freely settable anchor points.
"Stop Line" on page 174	Horizontal line for marking price levels.
"Andrew's Pitchfork" on page 176	Three lines (median, support, resistance) based on the analysis method by Andrew.
"Linear Regression Channel" on page 179	Trend channel on the basis of a regression line between two anchor points.
"Gann Line" on page 182	45 degree line based on the analysis method by Grad W. Gann.
"Arrow" on page 183	Arrow between two anchor points (automatic labeling possible).
"Guide Line" on page 185	Simple vertical line with date and time.
"Ellipse" on page 186	Ellipse with arbitrary dimensions.
"Rectangle" on page 187	Rectangle with arbitrary dimensions.
"Circle" on page 188	Circle with arbitrary diameter.
"arc" on page 189	Semi-circle with arbitrary dimensions.
"Triangle" on page 190	Filled triangle with arbitrary dimensions.
"Triangle Pattern" on page 191	Shaded triangle projection based on four anchor points.
"ABCD Pattern" on page 192	ABCD pattern based on four anchor points.

Name	Description
"XABCD Pattern" on page 193	XABCD or Cypher pattern based on five marked points.
"Elliott Wave 5 Line" on page 195	Either an Elliott impulse wave, Elliott Triangle Wave or Elliott Triple Combo Wave based on six anchor points.
"Elliott Wave 3 Line" on page 197	Either an Elliott correction wave or Elliott Double Combo Wave based on four anchor points.
"Glyph" on page 212	Draws a glyph into the chart.
"Fibonacci Wedge" on page 213	Calculates and draws Fibonacci bands within a wedge shaped projection.
"Point and Figure Vertical Target" on page 215	Draws vertical price target in a Point and Figure chart.
"Point and Figure Horizontal Target" on page 217	Draws horizontal price target in a Point and Figure chart.

WORKING WITH CHART TOOLS

INSERTING A DRAWING OBJECT

To use a chart tool for entering a drawing or text object, click the respective icon. Then click into the chart and enter the object. The detailed proceeding depends on the tool: for a line, you have to enter two anchor points, for a circle you only have to click into the chart once and then drag the cursor to draw the circle.

OPENING THE CONTEXT MENU

To open the context menu of a drawing object, right-click the object.

MOVING AND SHAPING DRAWING OBJECTS

Drawing objects can be moved freely and shaped in the chart, as long as the snap mode isn't active.

→ To move whole objects, click on the object. A small hand or, depending on the object, a double arrow appears. Keep the left mouse button pressed and drag and drop the object.

→ To change the shape of a drawing object, e.g. for moving a single anchor point or for changing the dimensions of a circle, click the anchor or boundary point, keep the mouse button pressed, and move the point.

In the case of trend lines, trend channels and Fibonacci retracements, you can also extend the line into the moving direction by double-clicking one of the anchors points. Alternatively, you can also choose **Extend left** or **Extend right** from the context menu. The extended line ends at the edge of the chart. No additional anchor points are inserted.

DUPLICATING OBJECTS

You can duplicate every drawing or text object by double-clicking the object or by choosing **Duplicate** from the context menu. Upon duplication, all graphic properties like color, opacity, style, entered text or other specific settings are copied 1:1.

In the case of trend lines and channels, three additional duplication methods are available:

→ When you press the **CTRL** key while double-clicking the object, the object is duplicated and the resulting copy is mirrored on the y-axis. This way, the moving direction is inverted.

→ When you press both the **CTRL** and **Shift** keys while double-clicking the object, the object is duplicated and the resulting copy is mirrored on the x-axis.

→ When you press the **SHIFT** key while double-clicking the object, the object is duplicated and the resulting copy is moved to the end point of the original object in moving direction. This way, lines and channels of the same direction and angle can be lined up with the first object.

DELETING DRAWING OBJECTS

To delete a single drawing or text object, select the object (in select mode) and press the **Del** key. Alternatively you can choose **Delete** from the context menu. If there are several objects under the mouse cursor, a selection list will be displayed. There will be no further confirmation dialog.

DELETING TOOLS FROM THE MANAGE OBJECTS DIALOG

To delete all drawing and text objects in the chart, click the **Delete** icon in the chart tools group, you will be shown the *Manage Objects* dialog where all tools in

the chart can be selected or removed.

The *Manage Objects* dialog also provides functions to perform bulk remove operations based on the selected tool in the dialog:

→ Remove all tools

→ Remove only tools before the selected tool

→ Remove all tools of the same type as the selected tool

Multiple tools in the *Manage Objects* dialog can selected at once by holding the **Ctrl** key when clicking on them. Selecting the **Delete** option with multiple selected items will delete them all.

Items will only be deleted when the **OK button** is clicked. If a tool should not be removed, either click the Undo button next to a tool selected for deletion, or click **Cancel** to abort all changes.

TOOLS BEHAVIOR WHEN REPLACING A SYMBOL

Tools on chart objects are saved and replaced when the symbol is replaced. The tools will be restored when the previous symbol is present again, e.g. by replacing it back into the chart.

In addition, when the option **Permanent** is set to "True", the tool will not be replaced when the symbol is replaced, but remains in the chart. This feature may be useful when, for example, a guide line is being used to keep a fixed point in time visible, or a text tool is being used like a notebook.

SELECTING SPECIFIC TOOLS IN A CHART

The tools tab of the *Manage Objects* dialog shows all tools in the selected chart. This list can be sorted, grouped and filtered as desired in order to locate the required tools.

Once an item of interest has been located, clicking on the **Select the tool button** next to the gear will select this tool in the chart. Clicking on the gear **Show tool settings** will show the full overview of the settings. Selecting the **Scroll to tool button** will scroll the chart to the location of the tool.

→ To sort the tools by a specific column, click on the column's header (click a second time for a reverse sort).

→ To group by a specific column, drag the column header to the area above the list (drag the column away form this area to remove the grouping)

→ To filter the list, hover the mouse over a column header, and click on the little filter icon that appears in the top right of the header. A list of possible filters will be displayed and can be freely selected.

LEAVING THE DRAWING MODE

You can leave the chart tool mode by

→ right-clicking within the chart

→ by clicking the select tool in the chart tools group.

Note: With the auto-reset button ⟳ in the chart tools group, you set a configuration so that after each chart tool use, the application automatically reverts into the select mode.

SETTINGS AND PROPERTIES

SNAP MODE

Click the magnet icon ᴜ to activate the snap mode. In the snap mode, the anchor points are drawn to the closest high or low point for exact positioning.

> Example
>
> If you set the first anchor point of a trend line close to a low point and then move the second anchor point across the chart, it will move along the other low points.

AUTO RESET

The standard setting is that once you selected a chart tool, you can enter as many objects into the chart as you want. This is the optimal setting for e.g. entering a multiple line chart analysis.

However, if you don't want to do that, you can use the auto reset mode. To set this option, click the ⟳ icon. Upon auto reset, the application automatically reverts into select mode after each use of a chart tool. To add another drawing object, you then have to select a chart tool again.

Click the ⟳ icon again to leave the auto reset mode.

DISPLAY PREFERENCES

In the mini toolbar you can edit various display settings for the objects. To change these settings, select the object and then click the respective property.

ALERTS AND DRAWING OBJECTS

You can assign alerts to drawing objects.

Tip: For more information see chapter "Alerts" on page 329.

SAVE YOUR SETTINGS AS STANDARD

To save your personal settings as the new default for a tool, click the disc icon at the top of the property inspector and confirm the prompt with OK.

Note: Your saved settings will be applied to the next use of a chart tool.

TEXT

With the text tool, you can enter notes or captions into a chart, e.g. before publishing it in the Tradesignal web forum.

You can find the text tool in the Chart Tools group in the "Toolbar" on page 42.

ENTERING TEXT

01. Open a symbol chart.

02. Click on the text tool in the toolbar.

03. Click into the chart. A text field with four anchor points appears.

04. Enter the text.

EDITING TEXT

→ To edit the text, click on it with the mouse (so that it is selected) and then click once again, so that the text field is highlighted. Now you can edit the text.

→ To move the text, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To duplicate the text by double-clicking it.

→ When the text is selected, you can edit the text properties in the toolbox.

→ To delete the text, right-click on it and select **Delete** from the context menu. Alternatively, select the text and press the **DEL** key.

PROPERTIES

Font Here you can change the font type and size, e.g. to *Arial bold 10*.

Color Here you can change the text color, e.g. to red.

Background Here you can set a background color and opacity for the text object, e.g. black.

Frame Here you can select whether you want to display a frame (in the same color as the text) around the text.

Anchor Here you can select how the text is placed in relation to the chart data. Choose an option from the drop-down list.

TREND LINE

The simplest tool for a chart analysis is the trend line. With it, trends in price movements can be visualized and emphasized. Trading decisions may be based on analysis of trend lines. Trend lines may be used for:

↑ TREND LINE

→ Visualizing trends

→ Marking market phases

→ Marking resistance and support levels

You can find the trend line tool in the *Chart Tools* group in the "Toolbar" on

ENTERING A TREND LINE

01. Open a symbol chart.

02. Click on the trend line tool in the toolbar.

03. Click into the chart to set the starting point of the trend line.

04. Keep the mouse button pressed and move the pointer to the end point of the trend line.

05. Release the mouse button.

You can align the anchor points of the trend line to a certain price level. To do so, activate the Snap Mode by clicking on the magnet symbol in the toolbar. Now when you draw a trend line in the chart, it is positioned exactly at high and/or low points.

EDITING A TREND LINE

To move the trend line:

01. Drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely.

02. Release the mouse button when done.

To change the trend line angle:

01. Click the anchor points of the line (the mouse pointer turns into an axis of coordinates symbol).

02. Drag into another position.

Note: The trend line cannot be moved freely if the Snap Mode is active. If necessary, switch it off by clicking the magnet symbol in the toolbar.

You can duplicate a trend line in two ways (see "Chart Tools" on page 161):

→ Double-click on the respective anchor point at the end of the trend line to extend the length of the trend line until the right or left edge of the chart.

→ When the trend line is selected, you can edit the properties in the toolbox.

An alert function is available for the trend line. To set an alert, set the **Alert Mode** from Disabled to one of the options (see below).

To delete the trend line:

→ Right-click on it and select **Delete** from the context menu. Alternatively, select the trend line and press the **DEL** key.

USING THE MEASUREMENT FUNCTION

In the trend line properties, you can switch on the measurement function.

The following information is displayed for the time axis:

→ Number of bars (trading periods) between the two anchor points

→ Number of calendar days between the two anchor points

Example:

"47 Bars (2d)"

The following information is displayed for the price axis:

→ Absolute price difference between the price levels of the anchor points

→ Relative price movement between the price levels of the anchor points

→ Relative gradient between periods for the slope between the two anchor points

Example:

"3.48 (+5.7)"

"0.07/Bar"

PROPERTIES

TREND LINE PROPERTIES

Extend Left/Extend Right Select whether the line is to be extended to the left and/or right until the edge of the chart.

GRAPHIC PROPERTIES

The following properties can be set for the trend line tool:

Color Here you can select a color for the line.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing the line with a 3D effect. Four settings are available.

Label Here you can set the value label for the last data point to visible or hidden. The label is only displayed when the trend line is drawn through, below or above the last data point (candle, bar etc.). In Tradesignal you can also specifiy the location at which the label should be displayed.

Measurement Here you can switch the measurement function on or off.

ALERT PROPERTIES

The trend line tool can be used with various kinds of alerts:

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether every crossing is considered or only one crossing per trading period or trend line.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a "Point and Figure Chart" on page 144.

For more information see chapter "Alerts" on page 329.

TREND CHANNEL

The trend channel is a standard tool in chart analysis. It offers two parallel lines that are helpful for visualizing trends. Trading decisions may be based on the trend channel's alert function.

↑ TREND CHANNEL

Trend channels may be used for visualizing:

→ strong price movements

→ resistance and support levels

→ chart patterns

→ sidewards markets

You can find the trend channel tool in the Chart Tools group in the "Toolbar" on page 42.

ENTERING A TREND CHANNEL

01. Open a symbol chart.

02. Click on the trend channel tool in the toolbar.

03. Click into the chart to set the starting point of the trend channel.

04. Keep the mouse button pressed and move the pointer to the end point of the trend channel. Release the mouse button.

You can align the anchor points of the trend channel to a certain price level. To do so, activate the Snap Mode by clicking on the magnet symbol in the toolbar. Now when you draw a trend channel in the chart, the middle line is positioned exactly at high and/or low points.

EDITING A TREND CHANNEL

→ To move the trend channel, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To move the lines of the trend channels up or down, click the center point of a line (the mouse pointer changes into a double arrow) and drag it.

→ To change the trend channel angle, click the anchor points of the channel (the mouse pointer turns into an x-y axis symbol) and drag into another position.

Note: The trend channel cannot be moved freely if the Snap Mode is active. If necessary, switch it off by clicking the magnet symbol in the toolbar.

You can duplicate a trend channel in two ways (see the chapter "Chart Tools" on page 161):

→ Double-click on anchor points at the right or left end of the channel to extend the length of the trend channel to the right or left edge of the chart.

→ When the trend channel is selected, you can edit the properties in the toolbox.

The alert function is available for the trend channel. To set an alert, set the **Alert Mode** from Disabled to one of the options (see below).

→ To delete the trend channel, right-click on it and select **Delete** from the context menu. Alternatively, select the trend channel and press the **DEL** key.

PROPERTIES

TREND CHANNEL PROPERTIES

Distance Here you can enter a distance between the two lines of the trend channel. The value changes if you move the lines independently. You can also directly enter the value here.

Always parallel Select whether the lines of the trend channel are always be kept parallel. (If you change the chart display from linear to logarithmic, the drawing elements in the chart may "bend" and change their angles. In the case of trend channels, this may lead to non-parallel lines. Set the option to true to avoid this distortion.)

Extend Left/Extend Right Select whether the lines are to be extended to the left and/or right until the edge of the chart.

GRAPHIC PROPERTIES

The following properties can be set for the trend line tool:

Color Here you can select a color for the lines.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing the lines with a 3D effect. Four settings are available.

Fill Color Here you can select a color and opacity for the channel area.

Label Here you can set the value label for the last data point to visible or hidden. The label is only displayed when the trend line is drawn through, below or above the last data point (candle, bar etc.). In Tradesignal you can also specifiy the location at which the label should be displayed.

ALERT PROPERTIES

The trend channel tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether every crossing is considered or only one crossing per trading period or trend line.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a "Point and Figure Chart" on page 144.

Break-in/Break-out Treats the tool not as two separate lines but as a channel instead and triggers an alert, when the price breaks into or out of the tool's channel.

For more information see chapter "Alerts" on page 329.

STOP LINE

The stop line is a simple horizontal line that is defined by only the value on the price axis. Entered for one level, the line is extended to both sides of the chart. The stop line has an alert function and can be used for precise timing of buy and sell orders. The stop line may be used for

↑   STOP LINE

→   drawing horizontal lines

→   marking resistance and support levels

→   exactly measuring price movements

→   placing a line at a user-defined price level

Identically named stop lines in the same workspace can also be synchronized.

ENTERING A STOP LINE

01. Open a symbol chart.

02. Click on the stop line tool in the toolbar.

03. Click into the chart. A horizontal stop line is drawn. The current value is given at the left side of the chart.

You can align the anchor points of the stop line to a certain price level. To do so, activate the Snap Mode by clicking on the magnet symbol in the toolbar. Now when you enter a stop line in the chart, it is positioned exactly at a high or low point.

EDITING A STOP LINE

→ To move the stop line, drag it with the mouse (the mouse pointer turns into a double arrow) and move it up or down. Release the mouse button when done.

Note: The stop line cannot be moved freely if the Snap Mode is active. If necessary, switch it off by clicking the magnet symbol in the toolbar.

→ You can duplicate the stop line by double-clicking it.

→ When the stop line is selected, you can edit the properties in the toolbox.

→ For the stop line, the alert function is available. To set an alert, set the **Alert Mode** in the properties in the toolbox from Disabled to one of the options, see below.

→ To delete the stop line, right-click on it and select **Delete** from the context menu. Alternatively, select the stop line and press the **DEL** key.

PROPERTIES

GRAPHIC PROPERTIES

The following properties can be set for the trend line tool:

Color Here you can select a color for the line.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Label Alignment Here you can set the value label to visible or hidden and align it to the stop line.

ALERT PROPERTIES

The stop line tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list, if crossings of all kinds lead to alerts or only crossings of a certain direction.

Alert Mode Here you can select an alert mode from the list. Select if every crossing is considered or only one crossing per trading period or trend line.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a Point&Figure Chart.

For more information see chapter "Alerts" on page 329.

SYNCHRONIZE STOP LINE VALUES

Stop lines in the same or in different charts in the same workspace can have their values synchronized when one is changed.

To enable this behavior, ensure the setting *File > Options > Advanced > Chart Style> Sync value of stop lines with the same name in the same workspace* is checked (it is unchecked by default) and set the **Alert Name** property of each line to exactly the same, non-empty name (case sensitive).

ANDREW'S PITCHFORK

Andrew's Pitchfork (originally called *median line studies*) is a drawing tool which, if correctly aligned, is also a geometric indicator. Andrew's Pitchfork consists of three parallel lines and is especially useful for finding resistance and support levels.

↑ ANDREW'S PITCHFORK

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING ANDREW'S PITCHFORK

Three points are necessary to enter a Andrew's Pitchfork.

→ The start (pivot) point of a trend (high or low). This is the starting point of the handle.

→ The two corner points of a major correction against the trend. These will be the starting points of the prongs.

Proceed as follows:

01. Open a symbol chart.

02. Click on the Andrew's Pitchfork tool in the toolbar.

03. Click into the chart on one of the corners of the correction movement.

04. Keep the mouse button pressed and move the pointer to the second corner of the correction movement. Release the mouse button.

05. Drag the start point (anchor point of the handle) to the correct position by moving it to the start point of the trend.

The resulting pitchfork consists of a handle with a middle line and two prongs. All lines can serve as resistance and support levels in price movements.

EDITING ANDREW'S PITCHFORK

→ To move Andrew's Pitchfork, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the direction of Andrew's Pitchfork, click the pivot point of the handle (the mouse pointer changes into an x-y axis symbol) and move it. This will make the fork rotate.

→ You can edit the corner points of the prongs. Click these anchor points (the mouse pointer turns into an x-y axis symbol) and drag them to another position. Due to the line coupling, the fork's appearance changes.

→ You can duplicate Andrew's Pitchfork by double-clicking on it.

→ When Andrew's Pitchfork is selected, you can edit the properties in the toolbox.

The alert function is available for Andrew's Pitchfork. To set an alert, set the **Alert Mode** from Disabled to one of the options (see below).

→ To delete Andrew's Pitchfork, right-click on it and select **Delete** from the context menu. Alternatively, select Andrew's Pitchfork and press the **DEL** key.

PROPERTIES

GRAPHIC PROPERTIES

The following properties can be set for the Andrew's Pitchfork tool:

Handle Color Here you can select a color for the handle line.

Prongs Color Here you can select a color for the prong lines.

Width Here you can set a width for all lines by entering a number.

Handle Style Here you can select a line style for the handle, e.g. solid or dotted.

Prongs Style Here you can select a line style for the prongs, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing all lines with a 3D effect. Four settings are available.

Base Here you can select whether the base line (the line connecting the two anchor points of the prongs) is to be visible or hidden.

Label Here you can set the value label for the current data point to visible or hidden. In Tradesignal you can also specifiy the location at which the label should be displayed

ALERT PROPERTIES

The Andrew's Pitchfork tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether every crossing is considered or only one crossing per trading period or trend line.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool.

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a Point&Figure Chart.

Break-in/Break-out Treats the tool not as two separate lines but as a channel instead and triggers an alert, when the price breaks into or out of the tool's channel.

For more information see chapter "Alerts" on page 329.

LINEAR REGRESSION CHANNEL

The linear regression channel is a drawing tool with a calculation function. You as the user define the start and end point of the channel as well as the calculation method for the outer lines. The definite position of the channel in the chart, however, results from the calculation of the mid-line.

↑   LINEAR REGRESSION CHANNEL
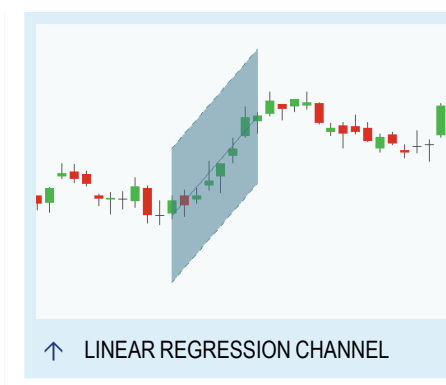
The mid-line of the channel is calculated on the basis of linear regression with the least square method. In this method, the line that is drawn through a number of data points effectively reflects the trend. The channel is constructed with lines above and below the mid-line, in defined distances.

The linear regression channel may be used for:

→ visualizing trends

→ searching swing points

→ finding resistance and support levels

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING A LINEAR REGRESSION CHANNEL

01. Open a symbol chart.

02. Click on the linear regression channel tool in the toolbar.

03. Click into the chart to set the starting point of the linear regression channel.

04. Keep the mouse button pressed and move the pointer to the end point of the linear regression channel. Release the mouse button.

By default, the linear regression channel is drawn with a standard deviation of 2 from the linear regression line. Therefore, the width of the channel depends on the price volatility over the time span between the channel start and end.

Since the linear regression channel is based on calculation, it aligns to the data points almost as if in Snap Mode.

EDITING A LINEAR REGRESSION CHANNEL

→ To move the linear regression channel, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it. Release the mouse button when done. Note that since the linear regression channel is based on calculation, it aligns to the data points almost as if in Snap Mode.

→ To extend the length of the linear regression channel, i.e. the data points used for calculation, click an anchor point at the end of the middle line (the mouse pointer changes into a double arrow) and drag it.

→ To extend the length of the channel until the right or left edge of the chart, double-click on the respective anchor point at the end of the middle line.

→ You can duplicate a linear regression channel by double-clicking on it.

→ When the linear regression channel is selected, you can edit the properties in the toolbox.

→ You can edit the width of the linear regression channel either by changing the **StdDev** parameters for the Standard Deviation or by selecting another calculation method for the channel (see below).

→ The alert function is available for the linear regression channel. To set an alert, set the **Alert Mode** from Disabled to one of the options (see below).

→ To delete the linear regression channel, right-click on it and select **Delete** from the context menu. Alternatively, select the linear regression channel and press the **DEL** key.

PROPERTIES

REGRESSION CHANNEL PROPERTIES

Extend Left/Extend Right Select if the channel is to be extended to the left and/or right until the edge of the chart.

Channel Method Select the method that will be used for calculating the channel:

Standard Deviation The width of the channel is given by the measured standard deviation in the channel's time span. The StDvs up and StDvs down parameters give the offset (above and below) from the regression line.

High / Low The channel includes the highest and lowest price within the time span. This channel method is similar to the classic Trend Channel.

Percentage The width is given as percentage of the price at the last anchor point. The % parameter gives the offset from the regression line.

GRAPHIC PROPERTIES

The following properties can be set for the linear regression tool:

Color Here you can select a color for the lines.

Width Here you can set a line width by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Shadow Here you can set a shadow for emphasizing the lines with a 3D effect. Four settings are available.

Fill Color Here you can select a color and opacity for the channel area.

Label Here you can set the value label for the current data point to visible or hidden. In Tradesignal you can also specifiy the location at which the label should be displayed.

ALERT PROPERTIES

The linear regression channel tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether every crossing is considered or only one crossing per trading period or trend line.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a Point&Figure Chart.

Break-in/Break-out Treats the tool not as two separate lines but as a channel instead and triggers an alert, when the price breaks into or out of the tool's channel.

For more information see chapter "Alerts" on page 329.

GANN LINE

The Gann line is a drawing tool based on the analysis methods of W.D. Gann. In his publications around 1929 Gann presented methods based on the premise that the market obeys mathematical - geometrical - laws.

He proposed a relation between the price dimension and time dimension, which construct a price pattern. Thus the idea of constructing trend lines based on angles and time was born.

↑ GANN LINE

You can use Gann lines for

→ Marking trends in price movements

→ Searching support and resistance price levels

→ You can find the Gann line in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING A GANN LINE

01. Open a symbol chart.

02. Click on the Gann line tool in the toolbar.

03. Click into the chart to set the starting point.

The Gann line is drawn. The default setting of the Gann line is an angle of 45°. This complies to a 1:1 ratio of time and price. The angle results from the property **Runs** (**Rises** is a calculated value). Change the **Runs** value to change the angles. With a **Runs** value of 2, a 1:2 ratio results.

EDITING A GANN LINE

→ To move the Gann line, drag the line, i.e. the anchor point, with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can duplicate a Gann line by double-clicking on it.

→ When the Gann line is selected, you can edit the properties in the toolbox.

→ To delete the Gann line, right-click on it and select **Delete** from the context menu. Alternatively, select the Gann line and press the **DEL** key.

PROPERTIES

Runs Here you can enter how many candles/bars a price on the price axis should represent.

Rises This value is calculated from the **Runs** value and the line properties when first drawing the Gann line. Will not be adapted when you move or edit the Gann line.

Color Here you can edit the line color, e.g. to red.

Width Here you change the thickness of the guide line in pixels, e.g. to "3".

Style Here you can edit the line style, e.g. set it to "Dot".

ARROW

Like the guide line and other tools, the arrow helps you to illustrate special situations in charts. This, in addition with analysis tools, allows you to create more meaningful charts.

You can find the arrow tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑   ARROW

ENTERING AN ARROW

01.   Open a symbol chart.

02.   Click on the arrow tool in the toolbar.

03.   Click into the chart to set the starting point.

04.   Keep the mouse button pressed while moving the pointer to the end point, and release it there.

At the start point, a text box appears. It includes general chart information and analysis results (open, high, low...) for the data encompassed by the arrow.

You can align the anchor points of the arrow to a certain price level. To do so, activate the Snap Mode by clicking on the magnet symbol in the toolbar. Now when you draw an arrow in the chart, it is positioned exactly at high and/or low points.

EDITING AN ARROW

→   To move the arrow, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the

mouse button when done. Note that although the text box will move with the arrow, the text box contents will not be refreshed. This might mislead you in interpretation.

→ To change the arrow angle, click an anchor point of the arrow (the mouse pointer turns into an x-y axis symbol) and drag it to another position.

→ Note that the arrow cannot be moved freely if the Snap Mode is active. If necessary, switch it off by clicking the magnet symbol in the toolbar.

→ You can duplicate an arrow by double-clicking on it.

→ When the arrow is selected, you can edit the properties in the toolbox.

→ To delete the arrow, right-click on it and select **Delete** from the context menu. Alternatively, select the trend line and press the **DEL** key.

PROPERTIES

User Text Here you can enter a title for the text box, which will be displayed as its header line.

Width Here you can enter the thickness of the arrow in pixel, e.g. "3".

Arrowhead Angle Here you can set how narrow (small number) or wide (high number) the arrowhead will be.

Arrowhead Size Here you can set the length of the arrowhead.

Step Mode Here you can select whether the line between the start and end point is to be straight or stepped (bent shortly below the end point).

Arrowhead Shape Here you can select between four different shapes, e.g. "triangular".

Style Here you can select the line style of the arrow, e.g. "Dot".

Arrow Border Color Here you can edit the arrow color.

Arrow Fill Color Here you can edit the fill color for the arrowhead.

Autotext Here you can set how many details are displayed in the text box. The box can include basic chart information or also indicator data etc.

Autotext Fill Color Here you can edit the background color for the text box.

Autotext Color Here you can edit the text color in the text box.

Guide Line Select if the guide line should always be visible. Otherwise it will be temporarily displayed to help you setting the exact arrow's end point.

GUIDE LINE

The guide line is a tool for marking events in a trading period. With it, you can easily emphasize a candle, a bar or the signal of an indicator. In Tradesignal, the guide line comes with a date label.

You can find the guide line in the Chart Tools group in the "Toolbar" on page 42.

ENTERING A GUIDE LINE

↑ GUIDE LINE

01. Open a symbol chart.

02. Click on the guide line tool in the toolbar.

03. Click into the chart to set the anchor point of the guide line.

The guide line is drawn into the graph. The default setting of the tool is that a guide line drawn in a chart will be displayed in all subcharts. However, you can move or delete this guide line only in the chart in which it was originally drawn, because only there can you take hold of it with the mouse.

You can align the guide line to a certain price level. To do so, activate the Snap Mode by clicking on the magnet symbol in the toolbar. Now when you draw the guide line in the chart, it is positioned exactly at high and/or low points.

EDITING A GUIDE LINE

→ To move the guide line, drag it with the mouse (the mouse pointer turns into a vertical double arrow symbol) and move it freely. Release the mouse button when done.

→ Note that the guide line cannot be moved freely if the Snap Mode is active. If necessary, switch it off by clicking the magnet symbol in the toolbar.

→ You can duplicate a guide line by double-clicking on it.

→ When the guide line is selected, you can edit the properties in the toolbox.

→ To delete the guide line, right-click on it and select **Delete** from the context menu. Alternatively, select the trend line and press the **DEL** key.

PROPERTIES

Color Here you can edit the line color, e.g. to red.

Style Here you can edit the line style, e.g. set it to "Dot".

Width Here you change the thickness of the guide line in pixel, e.g. to "3".

Scope Here you can select whether the guide line is displayed only in the graph in which it was drawn or in all of them (default).

Label Here you can select whether the data point label with date and time (for shorter periods) is visible or hidden in the chart. In Tradesignal you can also specify the the text orientation.

Label Alignment Here you can select at which location the label should be displayed.

ELLIPSE

The ellipse is a simple drawing object. Typically ellipses are used for highlighting the expansion of a consolidation zone, based on the idea of a harmonic price movement.

You can find the ellipse tool in the Chart Tools group in the "Toolbar" on page 42.
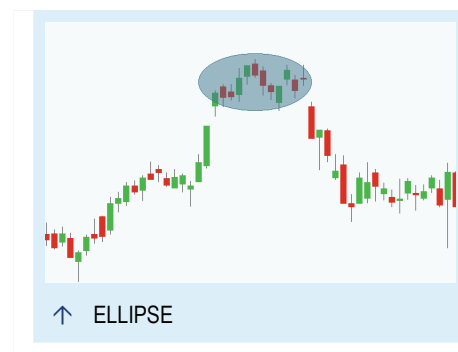
↑ ELLIPSE

ENTERING AN ELLIPSE

01. Open a symbol chart.

02. Click on the ellipse line tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the ellipse. Release the mouse button when done.

EDITING AN ELLIPSE

→ To move the ellipse, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can duplicate an ellipse by double-clicking on it.

→ When the ellipse is selected, you can edit the properties in the toolbox.

→ To delete the ellipse, right-click on it and select **Delete** from the context menu. Alternatively, select the ellipse and press the **DEL** key.

PROPERTIES

Fill Color Here you can set up which color and opacity you want to use for the ellipse area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

Border Color Here you can set the border color of the ellipse.

RECTANGLE

The rectangle is a simple drawing tool. Typically rectangles are used for highlighting mean-reverting markets, support and resistance price levels or chart patterns.

You can find the rectangle tool in the *Chart Tools* group in the "Toolbar" on page 42.
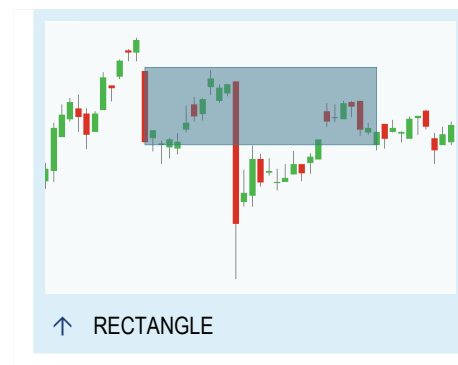
↑ RECTANGLE

ENTERING A RECTANGLE

01. Open a symbol chart.

02. Click on the rectangle tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the rectangle. Release the mouse button when done.

EDITING A RECTANGLE

→ To move the rectangle, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To move single sides of the rectangle up/down or left/right, click an anchor point in the middle of a side and drag it.

→ To change the size of the rectangle, click an anchor point in the corner of the rectangle and drag it.

→ You can duplicate a rectangle by double-clicking on it.

→ When the rectangle is selected, you can edit the properties in the toolbox.

→ To delete the rectangle, right-click on it and select **Delete** from the context menu. Alternatively, select the rectangle and press the **DEL** key.

PROPERTIES

Fill Color Here you can set up which color and opacity you want to use for the rectangle area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

Border Color Here you can set the border color of the rectangle.

CIRCLE

The circle is a simple drawing object. Typically circles are used for highlighting intersections of trend lines, chart patterns or target prices.

You can find the circle tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ CIRCLE

ENTERING A CIRCLE

01. Open a symbol chart.

02. Click on the circle tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the circle. Release the mouse button when done.

EDITING A CIRCLE

→ To move the circle, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can duplicate a circle by double-clicking on it.

→ When the circle is selected, you can edit the properties in the toolbox.

→ To delete the circle, right-click on it and select **Delete** from the context menu. Alternatively, select the circle and press the **DEL** key.

PROPERTIES

Fill Color Here you can set the color and opacity for the circle area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

Border Color Here you can set the border color of the circle.

ARC

The arc is a simple drawing object useful for highlighting special situations in a chart.

You can find the arc tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING AN ARC

01. Open a symbol chart.

02. Click on the arc tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the arc. Release the mouse button when done.

EDITING AN ARC

→ To move the arc, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the arc, click on an anchor point surrounding the arc and drag it.

→ You can duplicate an arc by double-clicking on it.

→ When the arc is selected, you can edit the properties in the toolbox.

→ To delete the arc, right-click on it and select **Delete** from the context menu. Alternatively, select the arc and press the **DEL** key.

PROPERTIES

**Fill Color** Here you can set the color and opacity for the arc area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

Border Color Here you can set the border color of the arc.

TRIANGLE

The triangle is a drawing tool. Typically triangles are used for highlighting triangle patterns in continuation analysis.

You can find the triangle tool in the *Chart Tools* group in the "Toolbar" on page 42.
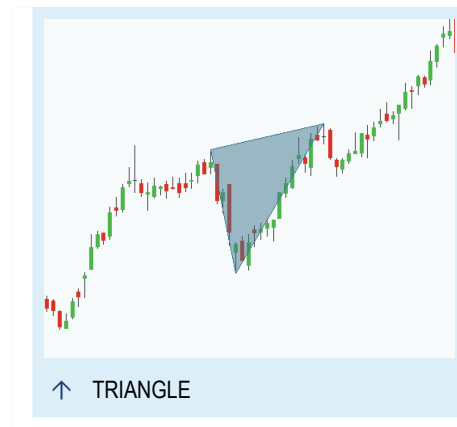
↑ TRIANGLE

ENTERING A TRIANGLE

01. Open a symbol chart.

02. Click on the triangle tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the triangle. Release the mouse button when done.

EDITING A TRIANGLE

→ To move the triangle, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the triangle, click an anchor point in the corner of the triangle and drag it.

→ You can duplicate a triangle by double-clicking on it.

→ When the triangle is selected, you can edit the properties in the toolbox.

→ To delete the triangle, right-click on it and select **Delete** from the context menu. Alternatively, select the triangle and press the **DEL** key.

PROPERTIES

Price 1 / Price 2 / Price 3 The three anchor points of the triangle.

Permanent Here you can select whether the triangle should be displayed permanently. The default value is false.

Pattern Here you can select a pattern, either closed or open (top or bottom side without line).

Line Color Here you can select a line color.

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

Fill Color Here you can select a color and opacity for the triangle area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

TRIANGLE PATTERN

The triangle pattern tool draws a shaded triangle projection based on four anchor points.

You can find the triangle pattern tool in the *Chart Tools* group in the "Toolbar" on page 42.
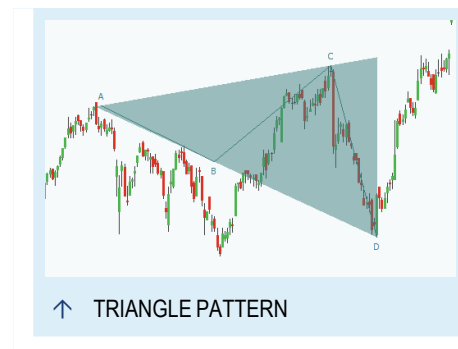
↑　TRIANGLE PATTERN

ENTERING A TRIANGLE PATTERN

01. Open a symbol chart.

02. Click on the triangle pattern tool in the toolbar.

03. Click into the chart to set the first anchor point A.

04. Keep the mouse button pressed and draw the triangle pattern. Release the mouse button when done.

EDITING A TRIANGLE PATTERN

→ To move the triangle pattern, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the triangle pattern, click an anchor point and drag it.

→ You can duplicate a triangle pattern by double-clicking on it.

→ When the triangle pattern is selected, you can edit the properties in the toolbox.

→ To delete the triangle pattern, right-click on it and select **Delete** from the context menu. Alternatively, select the triangle and press the **DEL** key.

PROPERTIES

Price 1 / Price 2 / Price 3 / Price 4 The four anchor points of the triangle pattern.

Permanent Here you can select whether the triangle pattern should be displayed permanently. The default value is false.

Font Here you can set the font type, weight and size for the anchor labels.

Line Color Here you can select a line color.

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

Fill Color Here you can select a color and opacity for the triangle pattern area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

ABCD PATTERN

The ABCD pattern tool draws the ABCD pattern based on four anchor points.

Typically this harmonic pattern is used for determining trade exit or entry points.

You can find the ABCD pattern tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ ABCD PATTERN

ENTERING AN ABCD PATTERN

01. Open a symbol chart.

02. Click on the ABCD pattern tool in the toolbar.

03. Click into the chart to set the first anchor point A.

04. Keep the mouse button pressed and draw the ABCD pattern. Release the mouse button when done.

EDITING AN ABCD PATTERN

→ To move the ABCD pattern, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the ABCD pattern, click an anchor point and drag it.

→ You can duplicate a ABCD pattern by double-clicking on it.

→ When the ABCD pattern is selected, you can edit the properties in the toolbox.

→ To delete the ABCD pattern, right-click on it and select **Delete** from the context menu. Alternatively, select the ABCD pattern and press the **DEL** key.

PROPERTIES

Price 1 / **Price 2** / **Price 3** / **Price 4** The four anchor points of the ABCD pattern.

Permanent Here you can select whether the ABCD pattern should be displayed permanently. The default value is false.

Font Here you can set the font type, weight and size for the anchor labels.

Line Color Here you can select a line color.

Line Width Here you can set a line width for the main pattern A-B-C-D, e.g. "1".

Line Style Here you can select a line style for the main pattern A-B-C-D, e.g. "Solid".

Line Width 2 Here you can set a second line width for the distances A-C and B-D, e.g. "2".

Line Style 2 Here you can select a second line style for the distances A-C and B-D, e.g. "Dot".

XABCD PATTERN

The XABCD pattern tool draws either the XABCD or the Cypher pattern based on five anchor points.

Typically this harmonic pattern is used for determining trade exit or entry points.

You can find the XABCD pattern tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ XABCD PATTERN

ENTERING AN XABCD PATTERN

01. Open a symbol chart.

02. Click on the XABCD pattern tool in the toolbar.

03. Click into the chart to set the first anchor point X.

04. Keep the mouse button pressed and draw the XABCD pattern. Release the mouse button when done.

EDITING AN XABCD PATTERN

→ To move the XABCD pattern, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the XABCD pattern, click an anchor point and drag it.

→ You can duplicate an XABCD pattern by double-clicking on it.

→ When the XABCD pattern is selected, you can edit the properties in the toolbox.

→ To delete the XABCD pattern, right-click on it and select **Delete** from the context menu. Alternatively, select the XABCD pattern and press the **DEL** key.

PROPERTIES

Price 1 / **Price 2** / **Price 3** / **Price 4** / **Price 5** The five anchor points of the XABCD pattern.

Permanent Here you can select whether the XABCD pattern should be displayed permanently. The default value is false.

Pattern Here you can select the pattern, either XABCD pattern or Cypher pattern.

Font Here you can set the font type, weight and size for the anchor labels.

Line Color Here you can select a line color.

Line Width Here you can set a line width for the main pattern X-A-B-C-D, e.g. "1".

Line Style Here you can select a line style for the main pattern X-A-B-C-D, e.g. "Solid".

Line Width 2 Here you can set a second line width for the distances A-C and X-D, e.g. "2".

Line Style 2 Here you can select a second line style for the distances A-C and X-D, e.g. "Dot".

Fill Color Here you can select a color and opacity for the XABCD pattern area. The higher the opacity, the lower the transparency, i.e. the less you can see the original chart behind it.

DIFFERENCE BETWEEN XABCD AND CYPHER

The two patterns differ in the way they are calculated, resulting in slightly different distances for A-C and X-D.

XABCD:

A – C: (price(C) – price(B)) / (price(B) – price(A))

X – D: (price(A) – price(D)) / (price(X) – price(A))

Cypher:

A – C: (price(X) – price(C)) / (price(X) – price(A))

X – D: (price(C) – price(D)) / (price(X) – price(C))

ELLIOTT WAVE 5 LINE

The Elliott Wave 5 Line tool draws either an Elliott Impulse Wave, Elliott Triangle Wave or Elliott Triple Combo Wave based on six anchor points.

You can find the Elliott Wave 5 Line tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ ELLIOTT WAVE 5 LINE

ENTERING AN ELLIOTT WAVE 5 LINE

01. Open a symbol chart.

02. Click on the Elliott Wave 5 Line tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the Elliott Wave 5 Line. If a rule-conforming wave can be plotted when drawing with the tool, it will attempt to do so, otherwise it will infer points based on a local highs/lows approach. Release the mouse button when done.

EDITING AN ELLIOTT WAVE 5 LINE

→ To move the Elliott Wave 5 Line, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the Elliott Wave 5 Line, click an anchor point and drag it.

→ You can duplicate an Elliott Wave 5 Line by double-clicking on it.

→ When the Elliott Wave 5 Line is selected, you can edit the properties in the toolbox.

→ To delete the Elliott Wave 5 Line, right-click on it and select **Delete** from the context menu. Alternatively, select the Elliott Wave 5 Line and press the **DEL** key.

PROPERTIES

Price 1 / Price 2 / Price 3 / Price 4 / Price 5 / Price 6 The six anchor points of the Elliott 5 Wave Line pattern.

Permanent Here you can select whether the pattern should be displayed permanently. The default value is false.

Pattern Here you can select the pattern, either Elliott Impulse Wave, Elliott Triangle Wave or Elliott Triple Combo Wave.

Wave Degree Here you can select the wave degree (time scale), between GrandSuperCycle and Subminuette. Default: Intermediate.

Font Here you can set the font type, weight and size for the anchor labels.

Line Color Here you can select a line color.

Labels Only Here you can select whether lines and anchor labels should be displayed (False) or only the labels (True).

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

DIFFERENCE BETWEEN THE ELLIOTT PATTERNS

Elliott Impulse Wave: This wave consists of five sub-waves that make net movement in the same direction as the trend of the next-largest degree. It consists of five waves labeled 1-2-3-4-5.

Elliott Triangle Wave: A triangle wave is typical for a sideways movement, associated with decreasing volume and volatility. It consists of five waves labeled a-b-c-d-e.

Elliott Triple Combo Wave: This is a combination of three corrective structures. It consists of five waves labeled W-X-Y-X-Z.

All three patterns follow specific rules. If a rule-conforming wave can be plotted when drawing with the tool, it will attempt to do so, otherwise it will infer points based on a local highs/lows approach. After the wave is drawn, all anchor points can be manipulated so that the pattern might no longer follow the wave theories.

ELLIOTT WAVE 3 LINE

The Elliott Wave 3 Line tool draws either an Elliott Correction Wave or an Elliott Double Combo Wave, based on four anchor points.

You can find the Elliott Wave 3 Line tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ ELLIOTT WAVE 3 LINE

ENTERING AN ELLIOTT WAVE 3 LINE

01. Open a symbol chart.

02. Click on the Elliott Wave 3 Line tool in the toolbar.

03. Click into the chart to set the anchor point.

04. Keep the mouse button pressed and draw the Elliott Wave 3 Line. If a rule-conforming impulse wave can be plotted when drawing with the tool, it will attempt to do so, otherwise it will infer points based on a local highs/lows approach. Release the mouse button when done.

EDITING AN ELLIOTT WAVE 3 LINE

→ To move the Elliott Wave 3 Line, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ To change the size of the Elliott Wave 3 Line, click an anchor point and drag it.

→ You can duplicate an Elliott Wave 3 Line by double-clicking on it.

→ When the Elliott Wave 3 Line is selected, you can edit the properties in the toolbox.

→ To delete the Elliott Wave 3 Line, right-click on it and select **Delete** from the context menu. Alternatively, select the Elliott Wave 3 Line and press the **DEL** key.

PROPERTIES

Price 1 / **Price 2** / **Price 3** / **Price 4** The four anchor points of the Elliott 3 Wave Line pattern.

Permanent Here you can select whether the pattern should permanently be displayed. The default value is false.

Pattern Here you can select the pattern, either Elliott Correction Wave or Elliott Double Combo Wave.

Wave Degree Here you can select the wave degree (time scale), between GrandSuperCycle and Subminuette. Default: Intermediate.

Font Here you can set the font type, weight and size for the anchor labels.

Line Color Here you can select a line color.

Labels Only Here you can select whether lines and anchor labels should be displayed (False) or only the labels (True).

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

DIFFERENCE BETWEEN THE ELLIOTT PATTERNS

Elliott Correction Wave: This is a main correction declining pattern, also called ZigZag. It consists of three waves labeled A-B-C.

Elliott Double Combo Wave: This is an extension of the correction wave. It consists of three waves labeled W-X-Y.

Both patterns follow specific rules. If a rule-conforming wave can be plotted when drawing with the tool, it will attempt to do so, otherwise it will infer points based on a local highs/lows approach. After the wave is drawn, all anchor points can be manipulated so that the pattern might no longer follow the wave theories.

FIBONACCI RETRACEMENTS

Fib. Retracements are a drawing tool with a calculation function. You as the user define the start and end point of the price levels that are to be used for the calculation. You can base your decision on price or correction movements.

↑   FIBONACCI RETRACEMENTS

Between these two price levels, the retracement lines are drawn according to the numerical proportion of the Fibonacci numerical series. The calculation is based on the golden section. The theory behind using Fib. Retracements for chart analysis is that price movements have rhythms similar to natural processes.

Fib. Retracements may be used for:

→   finding course aims of correction movements

→   finding course aims of trend movements

→   finding price targets of breakouts

→   judging the market and its trends

→   finding potential entry points at swing points

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING FIBONACCI RETRACEMENTS

01. Open a symbol chart.

02. Click on the Fib. Retracements tool in the toolbar.

03. Click into the chart to set the start point of the price development (this is the 0% level).

04.   Keep the mouse button pressed and move the pointer to the end point of the price development (this is the 100% level). Release the mouse button.

Between the 0 and 100% levels, the calculated lines are drawn. The horizontal position of the anchor points can be changed without effect. Only the distance between the resulting lines is important.

For extrapolating values beyond the 100% level, you can set the corresponding lines to visible (e.g. for 138.2% and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

DIRECTION-DEPENDENT ANALYSIS

For the sensible usage of the Fib. Retracements, it is important to enter the lines correctly into the chart. The start and end points have to be placed differently depending on whether you wish to analyze correction movements or trend movements.

ANALYSIS OF UPWARDS MOVEMENTS

→   For finding possible correction levels in an upwards movement, draw the line from the high to the low point of the movement. This puts the 0% level at the high and the 100% level at the low point. The standard lines that are displayed separate the trend movement into the possible correction levels.

→   To find possible future price levels of an upwards movement, however, draw the line from the low to the high point. Then set the levels beyond 100% to visible by selecting them in the properties.

ANALYSIS OF DOWNWARDS MOVEMENTS

→   For finding possible correction levels in a downwards movement, draw the line from the low to the high point of the movement. This puts the 0% level at the low and the 100% level at the high point. The standard lines that are displayed separate the trend movement into the possible correction levels.

→   To find possible future price levels of a downwards movement, however, draw the line from the high to the low point. Then set the levels beyond 100% to visible by selecting them in the properties.

EDITING FIBONACCI RETRACEMENTS

→ To change the 0% and 100% marks, click the anchor point of the respective line (the mouse pointer changes into an x-y axis symbol) and move it. The line positions will be adapted accordingly.

→ To move Fib. Retracements, drag them with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can edit the ratio of each Fib. line in the retracements. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fib. Retracements by double-clicking on them.

→ When the Fib. Retracements are selected, you can edit the properties in the toolbox.

→ The alert function is available for Fib. Retracements. To set an alert, set the Alert Mode from Disabled to one of the options (see below).

→ To delete the Fib. Retracements, right-click on them and select Delete from the context menu. Alternatively, select the Fib. Retracements and press the DEL key.

PROPERTIES

FIB. RETRACEMENTS PROPERTIES

% 1, % 2... Select from the list of available Fib. levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

Extend Left/Extend Right Select whether the lines are to be extended to the left and/or right until the edge of the chart.

Modus Select whether the lines are to be displayed in linear or logarithmic scale.

GRAPHIC PROPERTIES

The following properties can be set for the Fib. Retracements tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Labels Here you can set the value label for the lines to visible or hidden. In Tradesignal you can also specifiy the location at which the label should be displayed.

Show Guide Line Here you can select whether the guide line (the line connecting the two anchor points of the 0% and 100% lines) is visible or hidden.

ALERT PROPERTIES

The Retracements tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether crossing raises an alert always, once per bar or once overall.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed: Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a Point&Figure Chart.

For more information see chapter "Alerts" on page 329.

FIBONACCI EXTENSIONS

Fibonacci Extensions is a drawing tool with a calculation function. You as the user define the start on a significant swing low, then drag your mouse and click on the most recent swing high. Finally, drag your mouse down and click on any of the retracement levels.

↑ FIBONACCI EXTENSION

Between these three price levels, the extension lines are projected according to the numerical proportion of the Fibonacci numerical series. The calculation is based on the golden section. The theory behind using Fibonacci Extensions

for chart analysis is that price movements have rhythms similar to natural processes.

Most traders use Fibonacci Extensions in combination with other technical indicators/patterns to help them determine appropriate target prices.

You can find the tool in the Chart Tools group in the "Toolbar" on page 42.

ENTERING FIBONACCI EXTENSIONS

01. Open a symbol chart.

02. Click on the Fibonacci Extensions tool in the toolbar.

03. Click into the chart to set the low swing point.

04. Keep the mouse button pressed and move the pointer to a swing high. Release the mouse button.

The third point will be automatically calculated, but may be repositioned later by clicking and dragging it. For extrapolating values beyond the 100% level, you can set the corresponding lines to visible (e.g. for 138.2% and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

DIRECTION-DEPENDENT ANALYSIS

For the sensible usage of the Fibonacci Extensions, it is important to enter the lines correctly into the chart. The start and end points have to be placed appropriately depending on whether you wish to analyze correction movements or trend movements.

EDITING FIBONACCI EXTENSIONS

→ To change the marks, click the anchor point of the respective line (the mouse pointer changes into an x-y axis symbol) and move it. The line positions will be adapted accordingly.

→ To move Fibonacci Extensions, drag them with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can edit the ratio of each Fibonacci line in the extension. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fibonacci Extensions by double-clicking on them.

→ When the Fibonacci Extensions is selected, you can edit the properties in the toolbox.

→ The alert function is available for Fibonacci Extensions. To set an alert, set the **Alert Mode** from *Disabled* to one of the options (see below).

→ To delete the Fibonacci Extensions, right-click on them and select **Delete** from the context menu. Alternatively, select the Fibonacci Extensions and press the **DEL** key.

→ You can extend the Fibonacci lines by either clicking and dragging an end on either side, or enabling the *Extend Left* or *Extend Right* properties in the Inspector.

PROPERTIES

FIBONACCI EXTENSIONS PROPERTIES

 %1, % 2... Select from the list of available Fib. levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

Extend Left/Extend Right Select whether the lines are to be extended to the left and/or right until the edge of the chart.

Mode Select whether the lines are to be displayed in linear or logarithmic scale.

GRAPHIC PROPERTIES

The following properties can be set for the Fibonacci Extensions tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Labels Here you can set the value label for the lines to visible or hidden. In Tradesignal you can also specify the location at which the label should be displayed.

Show Guide Line Here you can select whether the guide line is visible or hidden.

ALERT PROPERTIES

The Extensions tool can be used with various kinds of alerts.

Alert Direction Here you can select from the list whether crossings of all types lead to alerts or only crossings in a certain direction.

Alert Mode Here you can select an alert mode from the list. Select whether crossing raises an alert always, once per bar or once overall.

Alert Name Here you can specify a name for alerts generated by this tool. It will be included in the signal field of the alert.

Alert Trigger Here you can select when an alert should be triggered.

Crossed Triggers when the price crosses the tool, e.g. goes from below the tool to above the tool

Hit or Crossed Same as above, but also triggers when the price merely hits the tool. This setting is useful for a "Point and Figure Chart" on page 144.

For more information see chapter "Alerts" on page 329.

FIBONACCI TIME PROJECTION

Fib. Time Projection is a drawing tool with a calculation function. You as the user define two anchor points at extremes, i.e. either high or low points in the chart.

↑ FIBONACCI TIME PROJECTION

The Fib. Time Projection then extends the distance between the two anchor points in the time line with a number of vertical lines. The lines are calculated by multiplying the distance between the anchor point with the Fibonacci numbers. The result is a number of projection lines that can be useful for finding swing points in charts.
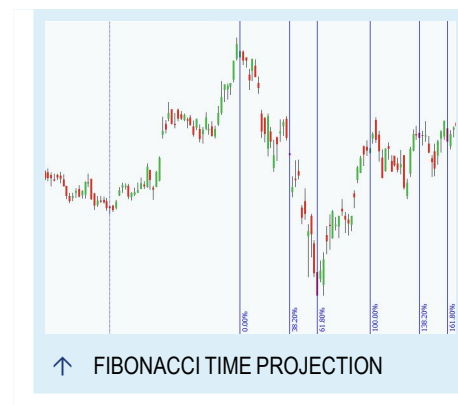
Fib. Time Projections may be used for:

→ finding possible swing points

→ finding time aims for current price movements

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING FIBONACCI TIME PROJECTION

01. Open a symbol chart.

02. Click on the Fib. Time Projection tool in the toolbar.

03. Click into the chart on a high or low point to set the first anchor point.

04. Keep the mouse button pressed and move the pointer to another high or low point of a similar price level in the chart. Release the mouse button.

In a time projection, the Fib. lines are drawn to the right of the anchor points. The vertical position of the anchor points can be changed without effect. Only the distance between the anchor points is important.

For extrapolating values beyond the 100% level, you can set the corresponding lines to visible (e.g. for 138.2% and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

EDITING FIB. TIME PROJECTION

→ To move the anchor points, click on the respective point (the mouse pointer changes into an x-y axis symbol) and move it. The line positions will be adapted accordingly.

→ To move the Fib. Time Projection, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can edit the ratio of each Fib. line in the retracements. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fib. Time Projection by double-clicking on it.

→ When the Fib. Time Projection is selected, you can edit the properties in the toolbox.

→ To delete the Fib. Time Projection, right-click on it and select **Delete** from the context menu. Alternatively, select the Fibonacci Time Projection and press the **DEL** key.

PROPERTIES

FIB. TIME PROJECTION PROPERTIES

% 1, % 2... Select from the list of available Fib. levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

GRAPHIC PROPERTIES

The following properties can be set for the Fib. Time Projection tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

Label Placement Here you can set whether and where the value labels for the lines will be displayed, bottom or top.

Show Guide Line Here you can select whether the guide line (the line connecting the two anchor points) is to be visible or hidden.

FIBONACCI TIME ZONES

Fibonacci Timezones is a drawing tool with a calculation function. You as the user define two anchor points at extremes, i.e. either high or low points in the chart.

The Fibonacci Timezones then extends the distance between the two anchor points in the time line with a number of vertical lines. The lines are calculated by multiplying the distance between the anchor point with the Fibonacci numbers. The result is a number of timezone lines that can be useful for finding swing points in charts.

↑   FIBONACCI TIME ZONES

Fibonacci Timezones may be used for:

→   finding possible swing points

→   finding time aims for current price movements

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING FIBONACCI TIMEZONES

01.   Open a symbol chart.

02.   Click on the Fibonacci Timezones tool in the toolbar.

03.   Click into the chart on a high or low point to set the anchor point.
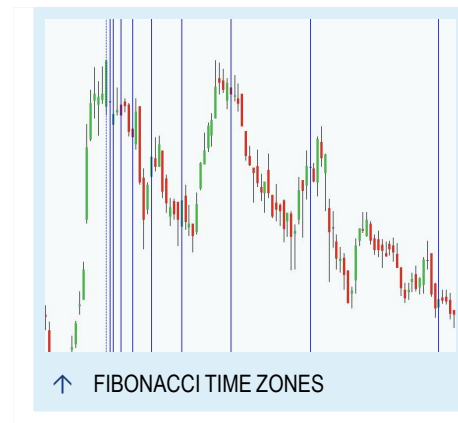
04. Keep the mouse button pressed and move the pointer to position the Fibonacci Timezones. Release the mouse button.

In a timezone projection, the Fibonacci lines are drawn to the right of the anchor point. The vertical position of the anchor points can be changed without effect. Only the distance between the anchor points is important.

For extrapolating values beyond the 100% level, you can set the corresponding lines to visible (e.g. for 138.2 and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

EDITING FIBONACCI TIMEZONES

→ To move the anchor points, click on the respective point (the mouse pointer changes into an x-y axis symbol) and move it. The line positions will be adapted accordingly.

→ To move the Fibonacci Timezones, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the mouse button when done.

→ You can edit the ratio of each Fibonacci line in the retracements. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fibonacci Timezones by double-clicking on it.

→ When the Fibonacci Timezones is selected, you can edit the properties in the toolbox.

→ To delete the Fibonacci Timezones, right-click on it and select **Delete** from the context menu. Alternatively, select the Fibonacci Timezones and press the **DEL** key.

PROPERTIES

The following properties can be set for the Fibonacci Timezones tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

FIBONACCI ARCS

Fibonacci Arcs are a drawing tool with a calculation function. You as the user define the start and end point of the price levels that are to be used for the calculation. The Fibonacci Arcs are then calculated and drawn, similar to the Fibonacci Retracements. The theory behind using Fibonacci numbers for chart analysis is that price movements have rhythms similar to natural processes.

↑　FIBONACCI ARCS

You may use Fibonacci Arcs for

→ finding consolidation aims in price movements

→ finding resistance and support levels

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING FIBONACCI ARCS

01. Open a symbol chart.

02. Click on the Fibonacci Arcs tool in the toolbar.

03. Click into the chart, for example a high point.

04. Keep the mouse button pressed and move the pointer to the next low point.

05. Release the mouse button.

Between the anchor points, the calculated arcs are drawn.

For extrapolating values beyond the 100% level, you can set the corresponding arcs to visible (e.g. for 138.2 and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

EDITING FIBONACCI ARCS

→ To move the baseline, click the respective anchor point (the mouse pointer changes into an x-y axis symbol) and move it. The arcs will be adapted accordingly. Depending on the position of the middle to the outer anchor point, the arcs are drawn upwards or downwards.

→ To move Fibonacci Arcs, drag them with the mouse (the mouse pointer turns into a hand symbol) and move them freely. Release the mouse button when done.

→ You can edit the ratio of each Fibonacci line in the arcs. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fibonacci Arcs by double-clicking on them.

→ When the Fibonacci Arcs are selected, you can edit the properties in the toolbox.

→ To delete the Fibonacci Arcs, right-click on them and select **Delete** from the context menu. Alternatively, select the *Fibonacci Arcs* and press the **DEL** key.

PROPERTIES

FIBONACCI ARCS PROPERTIES

% 1, % 2... Select from the list of available Fibonacci levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

GRAPHIC PROPERTIES

The following properties can be set for the Fibonacci Arcs tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

FIBONACCI FANS

Fibonacci Fans are a drawing tool with a calculation function. You as the user define the start and end point of the price levels that are to be used for the calculation. The Fibonacci Fans are then calculated and drawn, similar to the Fibonacci Retracements. The theory behind using Fibonacci numbers for chart analysis is that price movements have rhythms similar to natural processes.

↑ FIBONACCI FANS

You may use Fibonacci Fans for

→ finding support lines in upwards movements

→ finding resistance levels in downwards movements

You can find the tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING FIBONACCI FANS

01. Open a symbol chart.

02. Click on the Fibonacci Fans tool in the toolbar.

03. Click into the chart to set an extreme point, for example at a high.

04. Keep the mouse button pressed and move the pointer to the next diametrical extreme, for example a low point.

05. Release the mouse button.

Between the anchor points, the calculated fans are drawn. They can be seen as resistance and support levels.

For extrapolating values beyond the 100% level, you can set the corresponding fans to visible (e.g. for 138.2% and 161.8%). To do so, select the check boxes in the full overview in the "Mini Toolbar" on page 45.

EDITING FIBONACCI FANS

→ To move the baseline, click the respective anchor point (the mouse pointer changes into an x-y axis symbol) and move it. The fans will be adapted accordingly. Depending on the position of the middle to the outer anchor point, the fans are drawn upwards or downwards.

→ To move Fibonacci Fans, drag them with the mouse (the mouse pointer turns into a hand symbol) and move them freely. Release the mouse button when done.

→ You can edit the ratio of each Fibonacci line in the fans. To do so, click on the numbers next to the check boxes (in the properties) and enter new values.

→ You can duplicate the Fibonacci Fans by double-clicking on them.

→ When the Fibonacci Fans are selected, you can edit the properties in the toolbox.

→ To delete the Fibonacci Fans, right-click on them and select **Delete** from the context menu. Alternatively, select the *Fibonacci Fans* and press the **DEL** key.

PROPERTIES

FIBONACCI FANS PROPERTIES

% 1, % 2... Select from the list of available Fibonacci levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

GRAPHIC PROPERTIES

The following properties can be set for the Fibonacci Fans tool:

Color Here you can select a line color.

Width Here you can set a width for all lines by entering a number.

Style Here you can select a line style, e.g. solid or dotted.

GLYPH

With the Glyph tool a variety of glyphs can be added to your charts.

You can find the Glyph tool in the *Chart Tools* group in the "Toolbar" on page 42.

↑ GLYPH

ENTERING A GLYPH

01. Open a symbol chart.

02. Click on the Glyph tool.

03. Click on the chart where the glyph should be placed.

EDITING A GLYPH

→ To move the Glyph, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely. Release the

mouse button when done.

→ To change the size of the Glyph, select the Glyph, click on the shown circle and drag it.

→ To change the glyph itself, change the **style** at the properties in the toolbox.

→ You can duplicate a Glyph by double-clicking on it.

→ When the Glyph is selected, you can edit the properties in the toolbox.

→ To delete the Glyph, right-click on it and select **Delete** from the context menu. Alternatively, select the Glyph and press the **DEL** key.

PROPERTIES

Style Here you can select the used glyph.

Size Here you can adjust the size of the glyph.

Color Here you can select the color of the glyph.

FIBONACCI WEDGE

Fibonacci Wedge is a drawing tool that calculates and draws Fibonacci bands within a wedge shaped projection. You define the anchor and end point of the levels that are used for the calculation. The Fibonacci Wedge is then calculated and drawn, very similar to the Fibonacci Retracements. The theory behind using Fibonacci numbers for chart analysis is that price movements have rhythms similar to natural processes.
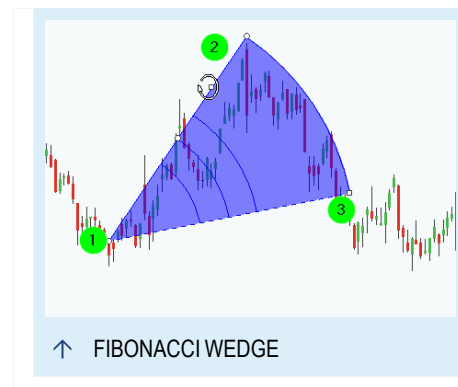
↑   FIBONACCI WEDGE

You can find the Fibonacci Wedge tool in the *Chart Tools* group in the "Toolbar"

ENTERING A FIBONACCI WEDGE

01. Open a symbol chart.

02. Click on the Fibonacci Wedge tool in the toolbar

03. Click into the chart to set the anchor point for the wedge.

04. Keep the mouse pressed and move the pointer to end point of the wedge.

The Wedge is drawn clockwise between the anchor point (1) and the end point (2) and several Fibonacci lines are also drawn in the Wedge. If you press CTRL during the drawing the wedge is drawn count-clockwisen.

For additional extrapolating values, the corresponding level can be activated in the full overview in the "Mini Toolbar" on page 45.

EDITING A FIBONACCI WEDGE

→ To change the angle and radius of the Fibonacci Wedge, select it and drag the main tool line (solid) between the start point (1) and low point (2).

→ To adjust only the angle of the Fibonacci Wedge, select it and drag the help line (stepped line) at the help point (3).

→ To define the used Fibonacci levels change the values in the properties.

→ To reflect the Fibonacci Wedge on the main tool line press Shift and double-click on the tool. To reflect the Fibonacci Wedge on the start point press CTRL and double-click on the tool.

→ To spin the tool around the anchor point (1), select it on the square on the main tool line, so that cursor is shown as a circled arrow.

→ To extend the wedge to the end of the chart double-click on the low point (2) or the help point (3).

PROPERTIES

Permanent Here you can select whether the Fibonacci Wedge should be displayed permanently. The default value is false.

Start Value Here you can change the anchor point.

End Value Here you can change the end point for the pivot wedges.

% 1, % 2... Select from the list of available Fibonacci levels the ones you want to display. You can edit the values by clicking on the numbers to the right of the check boxes and entering new ones. For each level you can set a different color. In order to set the color back to one default color, select *None* in the color picker.

Style Here you can select a line style, e.g. solid or dotted. The default value is solid.

Linecolor Here you can select a line color.

Fillcolor Here you can select a fill color.

Extend Lines Here you can select whether the wedge should be extended until the edge of the chart. The default value is false.

Show base lines Here you can select whether the base lines are displayed. The default value is true.

Font Here you can set the font type, weight and size for the labels of the levels.

Labels Here you can select whether the labels of the levels are displayed. The default value is hidden.

Width Here you can set a line width, e.g. "1".

POINT AND FIGURE VERTICAL TARGET

The Point and Figure Vertical Target Tool draws price targets in order to predict the stability of a trend and to confirm signals from other indicators or strategies.

↑   POINT AND FIGURE VERTICAL TARGET

You can find the Point and Figure Vertical Target tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING A POINT AND FIGURE VERTICAL TARGET

01. Open a symbol chart.

02. Click on the Point and Figure Vertical Target tool in the toolbar.

03. Click into the chart to set the anchor column of the tool.

04. Release the mouse and the target is drawn.
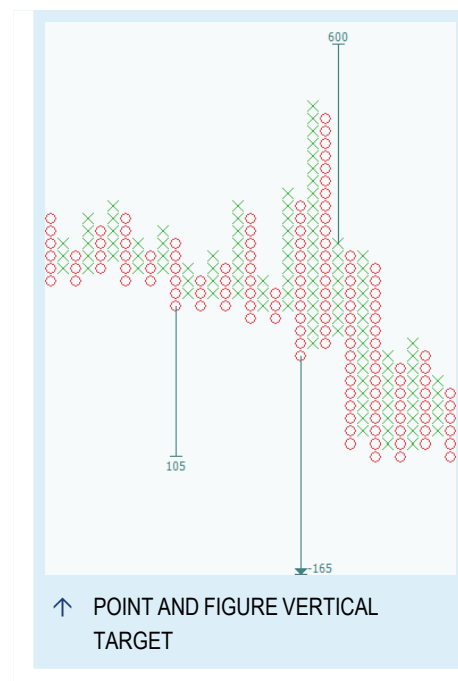
EDITING A POINT AND FIGURE VERTICAL TARGET

→   To move the Point and Figure Vertical Target tool, drag it with the mouse (the mouse pointer turns into a hand symbol) and

move it freely to another column with the same symbols. Release the mouse button when done.

→ You can duplicate a Point and Figure Vertical Target tool by double-clicking. The duplicate will be moved to the previous column with the same symbols.

→ When the Point and Figure Vertical Target tool is selected, you can edit the properties in the toolbox.

→ To delete the Point and Figure Vertical Target tool, right-click on it and select **Delete** from the context menu. Alternatively, select the Point and Figure Vertical Target tool and press the **DEL** key.

PROPERTIES

Permanent Here you can select whether the pattern should be displayed permanently. The default value is false.

Line Color Here you can select a line color.

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

Font Here you can set the font type, weight and size for the label.

CALCULATION

The calculation of vertical price targets is based on the selected column. The anchor price is the highest or lowest price of the previous column.

Vertical target for upside targets (columns of Xs):

Anchor Price + Number of Boxes * Box Size * Reversal

Vertical target for downside targets (columns of Os):

Anchor Price - Number of Boxes * Box Size * Reversal

POINT AND FIGURE HORIZONTAL TARGET

The Point and Figure Horizontal Target Tool draws price targets in order to predict the stability of a trend and to confirm signals from other indicators or strategies.

You can find the Point and Figure Horizontal Target tool in the *Chart Tools* group in the "Toolbar" on page 42.

ENTERING A POINT AND FIGURE HORIZONTAL TARGET
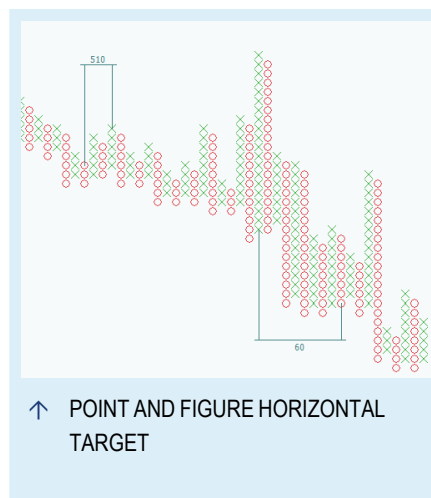
↑   POINT AND FIGURE HORIZONTAL TARGET

01. Open a symbol chart.

02. Click on the Point and Figure Horizontal Target tool in the toolbar.

03. Click into the chart to set the anchor column of the tool.

04. Keep the mouse button pressed and move the mouse to set the width of the pattern.

05. Release the mouse and the target is drawn with the selected width.

If you just click into the chart, the tool will be automatically drawn to the next column with the other symbol considering the set pattern width.

EDITING A POINT AND FIGURE HORIZONTAL TARGET

→   To move the Point and Figure Horizontal Target tool, drag it with the mouse (the mouse pointer turns into a hand symbol) and move it freely to another column with the same symbols. Release the mouse button when done.

→   You can duplicate a Point and Figure Horizontal Target tool by double-clicking on the left line. The duplicate will be moved to the previous column with the same symbols.

→   To change the width of the tool, drag the right point of the line with the label and move it freely to the next column with the same symbols. Release the mouse button and the new width is applied.

→   When the Point and Figure Horizontal Target tool is selected, you can edit the properties in the toolbox.

→ To delete the Point and Figure Horizontal Target tool, right-click on it and select **Delete** from the context menu. Alternatively, select the Point and Figure Horizontal Target tool and press the **DEL** key.

PROPERTIES

Permanent Here you can select whether the pattern should be displayed permanently. The default value is false.

Columns Here you can select how many additional columns to the selected column should be part of the pattern.

Line Color Here you can select a line color.

Line Width Here you can set a line width, e.g. "1".

Line Style Here you can select a line style, e.g. "Solid" or "Dot".

Font Here you can set the font type, weight and size for the label.

CALCULATION

The calculation of horizontal price targets is based on number of columns and the anchor price. The anchor price is the maximal or minimal price in the selected zone. The zone includes the selected column and the following columns defined by the property columns.

Horizontal price target with congestion top and downside reversal breakout (X to O):

Anchor Price - Columns * Box Size * Reversal

The anchor price is the maximal price in the zone.

Horizontal price target with congestion base and upside reversal breakout (O to X):

Anchor Price + Columns * Box Size * Reversal

The anchor price is the minimal price in the zone.

TIME SPANS AND PERIODS

For analyzing stocks and securities, not only the navigational features of the chart but also other settings are important, like the period and time span settings. Change them to:

↑ PERIOD MENU
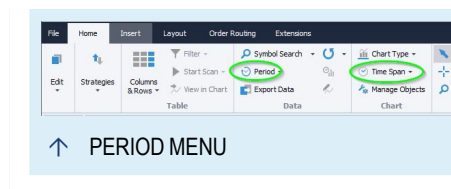
→ Analyze price movements and trends over various time resolutions

→ Detect trends over longer time periods (days, months, years)

→ Compare the performance of normalized time spans

→ Optimize the chart display according to your preferences

→ Change the signal generation frequency of a trading system

→ Adapt the visible data to the analysis horizon

You can set the trading period not only in the chart but also in the "Portfolio" on page 251, the "Scanner" on page 71 and the "Watchlist" on page 77. All paragraphs in this text apply analogously.

CHANGING THE PERIOD

You can change the period for all instruments in an active chart in two ways:

→ Via the button **Period** under *Home > Data* on the "Toolbar" on page 42. Click on the button to open the button menu and select a period.

→ Via the command line by entering certain shortcuts, for example "w" for week, "5h" for five hours, "25t" for 25 ticks. For a list of all shortcuts see chapter "Command Line" on page 38.

If you want to change the period for all instruments in all charts, press **Ctrl** while selecting a period.

To change the period of a single instrument in a chart, right-click on the chart legend of the instrument and change the **Period for Object** in the context menu.

A trading period is the unit that corresponds to a price in the plot. Trading periods are necessary for the financial market to be able to compare analysis methods, trading systems and price patterns independently of the actual value or day of time.

TRADING PERIOD TYPES

There are three types of trading periods:

→ Periods based on price fixing - in this case, the price is plotted for a defined number of ticks. This kind of period results in a non-linear time scale in the chart. Three periods are available: 1, 10 or 25 ticks.

↑ PERIOD MENU
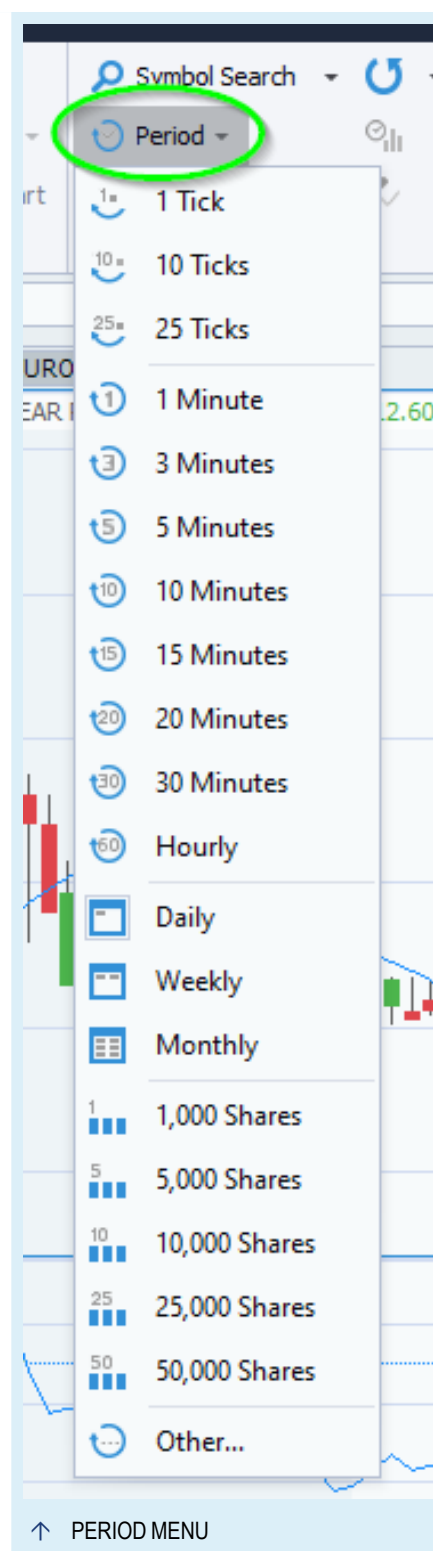
→ Time-dependent period - In this case, time units are used, like hour, day, month and year. Several standard time units are offered as quick settings.

→ Periods based on traded shares - In this case, a defined number of shares are accumulated to a trading period for this security. For example, you can set that for each 1000 shares, a price should be plotted. This kind of period results in a non-linear time scale in the chart. Several quick settings are available, from 1000 to 50000 shares.

DEFINING YOUR OWN TRADING PERIOD

You can define your own trading period by selecting the entry **Other Period** in the period button menu.

As a trading period, you can set every number divisible by 1 as a time and calendar unit, or set an arbitrary number for ticks and shares.

When using a 1 hour intra-bar period, it is possible to enter a **Shift in Minutes** from the natural clock the bar should close on. This feature could be used e.g. to offset hourly candles to generate signals some minutes before the clock hour. It also could be used to align the first hourly candle to the start of the day's trading. E.g. set the minute offset to 30 if the trading day starts at 8:30, so the first bar will be drawn aligned at 9:30.

The offset can also be set individually for an item in a chart, watchlist, portfolio or scanner. For this, open the context menu of the item and select *Period > Other Period* to open the *Change Period* dialog for this item and to adjust this offset.

CHANGING THE TIME SPAN

For an active chart, you can find the time span button in the *Chart* group in the "Toolbar" on page 42. Click on the small arrow to open the time span menu. Select a setting.

If you want to change the time span for all instruments in all charts, press **Ctrl** while selecting a "Toolbar" on page 42.

The time span is the span visible in the chart history without scrolling. You can use given settings or define your own time spans.

TIME SPAN TYPES

Several settings are available for the time span:

Current (Minute, Hour...) Display only the current minute, hour etc.

Recent (F8, default) In all chart types in which trading periods are linear with time, the "Recent" history is a length of 63 past trading periods and 7 empty periods of free space to the right of the current period. In chart types with non-linear time axes, the view is adapted to what viewers might perceive as optimal arrangement.

Full (Ctrl + F8) Show the data as set in **History Length** under **Date Axis** in the "Settings" on page 157 (default 1000, maximum 500000).

DEFINING CUSTOM TIME SPANS

To set exact time spans, select Absolute or Moving in the time span button menu.

Absolute Here you can define a start point for a time span of a fixed length. Pre-set values are the current time and date. Click the arrow next to the **Date From** field to open a calendar to choose a date from. For the time span, any number divisible by 1 is possible. By default, the time span is displayed from the start point into the future. Select "Span backwards from specified date" to display the time span from the start point into the past.

Moving Here you can define a time span of a fixed length that constantly begins with the last price of the current trading period. For the time span, any number divisible by 1 is possible.
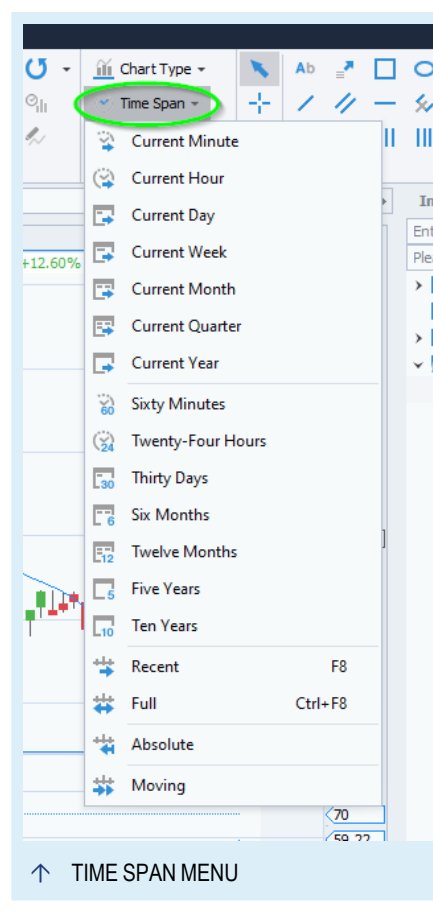
With the key **F8** or a click on the axes symbol on the lower right of the chart you return to the standard setting **Recent History**.

USING TEMPLATES

In templates you can save all graphic settings of a chart as well as any included indicators, strategies, and the history length as a template for future charts.

Templates are handled like documents in the "Toolbox" on page 49. Therefore, functions like package management and color tagging are available.

↑ TEMPLATE MANAGER IN THE TOOLBOX
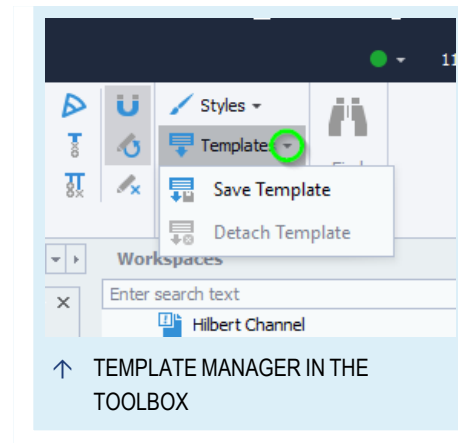
SAVING A TEMPLATE

01. Select **Save Template** in the context menu of the chart legend. Alternatively, click on *Home > Style > Template > Save Template* in the "Toolbar" on page 42.

02. Enter a name.

03. Either select **Create** in to choose an existing package for saving the template, or set up a new one.

04. Confirm with **OK** to save the template.

You can find all available templates in the toolbox under Templates.

Note: To save a template, a chart has to be active.

APPLYING A TEMPLATE

01. Click the button **Templates** in the toolbox.

02. Drag and drop a template into a selected chart or double click on it. All previously saved settings (including the securities, parameters of indicators and strategies, and the history length) are displayed in the chart. Alternatively, choose **Apply** from the context menu of the template.

If you apply a template to an existing chart, the symbols of the chart are used instead of the symbols saved in the template.

Once a template has been applied to a chart, the chart is linked to that template. Any changes to the template will be automatically applied to the chart. The template used by a chart can be seen in the full overview via the "Mini Toolbar" on page 45.

→ To detach a chart from its template select the chart and then click on *Home > Style > Templates > Detach Template* on the Toolbar.

→ To temporarily disable the automatic updating of charts when the template changes, uncheck the box in the options under *File > Options > Advanced > Templates*.

MANAGING TEMPLATES

In the template manager in the toolbar, you can access various functions via the context menu:

→ You can apply the template to the current chart or open it in a new chart.

→ You can rename or delete templates.

→ You can define a template as default with Set Default. The default template is then applied to all new charts. To return to the Tradesignal default, select Clear Default.

→ You can use color tags on templates.

STYLES

With styles, you can edit the graphic properties of "Chart" on page 96, "Scanner" on page 71, "Watchlist" on page 77, "Portfolio (Classic)" on page 261, "Market Depth" on page 90, and "News" on page 365.

You can do the following:

→ assign existing styles

→ save current settings as a new custom style

→ edit styles in style management

APPLYING STYLES

Styles button menu in the toolbar

When a document of a type listed above is open, you can find the Style area in the "Toolbar" on page 42.

Click on the **Styles** button to open the menu.

→ To apply a style to a single document, simply click on it in the list.

→ To apply a style to all currently open documents (in all workspaces), press the Ctrl key while clicking on the style.

The style is applied immediately.

SAVING STYLES

01. Open the **Styles** button menu and click **Save Style**.
A dialog opens.

02. Enter a name for the style.

03. Enter a description (optional). This is the text that will later appear in the Styles button menu.

04. Choose whether this style should be used as standard for this document type. In addition, you can choose whether the style should be applied to all open documents of this type.

05. Save the style by clicking **OK**.
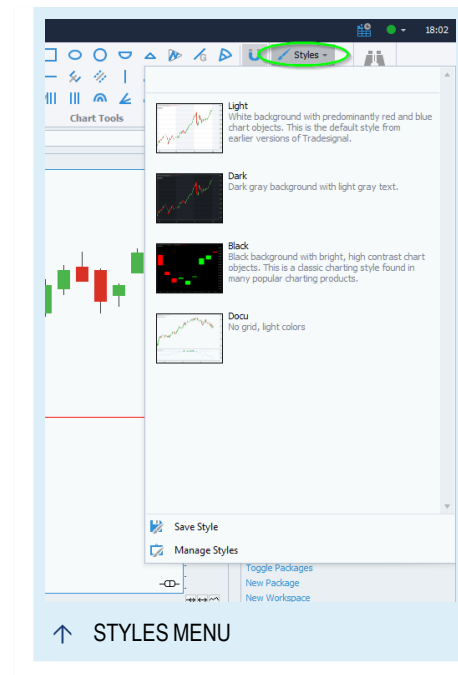
MANAGING STYLES

01. Open the **Styles** button menu and choose the entry **Manage Styles**. *A dialog opens.*

02. Open the tab of the document type for which you want to edit the styles.

↑   STYLES MENU

03. Click **Set as Default** to use the selected style as new standard for documents of that type. If you click Clear Default, the Tradesignal standard is used again.

04. If you have saved your own styles, you can edit them (only name and description) and delete them.
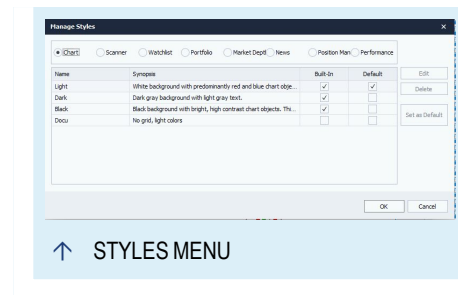
TRADING SYSTEMS AND ORDER ROUTING

USING TRADING STRATEGIES

A trading system is a collection of rules and functions from which trading decisions of any kind result. To this collection, rules for money and risk management are added. Modern computer software also supports the fully mechanized trade, up to the order routing to the broker. Trading systems are used to:

→ Test a set of rules for future real trade

→ Guarantee the smooth execution of trading decisions

→ Sidestep human weaknesses like fear and insecurity

→ Procure stable results based on clear rules

→ Automate trades based on a complex set of rules

→ Trade many different symbols or systems at the same time.

Tradesignal offers you a broad range of tools for the development, testing, and operation of complex trading systems:

→ "Using Strategies" on page 381 are written in Equilla and can be edited and adapted to your needs.

→ An "Order Editor" on page 233 which allows you to manually manage your orders

→ "Money Management" on page 236 with options for position sizing and risk management.

→ Analysis of the possible trading system turnover in the "Performance Report" on page 287.

→ Search for the most profitable and stable trading system configuration with the "Optimizer" on page 274.

→ Mechanical trading with "Automatic Order Routing" on page 307.

→ "Alerts" on page 329 issued when critical limits (values or graphic lines) are intersected in defined directions.

→ An easy start with the "Trading Strategy Wizard" below that offers more than 300 strategies in a modular system, as well as new indicators and strategies for download from Tradesignal.

All of these tools are intended to help you configure and optimize your own systems.

TRADING STRATEGY WIZARD

Trading strategies are an important tool for many traders who seek success at the market independent of their personal feelings, fears and insecurities. For this aim, Tradesignal offers many pre-defined indicators and strategies, which can be expanded by adjusting existing strategies or developing new strategies in Equilla.

↑ TRADING STRATEGY WIZARD
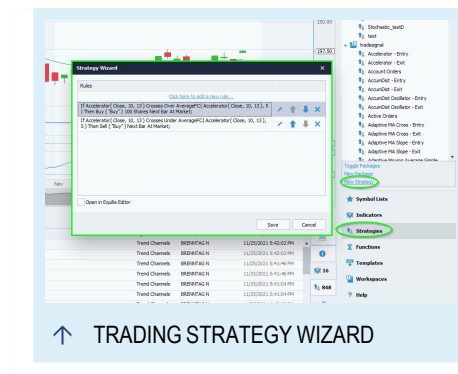
As an alternative, Tradesignal offers a Trading Strategy Wizard to support you in assembling a strategy. Instead of scripting, simply combine lists, conditions, expressions and patterns. The wizard helps you to

→ swiftly create trading strategies

→ modify your strategies and customize it

Strategies created in the wizard can be used in the "Chart" on page 96, "Scanner" on page 71, "Watchlist" on page 77, "Portfolio" on page 251 or the "Optimizer" on page 274. For all adjustable parameters, the wizard automatically creates "Input Declarations" so that you can edit the parameters in the "Mini Toolbar" on page 45 and the Optimizer.

CREATING A TRADING STRATEGY

01. In the toolbox, click on the **Strategies** button.

02. In the Related Tasks area, select **New Strategy**.

03. In the next dialog, select the option **Use the Trading Strategy Wizard**.

In the following window, the strategy rules are defined. Rules can be assigned to each trading order, and several trading orders can be set up for the strategy. For condition details, see below.

01. Click **New to enter a new order**.

02. Enter a name for the order (optional), to distinguish between different entry and exit methods.

03. Select an entry or exit method and enter an order type.

04. Select **Generate reversed trading condition** to generate also the reversed order (for example, for a "buy long" generate a "sell long" with reversed conditions).

05. Enter the Order Settings and click on **Next**.

06. In the next window, enter the conditions.

You can now edit the conditions further by clicking on **Edit** next to the Expression fields. The *Build Expression* dialog opens. Here you can define how the value is to be calculated. Select the option **Make an input** to make this value appear as parameter in the strategy properties and the Optimizer.

You can also change the operators that link the expressions. Select one from the list.

Click the **Done** buttons to save the expressions/strategy.

ENTRY AND EXIT METHODS

The trading methods are roughly divided into exit and entry orders.

ENTRY METHODS

The following two methods create orders that open a position.

Enter Long (Buy) A buying order is created.

Enter Short (Sell) A short sale order is created.

EXIT METHODS

The following two methods create orders that close an existing position.

Exit Long (Sell) A selling order is created to close a long position (a fraction or all of it).

Exit Short (Cover) A buying order is generated to cover a short position.

STOP LOSS, TRAILING STOP AND PROFIT TARGET

Stop Loss An order is created that closes the current position after reaching the defined loss.

Profit Target An order is created that closes the position after reaching the defined profit.

Break Even An order is created that prevents a position from causing losses after having made a profit.

Trailing Stop (Amount) An order is created that follows the position development. When the position moves with the desired trend, the order "trails" behind. When the position moves against the desired trend, the position is closed after a certain decline in profit, defined as amount.

Trailing Stop (Percent) An order is created that follows the position development. After a defined profit target, the stop order is activated. The position is closed after a certain decline in profit, defined in percent.

TRADING TYPES

An order type has to be assigned to each order. It defines when the order is executed. For two order types, additional conditions are available to control the execution.

This Bar on Close (TBOC) The order is submitted at the end of the trading. In the settings of the Order Routing in the "Tradesignal Options" on page 319, you can define at what distance to the real trading end a TBOC order is created and possibly routed. In backtests, the close price of the trading period is taken as execution price.

Next Bar at Market (NBAM) The order is submitted at the opening of the next trading period. In backtests, the open price of the trading period is taken as execution price.

Next Bar at Price Stop (NBPS) The order is submitted during the next trading period. For a buy order, the price has to cross the given price limit, for a short sale the price has to be undercut. This way, the position is opened when the trend moves into the preferred direction.

Next Bar at Price Limit (NBPL) The order is submitted during the next trading period. For a buy order, the price has to undercut the given price limit, for a short sale the price has to be crossed.

This Bar at Market (TBAM) The order is submitted during the current trading period. It is executed instantly.

ORDER SETTINGS

For each order, either you can define it so that the quantity of shares to be traded can be entered in the "Money Management" on page 236, or you can enter a fixed quantity here.

Setting quantities in the Money Management has the benefit of making it possible to use "Position Sizing" on page 301 methods that are offered in Tradesignal. This way, the quantities can be adapted dynamically in your trading system.

TRADING CONDITION TEMPLATES

The trading conditions are largely based on pre-defined Equilla scripts that include indicators, calculate chart patterns or search for candlestick patterns. For the signal generation, there are typically two expressions necessary, for example "indicator XYZ crosses over the average ABC". The calculation of the indicator and its average are all included in Equilla scripts that are combined and connected by operators in the Wizard.

The templates for signal generation are roughly listed by categories. At the top of the list, you can find three categories that generate signals based on the **Standard Price Series, Position based**, or based on **Date and Time**. Below these entries, you can find a long list of indicators, followed by candlestick patterns and chart patterns.

STANDARD PRICE SERIES

These signals are based on the price of the underlying stock. The signals are generated depending on comparisons of the current price to past prices. This way, changes in directions and the highest and close prices can be calculated.

POSITIONS BASED

These signals are based on the developments of existing positions.

DATE AND TIME

These signals are connected to certain dates or times. This way, you can create seasonal entries, for example. You can also create intraday strategies that are traded only within or outside of a certain time frame.

INDICATORS

This is the largest category. Here you can find all indicators included in the delivery. For each indicator, a folder with various signal variations is available. Crossings with lines, values or extremes, changes in directions and comparisons to historic values like averages are offered.

CANDLESTICK PATTERN

Here you can find a number of candlestick patterns. For each pattern, a folder with various signal variations is available. Usually, these consist of bullish and bearish patterns. Some signals are also available with trend filters.

Candlestick patterns offer one to two parameters. The first is used to define a candle body. The body is compared to the average candle body size of the given period. If a second parameter is available, it defines the period for an average that is used as trend filter. In this case, the pattern only causes a signal if it is complete and has the right position for the trend filter.

CHART PATTERN

Some common chart patterns are available here. For each pattern, a folder with a bullish and bearish pattern is available.

EDITING A GENERATED SYSTEM

WITH THE WIZARD

Any trading system generated in the Strategy Wizard can also be edited in the Strategy Wizard again. For this, right-click on the strategy in the chart legend or the toolbox to open the context menu, and select **Edit with Strategy Wizard**.

In the Strategy Wizard, click on **Edit** to edit the trading system. You can enter new conditions and rules or edit and delete old ones.

MANUALLY IN THE EDITOR

You can also open and edit a strategy in the Equilla Editor. However, please note that you will not be able to open the wizard for this strategy again if you made changes to it in the editor.

To open the trading system in the editor, right-click on the name of the strategy in the chart legend or the toolbar, and select **Edit** from the context menu. The Equilla Editor opens in which you can edit the source code.

A strategy may look as follows in the editor:

```
// Automatically generated by the Trading Strategy Wizard (1541647255)

Inputs:
CandleRawBigWhitePeriod( 5 ),
CandleRawBigBlackPeriod( 5 ),
Price1( Close ),
XAveragePeriod1( 30 ),
XAveragePeriod2( 60 );

Variables:
TRUEVALUE_VAR1,
XAVERAGE_VAR1,
XAVERAGE_VAR2;

TRUEVALUE_VAR1 = TrueValue( );
XAVERAGE_VAR1 = XAverage( Price1, XAveragePeriod1 );
XAVERAGE_VAR2 = XAverage( Price1, XAveragePeriod2 );


If CandleRawBigWhite( CandleRawBigWhitePeriod ) = TRUEVALUE_VAR1 Then
Buy ( "Long Candle" ) Next Bar At Market;

If CandleRawBigBlack( CandleRawBigBlackPeriod ) = TRUEVALUE_VAR1 Then
Short ( "Short Candle" ) Next Bar At Market;

If XAVERAGE_VAR1 Crosses Under XAVERAGE_VAR2 Then
Sell ( "Long Exit" ) Next Bar At Market;

If XAVERAGE_VAR1 Crosses Over XAVERAGE_VAR2 Then
Cover Next Bar At Market;
```

ORDER EDITOR

The Order Editor allows you to

→ recalculate full or partial backtesting data after the original backtest has been done,

→ modify or delete automatically generated orders and

→ manually add additional orders.

↑   ORDER EDITOR WINDOW

There is always exactly one Order Editor associated with each chart. Changes made in the chart will automatically reflect in the Order Editor.
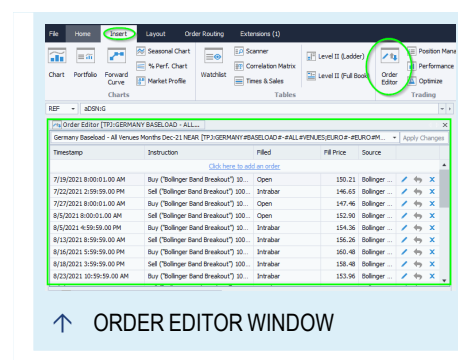
Caution: Multiple manual changes made in the Order Editor must be committed using the **Apply Changes Button**. Changes will otherwise be lost.

To open the Order Editor, proceed as follows:

01. Open a chart.

02. Switch to the *Insert* tab on the main ribbon.

03. Under *Trading*, click the button **Order Editor**.

The Order Editor opens.

EDITING AND DELETING STORED ORDERS

EDITING STORED ORDERS

→ Double-click the order you want to edit or

→ click the button **Edit** (1) on the right-hand side.

The Edit Order window opens.

The following options are available:

Order The order command and trade mode you wish to apply to this trade. The trade mode controls how the actual trade is being processed.

ORDER COMMANDS

Buy Places an order to buy a number of shares using a given trade mode.

Sell Short Places an order to sell short a number of shares using a given trade mode.

Sell Places an order to go close a long position or reduce it by a number of shares using a given trade mode.

Buy To Cover Places an order to go close a short position or reduce it by a number of shares using a given trade mode.

TRADE MODES

This Bar Market The trade is executed immediately.

This Bar Price The trade is executed at the specified price.

This Bar Stop Places a stop order. This order is only valid on this bar.

This Bar Limit Places a limit order. This order is only valid on this bar.

This Bar Close The trade is executed when the current bar closes.

Next Bar Market The trade is executed at the next bar's opening price.

Next Bar Stop Places a stop order. If the price is equal or higher than price on the next bar, the order is executed. Otherwise it gets cancelled. This order is only valid on the next bar.

Next Bar Limit Places a limit order. If the price is equal or lower than price on the next bar, the order is executed. Otherwise it gets cancelled. This order is only valid on the next bar.

Stop Price The stop price for this trade.

Quantity The quantity by which to exit the current position. Select *Total* to exit the current position by the specified quantity, deducting from each entry in the order they were entered, until the quantity is reached. Select *Per Entry* to reduce each entry in the current position by the specified quantity.

Exit From The position to exit from, leave blank to exit from any position.

Name The name attached to this order.

Fill Timestamp Time and date of the point in time at which the order was filled.

Filled Price type at which the order was filled.

Fill Price (€) The price at which the order was filled.

Fill Exchange Rate Exchange rate from instrument currency to account currency.

Commission (€) The commission to be taken into account for this order.

Slippage (€) The slippage to be taken into account for this order.

DELETING STORED ORDERS

→ Click **Delete** in the context menu of the trade or

→ click the **Delete** (2) Button to the left of the trade.

APPLY CHANGES

→ To apply changes using currently available data, click the **Apply Changes** (3) on the top bar of the *Order Editor* or

→ click **Recalculate From** in the context menu of an order.

Caution: This action will remove all existing trades and cannot be undone.

ADDING ORDERS

→ To add an order, click on **Click here to add an order** (4) above the orders list.

The Add Order Window opens.

For an overview of available options see "Editing and deleting stored orders" on page 234
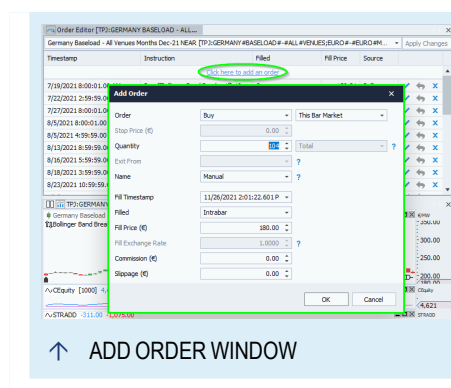
STRATEGY ORDERS

For information on historic orders generated by trading strategies see chapter "Persistence of executed strategy orders" on page 387.

↑ ADD ORDER WINDOW

MONEY MANAGEMENT

Any method for sensible capital and risk management is assembled under the concept Money Management. You can use Money Management for the following:

→ Setting the initial capital of a trading system

→ Setting the trading costs
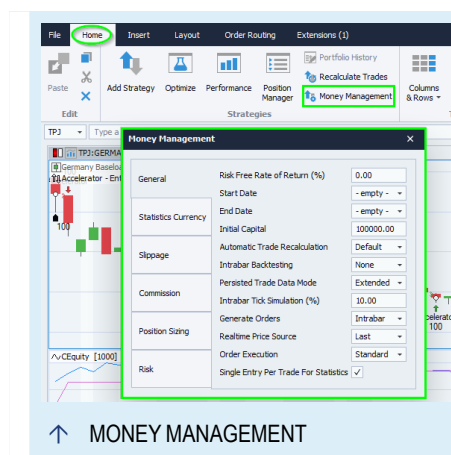
↑ MONEY MANAGEMENT

- → Controlling the fundamental trading system functions
- → Controlling the alerts generated by the trading system
- → Setting basic risk parameters

Tradesignal offers Money Management functions for "Chart" on page 96, "Scanner" on page 71, "Portfolio" on page 251 and "Watchlist" on page 77. You can also read them out with Equilla code and use them in your own trading systems. This way, you always have access to information like initial capital, trading costs etc. Other functionalities that are not part of the standard settings can be set up with strategies that are partly included in the delivery.

CONFIGURING THE MONEY MANAGEMENT

In the Home tab in the "Toolbar" on page 42 are all settings for the Money Management available.

GENERAL

Risk Free Rate of Return Here you can specify the expected rate of return for a risk-free investment. Used in the Sharpe Ratio and the Sortino Ratio calculations.

Start Date Here you can set a date at which the trade engine should start trading. If not set, it will start trading at the first available data point.

End Date Here you can set a date at which the trade engine should stop trading. If not set, it will continue trading indefinitely.

Automatic Trade Recalculation Here you can define whether trades should automatically be recalculated based on the settings in *File > Options > Advanced > Strategy Orders* or should be manually recalculated from the button **Recalculate Trades** (Never).

Initial Capital Here you can set the initial capital for the current trading system. This is an extremely important value for calculating performance, profits, losses, etc. A system that is profitable for $100.000 might well be a losing system at $10.000.

Intrabar Backtesting Enter the datapoint resolution for "Intrabar Backtesting" on page 243.

Persisted Trade Data Mode If Standard is activated, the same amount of data points as set in history length is used for backtesting. With Extended is the amount of data points increased.

Intrabar Tick Simulation % Enter the percentage of the price span (high-low) that is used for the generation of an artificial tick in case of a stop or limit order being

executed. This way, the behavior of the real price is simulated even though only the high, low, open and close values are available. The default value is "10%".

The **Generate Orders** property specifies when orders can be generated by the running strategies.

Intrabar Orders can be generated with every intra-bar update (for every tick).

On Bar Close Orders can only be generated when the bar closes. This mode is especially useful when a signal might be invalidated before the bar closes, which typically happens when the signals are generated based on compressed chart types like Point and Figure, Renko, Three Line Break and Kagi (these chart types can all remove bars resulting in trades being executed at prices that may not be reflected in a bar when it is closed).

The **Realtime Price Source** property controls which prices are used to fill orders in real time. Tradesignal supports two modes: bid/ask and last.

Bid/Ask Tradesignal uses the best bid / best ask data provided by either the broker (if an order routing module has been connected) or the data provider. If neither the broker nor the data provider is delivering bid/ask prices, Tradesignal uses the last price instead (for example in the case of indices). Best bid and best ask prices are generated when a market participant wants to buy or sell a number of shares/contracts while a last price represents an actual trade that has been made. Therefore this option has the benefit of more accurate fills for your orders. The caveat is however that the results collected in real time will not match the results of back-testing which will always only use the last price.

Last Tradesignal uses the last price delivered by the data provider. This is the same price as the one used to back-test the strategy. A last tick represents a trade that has been made in the market. When using this mode, Tradesignal can only fill and order after a trade has been made, even if there was a matching offer/request in the market prior to the trade. This mode ensures that real time results are closer to back-test results.

Single Entry per Trade for Statistics Set to true, in which case trades will be based on an entry/exit pair. The property can also be set to false, in which case trades will be based solely on exits (for example and exit that exits two entries would be a single trade).

STATISTICS CURRENCY

When trading multiple instruments that are quoted in different currencies, aggregated statistic values can become meaningless.For example when adding the net profit of $5 and ¥10 it is not enough to simply add the two numbers. In

order to solve this both values need to be converted to the same currency before adding them.This can be either of the two given currencies or a third one. In the example both values could be converted to $, ¥ or something else like €.

Currency The currency global statistic values should be calculated in. The available currencies are depended on your selected data provider.

Calculation Mode Selects the method that is used to calculate the currency conversion factors for the current bar.

Close of Previous Bar Use the currency values at the close of the previous bar.

Arithmetic Mean Calculates the arithmetic mean of Open, High, Low and Close at the current bar.

Midrange Uses the average of the highest and lowest currency value at the current bar.

Arithmetic Mean without Open The average of High, Low and Close currency values at the current bar.

Close Weighted Mean Calculate the arithmetic mean of High, Low and 2x Close at the current bar.

Open Weighted Mean Calculate the arithmetic mean of 2x Open, High and Low at the current bar.

Apply To Risk When this option is enabled currency conversion options will also be applied to automatic stop calculations. All numeric values in the "Total Commission and Slippage" on page 297 and the "Risk" on page 241 sections are assumed to be given in the global statistics currency.

SLIPPAGE AND COMMISSION

For realistic results in the backtest and the performance evaluation of a trading system, it is important to include the trading costs in the calculation.

Split over each trade in an Exit Order If true, and if an order exits multiple entries, commission and slippage will be distributed evenly across each trade. If set to false, commission and slippage will be applied in full for each trade exited by an order.

Two parameters are available:

SLIPPAGE

The slippage is the possible difference between the price at the trading signal and the real price at order execution. Usually, some time passes between the order

signal and the actual order execution, in which the price might move against the trader. You can enter the slippage per trade or share.

Slippage Source Set to *Settings & Assets* to use slippage from the instrument assets if available, otherwise to use the slippage from the properties. Set to *Settings* to only use the slippage specified in the properties. Set to *None* to ignore slippage.

Slippage/Trade Assumed Slippage per Order (independent of the number of shares), either as absolute number or as percent value (for this, enter a % character after the number).

Slippage/Contract Assumed Slippage per Contract or Share (independent of the number of trades), either as absolute number or as percent value (for this, enter a % character after the number).

Slippage/Lot Assumed Slippage per Contract Lot (independent of the number of trades), either as absolute number or as percent value (for this, enter a % character after the number).

COMMISSION

The commission includes all costs of the stock exchange and broker. You can enter the commission per trade or share. In addition, you can enter a commission flat rate, if your broker offers such trading conditions.

Commission/Trade Commission per order (independent of the number of shares), either as absolute number or as percent value (for this, enter a % character after the number).

Commission/Contract Commission per Contract or Share (independent of the number of trades), either as absolute number or as percent value (for this, enter a % character after the number).

Commission/Lot Commission per Contract Lot(independent of the number of trades), either as absolute number or as percent value (for this, enter a % character after the number).

Min. Commission Minimum commission costs per order (if set by your broker).

Max. Commission Maximum commission costs per order (if set by your broker).

POSITION SIZING

Default Quantity Enter the minimum number of shares that should be traded per order.

Max Shares Enter the maximum number of shares for this position (maximum position size). Orders that would lead to a higher position size will not get placed.

Pyramiding Some trading systems work with position legs, meaning that after a first trading signal, newer signals will lead to further trading activities depending on the market movement. For example, the position size may be increased or decreased for a high volatility. As default, this option is inactive. If you choose pyramiding, two settings are available:

Yes, Different Further shares will be purchased in case of trading signals different to the one that caused the first action.

Yes, All Further shares will be purchased in case of trading signals of any kind.

If you select pyramiding, you can enter a maximum number of open entries (**Max. Open Entries**).

RISK

Here you can find static risk settings like Stop Loss and Trailing Stop and also more dynamic parameters. In the following, the parameters in the Money Management properties and their corresponding "Equilla Functions" on page 415 are given.

Stop Mode Stop Mode has to be chosen in combination with the Stop Loss and Trailing Stop.

→ In Contract mode (corresponding to Share), the settings of Stop Loss and Trailing Stop are interpreted in relation to each share. For example, a Stop Loss of "100" is taken into account for each contract, independent of the position size. If the price drops by 100 from the starting value, the Stop Loss is set off.

→ In Position mode, the settings of Stop Loss and Trailing Stop are interpreted in relation to the complete position. For example, a Stop Loss of "100" will cause a position to be closed when the total loss is 100. This might actually be four points per share for Futures or one dollar for one hundred stocks.

→ In Lot mode, the settings of Stop Loss and Trailing Stop are interpreted in relation to each contract lot.

```
SetStopMode(Mode)
SetStopShare // Alias to SetStopContract
SetStopContract
```

```
SetStopPosition
SetStopLot
```

Profit Target This value in currency or points (depending on the security) gives the profit the position has to reach to be closed instantly. Profit targets may help you to stabilize your trading results over a longer time span.

```
SetStopProfitTarget(Value)
```

Stop Loss This value in currency or points (depending on the security) gives the maximum acceptable loss after the entry, at which point the position is instantly closed. A Stop Loss can protect you from overly high losses and secure your financial ability to act in the future.

```
SetStopLoss(Value)
```

Break Even This value in currency or points (depending on the security) gives the profit of the position that has to be reached before a position is closed once the market moves against it. It is based on the idea that positions that were once in the profit area should not move into a loss. Instead, they are closed, for example to cover the trading expenses.

```
SetStopBreakEven(Value)
```

Profit Trailing This value in currency or points (depending on the security) gives the maximum drawback of a position profit before the position is closed. This is a simple method with which to avoid losing achieved profit.

```
SetStopProfitTrailing(Value)
```

% Trailing (Floor) This is a more flexible version of the Profit Trailing stop. With the Floor parameter you enter a profit target at which the trailing stop will get activated. With the % Trailing (%) parameter you set the maximum loss (in percent) of the position profit before the position is closed.

```
SetStopPercentTrailing(ProfitTarget, PercentLoss)
```

Include Commission/Slippage Here you can choose whether the values for commission and slippage you entered in the above areas of the Money Management should be taken into account for the risk calculation.

ALERTS

Here you can select four possible situations (Order added, changed, cancelled, filled) in which an alert shall be issued. You can find more information in the Alerts

chapter.

INTRABAR BACKTESTING

Tradesignal allows you to use lower period data for backtesting in order to find more accurate prices for fills and to approximate real-time trading results. Using this feature will considerably shorten the available back testing history to that of the smallest period chosen and can increase the time it takes to perform the backtest (especially when performing optimization).

To enable this feature:

01. Go to *Money Management > General > Intrabar Backtesting*.

02. Select the desired period for the chart, watchlist, scanner or portfolio in the mini toolbar.

Available periods include Tick, 1 Minute, 5 Minutes, Hourly and Daily. When using Intrabar Backtesting, it is important to always select a period that is smaller than the period of the instrument in the chart.

Backtesting will only begin at the point where there is sufficient historic data available for both the original and lower period data sets. When using cumulated periods (such as hourly), the normal algorithm for determining the order of price flow within a bar will be used (for more information see the section on *Order Processing* in the Equilla Formula Language documentation).

> **Note:** *This bar at market* orders will continue to be treated as *This bar on close* orders for historic bars when using a lower period for backtesting.

The Strategy Equity Combined Indicator has been enhanced to indicate the range of data covered by the backtest, where this is less than the amount of visible data in the chart. The property HighlightBacktestingRange can be set to *False* to disable this indication.

STRATEGIES FOR MONEY MANAGEMENT

In the scope of delivery for Tradesignal, several strategies can be found that you can use for Money Management.

STOPS AND EXITS

Fast Profit Exit Exits a position if it yields profit the day after entry.

Peak Exit Exits a position if it made a profit and the trade changes direction against you. It is based on a complex calculation that includes an Average True Range indicator.

Percent Trailing Stop Corresponds to the setting in the Money Management area.

Profit Target Exit Corresponds to the setting in the Money Management area.

Profit Trailing Stop Corresponds to the simple Trailing Stop in the Money Management area.

Stop Loss Corresponds to the Stop Loss setting in the Money Management area.

Timed Exit Exits a position at a given time of day, e.g. "1900".

Timed Exit (Bars) Exits the position at a given number of trading periods.

POSITION SIZING

Position Sizing - Fixed Fractional Sets the position size depending on given fractions of capital.

Position Sizing - Fixed Fractional Percent Uses a combination of the method above and other methods to define the fraction size.

Position Sizing - Fixed Percent Uses a defined percentage of the capital for defining the position size.

Position Sizing - Fixed Risk Measures the volatility in the market and scales the position size accordingly. Especially useful in combination with a Volatility Stop.

Position Sizing - Market's Money Sets the position size depending on the performance of the trading system. If the total performance is in the profitable area, more positions are entered. If the performance is negative, the position size is reduced.

Position Sizing - Percent Volatility This is a variant of the Fixed Risk method, in which position sizing is scaled depending on the volatility of the market.

MONEY MANAGEMENT AND EQUILLA

Several parameters that have to do with Money Management can be read out or set with Equilla commands. This way, you are in complete control of share numbers, open prices, commissions and slippage.

Read slippage:

```
//Gives the slippage according to the Money Management parameters
Value1 = Slippage( Price, Quantity );
```

Read commission:

```
//Gives the commission according to the Money Management parameters
Value1 = Commission( Price, Quantity);
```

Read initial capital:

```
//Gives the initial capital according to the Money Management parameters
Value1 = InitalCapital;
```

In addition, you can read out many more parameters of open and close positions. See the chapter Equilla Functions for more information.

EXAMPLE: PARAMETERS FOR A SIMPLE TRADING SYSTEM

The following parameters could be used for a trading system with Money Management based on Candlestick Engulfing Patterns:

Chart:

→ .NDX.X

→ History Length in the chart properties to "2000"

Strategies:

→ Candle Bearish Engulfing - Entry

→ Candle Bullish Engulfing - Entry

Money Management:

→ Slippage/Trade to 2 points

→ Commission/Trade to 2 points

→ Default Quantity to 10 contracts

→ Stop Mode to "Contract"

→ Profit Target activate with a value of "225" (click on the number next to the checkbox and edit it)

→ Stop Loss activate with a value of "40" (click on the number next to the checkbox and edit it)

→ % Trailing (Floor) to 75 points

→ % Trailing (%) to 5 points

Now a first trading system is configured. You can find more strategies for Stops, Position Sizing and Statistics under **Add Strategy** in the toolbar.

POSITION MANAGER

The Position Manager is the central hub for trading system information. In case several trading systems are active in one or more charts, all information about held positions, pending orders etc. is displayed. This allows for a complete overview of your current trading system activities.

↑ POSITION MANAGER

You can use the Position Manager for the following:

→ Keeping an overview of open positions

→ Keeping an overview of working orders

→ Keeping an overview of filled or canceled orders

→ Tracking the current position development
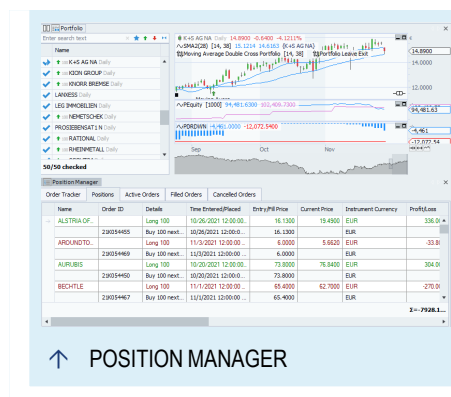
USING THE POSITION MANAGER

ACCESSING THE POSITION MANAGER

In order to use the Position Manager, do the following:

01. Set up a chart.

02. Set up a trading system with strategies.

03. Open the Position Manager by clicking the button **Position Manager** in the toolbar.

The new Position Manager group appears.

Note: By default, the Position Manager is linked to opened charts. You can find the current positions on the tab *Positions*.

The Position Manager collects all information from its start to its closing. It will resume collecting new information upon startup of the workspace.

> **Caution:** No data from the Position Manager is saved when closing a workspace.

POSITION MANAGER PROPERTIES

The general properties are available via "Settings" on page 157 in the home tab.

Monitor All Workspaces Usually, the Position Manager only collects information on the trading system of the currently active workspace. Click this button to collect information for all workspaces.

Print on separate pages Select this if the grids should be displayed on separate pages.

Show Flat Positions Select this if flat positions should also be displayed.

In **Appearance** you can define settings like background, text and grid colors as well as the font size.

UNLINKING THE POSITION MANAGER FROM A CHART

To sever the connection between Position Manager and chart, do the following:

01. Click the small plug symbol on the lower right of the chart to open the menu *Strategy Automation Options*.

02. Choose the entry **No Broker**.

The connection between Position Manager and charts is now severed. To reconnect, open the menu *Strategy Automation Options* again and click **Position Manager Only**.

POSITION MANAGER TABS

ORDER TRACKER

Here you can find a list of all generated orders. It lists information on the time and date of the purchase, the entry price, the profit/loss and the strategy that caused the order. In the Order Tracker you can follow all trading system activities in the workspace.

POSITIONS

Here you can find all currently held positions. It lists information on time and date of the purchase, the entry price, current price and profit/loss, the strategy that

effected the order and the broker (in case it was bought via Automatic Order Routing). The minimum size of each position is defined by the Default Quantity parameters in the Money Management of the chart.

ACTIVE ORDERS

Here you can find all pending orders, e.g. orders with a limited validity to be filled in at a certain time or for a certain price

FILLED ORDERS

Here you can find all orders that have been filled, together with information on the time, price, quantity, the strategy that effected the order to be submitted and the broker.

CANCELLED ORDERS

Here you can find all orders that were canceled before being filled. This may include Stop Orders or other order types that were canceled by the trading system prematurely.

COLUMN SUMMARIES

The *Positions* category supports column summaries. The Profit/Loss sum is added by default. Right-clicking on the shaded bar at the bottom of the positions tab window below a column opens a context menu with various predefined summary values that may be shown for that column (if applicable):

↑　ADDING A NEW SUMMARY FOR THE COLUMN "ENTRY/HILL PRICE"

→ Sum

→ Minimum Value

→ Maximum Value

→ Row Count

→ Average Value (Mean)
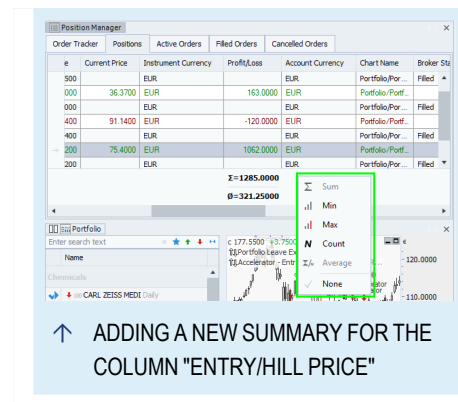
Multiple summaries may be displayed for a column via the option **New Summary** from the context menu (only available after a first summary has been added).

To remove summaries, either right-click a summary and select **None** to remove it, or select **Clear Summary Items** to remove all of them (only available if more than one summary is being displayed).

CONDITIONAL ROW COLORING

All categories support conditional row coloring and styling.

01. Select the category to configure.

02. Click **Home > Table > Columns > Conditional Formatting** on the Toolbar to display the conditional formatting dialog.

03. Click the **Add new condition...** link to add a new condition and name the rule.

04. In the condition field on the right, type the condition or use the **...** button to start the condition editor.

05. Select fore and background colors and optional font changes to use if the condition is met.

06. Add more conditions if desired

07. Select **OK** to apply the formatting.

Conditions may be removed by clicking the **x** next to the conditions name in the conditional formatting dialog.

> **Note:** Conditional formatting will be saved with a style template for the Position Manager.

FILTERING RESULTS

There are multiple ways to filter the results displayed a category in the Position Manager

→ Quick filtering by clicking on **Home > Find > Find** on the Toolbar, and typing a keyword, matching items will be highlighted, not matching rows will be hidden.

→ Show the Filter Editor by clicking on **Home > Table > Filter > Edit Filter**. The filter builder allows a filter to be visually constructed using various Boolean operations and interactive components arranged in a tree structure. All following commands will also be visible in the Filter Editor if shown.

→ Show the Auto Filter Row by clicking on **Home > Table > Filter > Show Auto Filter Row** on the toolbar. Only rows containing matching text entered in the filter row at the top of the column will be displayed.

→ Clicking the filter icon when hovering the mouse over a column title displays a list of possible filters for the selected column.

If any filtering method other than Quick Filtering is active, a row will be displayed at the bottom of the Position Manager pane showing the active filter conditions.

This row has the following options.

→ A **check box** to temporarily disable/enable the filter.

→ An **x** button to permanently remove the filter.

→ A button labelled **Edit Filter** that will show the *Filter Editor* dialog.

ADDING, REMOVING AND REORDERING COLUMNS

Columns may be resized or repositioned via drag-and-drop.

→ To add or remove columns, select **Home > Table > Columns > Add/Remove Columns** on the Toolbar, and drag and drop columns to and from the displayed dialog as desired.

EXPORTING POSITION MANAGER DATA

The table contents of the Position Manager can be copied to other programs. For more information, see the chapter *Copying Documents via the Windows Clipboard*.

EXAMPLE FOR SETTING UP THE POSITION MANAGER

With the following parameters you can follow a security with a MACD Crossover System intraday.

CHART

01. Select a security with a high turnover, e.g. "Apple Inc" (AAPL NAS)

02. Set *Period* to *hourly*

<table>
<tr><td>

STRATEGY

01. Apply the MACD Crossover with Bearish on short entry to the chart.

02. In the *Insert* group in the toolbar, click **Position Manager**.

03. Click on the tab *Positions* in the Position Manager to see the currently open positions.

</td></tr>
</table>

PORTFOLIO

Note: The following chapter describes the completely redesigned Portfolio approach published with Tradesignal 10. For the older, no longer recommended approach, see Portfolio (Classic).

↑ PORTFOLIO

The Portfolio in Tradesignal is a basket of securities that are traded by one or more trading systems. You can use the Portfolio to do the following:

→ Trade several securities in a trading system

→ Use trading systems for a list of securities

→ Trade an account of several securities by defined rules for money and risk management

→ Trade with trading systems automatically via a broker

Like the Watchlist, the Portfolio is updated automatically.

The Portfolio is a type of chart that splits the view between a list of instruments on the left side, and the chart, subcharts and tools of the selected item on the right side.

The important difference from Scanner and Watchlist is that the Portfolio is intended to handle the included instruments as a structurally unified whole. (However, this can be changed by you.) This results in the following:

→ In indicators and strategies, you can access data of other instruments in the Portfolio. (This is not possible in a

Watchlist.)

→ Indicators and strategies are each applied to all instruments in the Portfolio. For example, indicator 1 is applied to all instruments, then indicator 2 etc. This allows you using scripts to filter the instruments for the next steps. (In comparison, in the Scanner, Watchlist and Chart, the indicators/strategies are applied to each instrument, i.e. indicator 1 and 2 to instrument A, then both to instrument B etc.) However, every instrument has its own chart and can be set up to have other indicators/strategies and parameters applied than the others instruments while still remaining in the Portfolio.

→ The Money Management in the Portfolio refers to the complete Portfolio. (In Scanner and Watchlist, the Money Management applies to the single instruments.)

An important new feature is the Portfolio History; by tracking removed symbols as "deactivated" entries, every portfolio state can be seen, edited and reactivated in the Portfolio History. It is now also possible to import histories of instruments, e.g. the full history of the DAX including joiners, leavers and splits, and use this in the evaluation.

For the idea of using scripts as filters in the Portfolio analysis, two strategies are available in Tradesignal: "Portfolio Top Dogs Picker" and "Portfolio Top Dogs Trader". First, apply the picker to pick the ten best instruments of the last year and invest into them in equal shares, then use the trader to trade these ten instruments.

> **Note:** It is not possible to create a portfolio template, and templates cannot be applied to portfolio charts.

CREATING A PORTFOLIO

You can open a Portfolio and add symbols to existing ones in various ways.

→ Click on the **Portfolio** button in the *Insert* tab of the toolbar.

→ Open the context menu of a symbol list in the toolbox and choose the entry **Open in Portfolio**.

→ In the command line, enter a symbol shortcut, e.g. "DD NYS" and select **Add Symbol** to add it to an existing Portfolio, or **New Portfolio** for a new one.

$\rightarrow$ Via the symbol search. For this, click on the Symbol Search button, find a symbol and select **Insert the symbol into the selected workspace item** to add it to the Portfolio, or **Create a new Portfolio** for a new one.

$\rightarrow$ You can also add symbols to a Portfolio via drag-and-drop from the toolbox or other documents into either the list or the chart.

All portfolio changes have to be confirmed with **Done**. This creates a new history entry, see "Portfolio History" on page 255.

> **Tip:** When you select a symbol list (e.g. the Nasdaq), ensure that the index itself is not included in the Portfolio. It makes no sense to include an index in a list of symbols when searching for optimal trading parameters.

WORKING WITH THE PORTFOLIO

The Portfolio list has two columns - the checkmark column and the Name column. In the Name column, the green up arrow indicates the position "long" followed by position size, the red down arrow the position "short" followed by position size. No icon and size means a flat position.

By clicking the star icon ★, you can toggle the display between instrument name and symbol.

By clicking the arrow icons, you can toggle whether the respective positions will be displayed. The last icon is for toggling the display of the flat positions.

For filtering the list, enter free text in the search field for a wildcard search. The list will be filtered dynamically while typing.

↑ PORTFOLIO LIST WITH STRATEGY APPLIED

In the footer, there is an information on the number of items that will be considered for actions. Examples:

$\rightarrow$ When using a display filter: "2 of 10 selected"

$\rightarrow$ When only some items are checked: "1/10 checked"
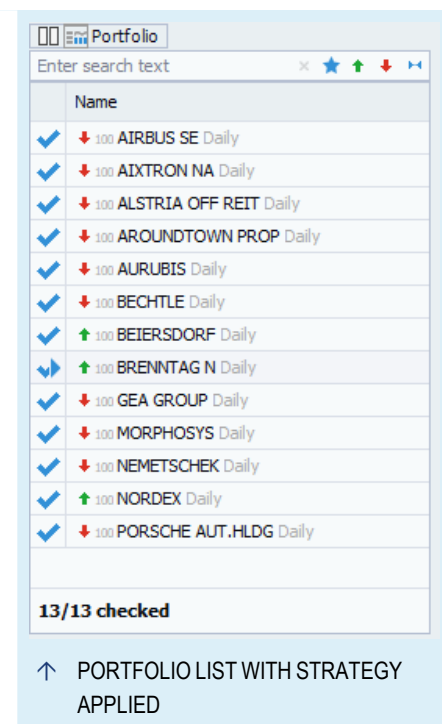
→ When a very long history is being loaded: information about the load progress

For the currently selected entry (visible from the small red arrow ⬇ in addition to the checkmark), the chart is displayed to the right, with all its indicators/strategies/subcharts/drawing tools.

THE PORTFOLIO LOGIC

By default, all items in the list are always active and contribute to each evaluation. In this so-called unified mode (see below), indicators and strategies will be added to each portfolio constituent, even the unchecked ones.

Regardless of unification mode, the following will only apply to checked ✔ items:

→ changes to indicator/strategy properties (one exception are global portfolio strategies (e.g. Top Dogs Portfolio), changing properties for such strategy will apply to all entries, checked or not)

→ operations such as add, remove, edit the item itself

→ drawing tools and repositioning items

Note that the currently selected (highlighted) entry ⬇ is always implicitly selected, so property changes will always be effective for that entry even when it was actually unselected.

Indicators that have no visible parent objects will be visible irrespective of the selected item. This way it is possible to add benchmarks or global statistics once instead of one time for each instrument.

THE CONCEPT OF "UNIFY PORTFOLIO"

In the **Columns & Rows** button menu, there is the option **Unify Portfolio** which is selected by default (gray row).

Every portfolio starts as unified portfolio, meaning that the application will strive to apply the operation to all symbols in the portfolio. However, if a change is not applicable to some checked items (for example, because it has been individually modified to no longer be similar), these items will be deemphasized in the list by a grayed-out checkmark ✔. The easiest way to have a grayed-out list is when you select a drawing tool. (Because changes of the drawing tool cannot be applied to the list items.)

Unselecting the option **Unify Portfolio** is the manual way to fragment the portfolio. In a non-unified portfolio, every entry has to be selected and edited for itself. Indicators and strategies will only be applied to the selected entries.

If a Portfolio is no longer unified, this can be seen via the button **Manage Objects**, see "Changing the Evaluation Order of Indicators and Strategies" on page 378. For every un-unified sample, there will be a row with an indicator or strategy and the number of symbols this applies to.

> **Tip:** Depending on the structural differences between the list entries it may not be possibly to re-unify a portfolio by clicking on **Unify Portfolio**. The best way to re-unify a fractured portfolio is by deleting at least some of the applied indicators and strategies, for example via the *Manage Objects* overview.

DELETING SYMBOLS FROM A PORTFOLIO

When you delete a symbol from the Portfolio, it will only be deactivated. Adding the same symbol again will recover the deactivated symbol. You can display deactivated symbols in the list via *Columns & Rows > Show Inactive Portfolio Items*.

To deactivate a symbol, click on a row and either press the **DEL** key or right-click on the entry and select **Delete** from the context menu.

Deleting a symbol completely is possible in two ways:

> → When the symbol is freshly added and removed before the change is confirmed with **Done**.

> → When you delete the symbol from a portfolio in the Portfolio History, see next section.

PORTFOLIO HISTORY

Portfolios will maintain their trade history even if one of the portfolio items is deleted (deactivated), if the Money Management property **Automatic Trade Recalculation** is set to "None". In this case, the trade history for a portfolio that changes over time will remain intact and be visible in the performance report. To regenerate executed historic trades manually, the Order Editor or the *Home > Strategies > Recalculate Trades* command must be used.

The option **Portfolio History** in the toolbar gives you a detailed history of the Portfolio, including Leavers & Joiners over time.

↑ PORTFOLIO HISTORY

→ In the left column, every change in the Portfolio is displayed with date and time stamp and changes. Click on the small button [**...**] to change the activation time, or click the revert button to revert all the changes made to the respective section to the state when the *Portfolio History* dialog was opened.

→ In the right column, the composition of the Portfolio state selected to the left is displayed. Portfolio items can be deleted here by selecting one or more entries (via Shift+click or Ctrl+click) and clicking **Remove**.
To remove the item from all saved states, check the option **Delete symbol from all portfolios in the history**. Otherwise it will only be deleted from the selected portfolio.
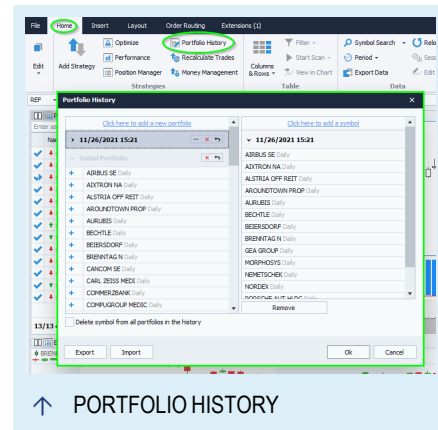
Tip: To backtest portfolio changes over time, enter the initial portfolio to generate the history. Next, enter the changed portfolio and select a bar from which this new portfolio takes effect. At this point, the chart automatically recalculates the trades based on the Portfolio change, if the Money Management property **Automatic Trade Recalculation** is set to "Default". (The automatic recalculation will adhere to what is set up in the advanced options, see "Strategy Orders" on page 327.)

The Leavers & Joiners Portfolio History can be exported and also imported. This e.g. makes it possible to import the DAX stock data from the last 30 years including symbol name changes, to backtest strategies against it.

The Leavers & Joiners Symbol List files will appear in a folder of the same name in the Symbol Lists in the toolbox, if a directory is defined in the advanced options, see "Leavers & Joiners Symbol Lists" on page 323. From the file context menu, the options **Insert Symbol List** (for inserting it into an existing portfolio) and **Open in Portfolio** (for creating a new portfolio) are available.

IMPORT PORTFOLIO HISTORY WIZARD

When importing a Portfolio History, a wizard starts, asking you how to handle the merge between the existing history and the one to import. If you start with an empty portfolio, just click **Finish**.

Keep the existing history and combine it with earlier entries of the imported history.

Keep the existing history and combine it with later entries of the imported history.

Discard the existing history, except the current portfolio, and combine it with the imported history.

Discard the existing portfolio history and replace it with the imported history.

In the next step, you need to define how to apply strategies to the new items:

Do not copy any strategy

Copy all strategies common to all existing items

Copy all strategies common to from a specific items

Select the strategies for every new item separately

PORTFOLIO SORTING

The order of the Portfolio determines how well a strategy works, as the symbols are processed in the given order.

Therefore, if you start changing the order and your Portfolio is being recalculated because the Money Management property **Automatic Trade Recalculation** is set to "Default" , you will lose the historical trades.

To prevent this, no automatic sorting is available. Symbols can only be sorted manually by drag-and-drop.

GROUPING IN THE PORTFOLIO

It is possible to group entries in the Portfolio. Grouping allows e.g. for weighted investments, in which you use 66% of investments in Group1, and 33% in Group2, see the "Group Alloc Portfolio Strategy" on page 666. The group information can also be used in Equilla scripts via the PortfolioGroup function.

↑   PORTFOLIO GROUPING

For grouping, use the **Set Group** function from the context menu or via *Columns & Rows > Set*
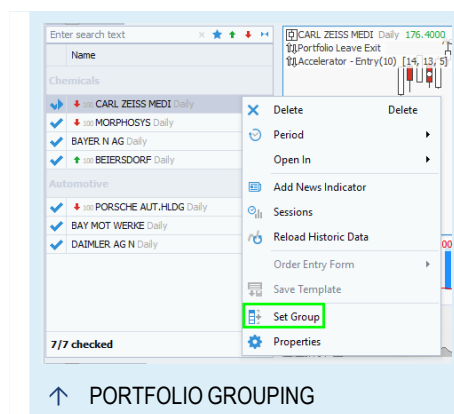
Group in the toolbar. You are asked for a group name.

If chosen from the context menu, this adds a group above the row your mouse cursor was positioned in. Otherwise, the new group is created as a new row on top.

You can move symbols between groups. For this, select one or more entries (via Shift+click or Ctrl+click) and drag-and-drop them to another group.

To remove a group, click the group name line and select *Columns & Rows > Set Group*. Delete the group name and confirm with **OK**. This will instantly remove the grouping and the symbols are joined with the group above, if any exists.

Note: Groups cannot be moved as whole and cannot be minimized or folded.

ADDING STRATEGIES TO THE PORTFOLIO

When a strategy is added to the Portfolio, the indicators "Strategy Equity Portfolio" and "Strategy Drawdown Portfolio" are added automatically as subcharts, unless you change this in the advanced options (see "Indicators & Strategies" on page 327).

In addition, the strategy "Portfolio Leave Exit" is also added, so that a position will be exited when the symbol is deactivated (see "Portfolio Leave Exit Strategy" on page 739). This can also be changed in the advanced options.

Adding further strategies will apply them to all items, unless the Portfolio is no longer unified.

PORTFOLIO PROPERTIES

As the portfolio is chart-based, it does not have properties of its own but is set up in the Chart "Settings" on page 157. All settings will be applied to each chart of every Portfolio item.

Important parameters are:

History Length Enter the length of the history here (max. 500000).

Min. Referenced Bars Enter the minimum number of bars that should be used for calculating the values of indicators and strategies.

Settings of symbols, indicators and strategies themselves are accessible in the "Mini Toolbar" on page 45.

PLACING ORDERS

This can be done through "Manual Order Routing" on page 317.

BUTTONS IN THE TOOLBAR

Period Here you can set the period that is to be used in the Portfolio (this corresponds to the period settings for a chart). The symbols in the Portfolio are always called up with the default period at first.

↑ PORTFOLIO OPTIONS IN THE TOOLBAR
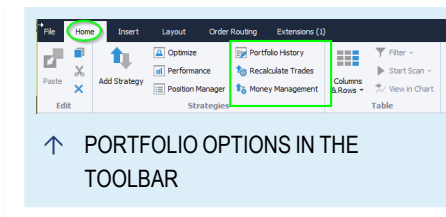
Columns & Rows Open the menu for the column settings of the Portfolio. For activation or deactivation of several columns select the columns and use *check* or *uncheck* at the bottom.

Set Group Here you can group the parameters for better overview. Select a number of rows in the table and click on the button. You can then enter a name for the group.

ANALYZE THE PORTFOLIO

You can apply indicators and strategies to the Portfolio. In addition, the Portfolio contents can be combined with other functions.

OPTIMIZE A STRATEGY IN A PORTFOLIO

You can start the Optimizer directly from within the Portfolio. This way, you can optimize the strategies for all symbols of the Portfolio.

Click on the button **Optimize** in the group *Strategies* of the toolbar to start the Optimizer. You have the choice between several methods, and you can choose the parameters that should be used for optimizing. The Optimizer then runs through all chosen parameters for the symbols included in the Portfolio.

For more information see chapter "Optimizer" on page 274.

ACTIVATE THE ORDER ROUTING FOR A PORTFOLIO

You can use Automatic Order Routing for a Portfolio. The following conditions have to be met:

→ The Order Routing has to be set up correctly. See chapter "Automatic Order Routing" on page 307.

→ The Option **Strategy Automation Option** has to be set. For this, click on the small plug symbol in the lower right corner of the equity subchart to open the menu, and select your broker.

The Order Routing can now be started by clicking **Start Automatic Order Routing** in the **Order Routing** tab in the toolbar.

USE THE POSITION MANAGER WITH THE PORTFOLIO

As soon as you have assigned strategies to a Portfolio, you can also open the Position Manager for it. If not defined otherwise, the Position Manager uses the position information of the current workspace, in this case the symbols in the Portfolio. To avoid losing the overview, it is useful to use the filter function for searching information for specific symbols. With a double-click at a specific row the traded symbol is focused at the portfolio itself.

Tip: You can find more information in the chapter "Position Manager" on page 246.

USE THE PERFORMANCE REPORT WITH A PORTFOLIO

You can generate a Performance Report for a Portfolio. The resulting report will include performance information for the complete Portfolio as well as for each symbol.

Tip: You can find more information in the chapter "Performance Report" on page 287.

MONEY MANAGEMENT

The global Money Management settings can also be used for the Portfolio. Note that in the Portfolio, the Money Management is applied to all instruments as a whole. You can enter the initial capital and values for Stop Loss and Trailing Stop. It is also reasonable to use some of the Position Sizing strategies offered by the software. This allows you to distribute the available capital onto the symbols in the Portfolio as positions of the same size.

Tip: You can find more information in the chapter "Money Management" on page 236.

CHANGE THE HISTORY LENGTH OF THE PORTFOLIO

You can set the history length of the Portfolio in the properties of the chart, setting **History Length**. Keep in mind that for long histories and large portfolios, a considerable computational effort results, which may impair your computer's free

resources. Therefore, it is recommended that backtests and the real trades should be performed in separate workspaces with different history lengths.

OPEN A CHART FROM THE PORTFOLIO AND PAGE THROUGH CHARTS

To view the chart for a symbol, click on the entry.

If you want to go through the whole list of symbols in a Portfolio to see each chart, use the red arrow buttons on the top left of the header. As soon as you open one chart of a Portfolio entry, you can page through the full list of symbols this way.

↑ TURN BUTTONS
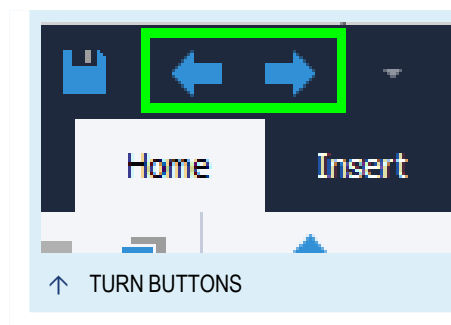
USE SYMBOLS IN ANOTHER TABLE

You can reuse symbols from a Portfolio in a Watchlist, a Scanner or another Portfolio.

In a similar way, you can drag symbols from a Scanner or Watchlist into a Portfolio.

PORTFOLIO (CLASSIC)

Note: As of Tradesignal 10, the Portfolio approach has been completely redesigned, offering many more capabilities than in the past. Therefore we recommend that you use the new Portfolio from here on.
However, you can still work with classic portfolios. For this, activate the option "**Show the deprecated Portfolio (Classic) in the ribbon**" via *Options > Personalize > Ribbon Toolbar* in the "Tradesignal Options" on page 319. When this option is activated, the Portfolio (Classic) entry will become available as addition to the Portfolio entry, e.g. when right-clicking a symbol list and selecting **Open in Portfolio (Classic)**.

The Portfolio (Classic) in Tradesignal is a basket of securities that are traded by one or more trading systems. You can use the Portfolio (Classic) to do the following:
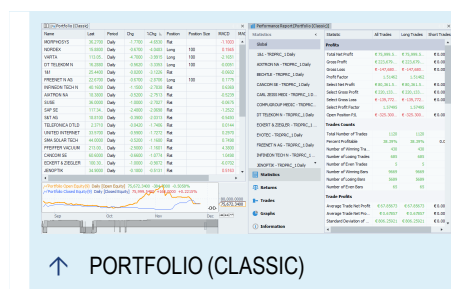
↑ PORTFOLIO (CLASSIC)

→ Trade several securities in a trading system.

→ Use trading systems for a list of securities

→ Trade an account of several securities by defined rules for money and risk management

→ Trade with trading systems automatically via a broker

Like the Watchlist, the Portfolio (Classic) is updated automatically. The data is displayed in realtime. The cells with the latest changed values are displayed with colored background.

The important difference from Scanner and Watchlist is that the Portfolio (Classic) handles the included instruments as a whole. This results in the following:

→ In indicators and strategies, you can access data of other instruments in the Portfolio (Classic). (This is not possible in a Watchlist.)

→ Indicators and strategies are each applied to all instruments in the Portfolio (Classic). For example, indicator 1 is applied to all instruments, then indicator 2 etc. This allows you using scripts to filter the instruments for the next steps. This is also the reason why a Portfolio (Classic) cannot be displayed in a chart. (In comparison, in the Scanner, Watchlist and Chart, the indicators/strategies are applied to each instrument, i.e. indicator 1 and 2 to instrument A, then both to instrument B etc.)

→ The Money Management in the Portfolio (Classic) refers to the complete portfolio. (In Scanner and Watchlist, the Money Management applies to the single instruments.)

For the idea of using scripts as filters in the Portfolio (Classic) analysis, two strategies are available in Tradesignal: "Portfolio Top Dogs Picker" and "Portfolio Top Dogs Trader". First, apply the picker to pick the ten best instruments of the last year and invest into them in equal shares, then use the trader to trade these ten instruments.

The document type Portfolio (Classic) has the following design parameters:

→ The maximum history length (in this case of the equity chart) is 500000.

→ The maximum number of instruments is 101.

→ The maximum number of indicators/strategies is 32.

→ Indicators and strategies are processed vertically, i.e. each is applied to all instruments before the next indicator/strategy is applied (see above).

PORTFOLIO (CLASSIC) SETUP

Tip: The Portfolio (Classic) should only be used for existing classic Portfolios before Tradesignal 10. See Portfolio for the new, more flexible portfolio management.

If the option **Show the deprecated Portfolio (Classic) in the ribbon** is activated, you can open a Portfolio (Classic) with symbols in various ways.

WITH THE WIZARD

When choosing one of the following methods, the wizard will open:

→ Click on the **Portfolio (Classic)**button in the *Insert* tab of the toolbar.

→ Open the context menu of a symbol list in the toolbox and choose the entry **Open in Portfolio (Classic)**. (If selecting this for a single symbol, it opens without a wizard.)

The Create Item wizard opens, in which you can select indicators and strategies in two more steps. Click on Done to close the wizard and save the settings.

ADDING ONE OR MORE SYMBOLS MANUALLY

You can also add single symbols or open a new Portfolio (Classic) without using the wizard.

→ Open the context menu of a symbol or symbol list in the toolbox and choose the entry **Insert Symbol** to add it to the active Portfolio (Classic).

→ In the command line, enter a symbol shortcut, e.g. "DD NYS" and select **Add Symbol** to add it to a Portfolio, or **New Portfolio (Classic)** for a new one.

→ Via the symbol search. For this, click on the search button and select **Insert the symbol into the selected workspace item** to add it to the Portfolio (Classic), or **Create a new Portfolio (Classic)** for a new one.

→ You can also add symbols to a Portfolio (Classic) via drag-and-drop from the toolbox or other documents.

The *History Length* (candles/bars) that is regularly taken into account is 2. When you add an indicator, the length may be increased if necessary for the indicator calculation. E.g., the Chande Momentum Oscillator sets the length to 16. If you go below this necessary length, indicators may not give results anymore. In this case, increase the length again.

When you select a symbol list (e.g. the Nasdaq), ensure that the index itself is not included in the Portfolio. It makes no sense to include an index in a list of symbols when searching for optimal trading parameters.

PORTFOLIO (CLASSIC) PROPERTIES

The general properties are available via "Settings" on page 157 in the home tab.

Important parameters are:

History Length Enter the length of the history here (max. 500000).

Min. Referenced Bars Enter the minimum number of bars that should be used for calculating the values of indicators and strategies.

In the *Appearance* area, you can enter the colors for changing values in the table.

Update Indications Set the background color for table cells with values changed since the last update, e.g. gray. **Up Move** and **Down Move** – Set the colors for increasing/decreasing values, e.g. green for up, red for down.

In the areas *Equity* and *Equity Chart* , you can change the settings for the equity chart.

Settings of symbols, indicators and strategies themselves are accessible in the "Mini Toolbar" on page 45.

DELETING SYMBOLS FROM A PORTFOLIO (CLASSIC)

You can delete symbols from a Portfolio (Classic).

Select the symbols. You have the following options:

→ Press Ctrl+A to select all.

→ Press Ctrl and click on single instruments to select them.

→ Press Shift and click on two instruments to select the instruments between them..

→ Press the **Del** key to delete the selected instruments.

PLACING ORDERS

This can be done though "Manual Order Routing" on page 317.

PORTFOLIO (CLASSIC) BUTTONS IN THE TOOLBAR

Period Here you can set the period that is to be used in the Portfolio (this corresponds to the period settings for a chart). The symbols in the Portfolio are always called up with the default period at first.

↑ PORTFOLIO (CLASSIC) OPTIONS IN THE TOOLBAR
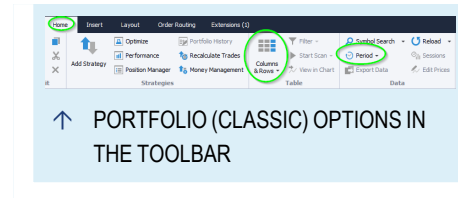
Columns & Rows Open the menu for the column settings of the Portfolio (Classic). With the option **Set Group** you can group the parameters for better overview. Select a number of rows in the table and click on the button. You can now enter a name for the group. A button appears on top of the table that allows you to open/close the group views like a folder tree in Windows Explorer.

COLUMNS IN THE PORTFOLIO (CLASSIC)

The table shows different columns depending on the indicators and strategies you are using. The number of columns added for each indicator or strategy depends on the number of output data.

→ For each indicator, all columns with a non-static output are displayed. For example, for the "Bollinger Band" indicator there are three columns, for the "Elder Ray" indicator two columns (and two invisible columns with static values).

→ For strategies, the two columns "Position" and "Position Size" are displayed over all strategies. The parameters of the single strategies are usually set to invisible in the Equilla code ("visuals" are "inactive"). If they were displayed, they might also interfere with the statistics, which is usually not desired. When at least one strategy is available, you can add columns for statistical output like "Total Net Profit".

SORTING THE COLUMNS

You can sort the columns in the Portfolio (Classic) by clicking on the column header. A little triangle appears, pointing up or down depending on the sorting direction. To change the direction, click on the column header again.

Alternatively, right-click into the column and select the sort direction in the context menu.

COLUMN GROUPING

This function in the *Columns* button menu leads to a new row in the table top. If groups are already defined, a button appears for them.

You can start a group by dragging a table row in this new row at the table top, or by selecting a row and clicking on **Set Group** under *Home > Table > Columns* on the toolbar.

ADD/REMOVE COLUMNS

With this function in the Columns button menu you can set columns in the table to visible or invisible.

In the list, all available columns are sorted by categories. Standard columns like price or symbol information are available, as well as a large numbers of statistical values for trading systems. If an indicator offers additional information, it appears as an entry here too.

Select the entries for all columns you want to display, or click on **Show All** for selecting all entries.

MANAGE STRATEGIES AND INDICATORS

With this function in the Columns button menu you can

→ set the processing order of the indicators and strategies by selecting an entry and clicking on **Sort Ascending** or **Sort Descending**. Remember that indicators/strategies are processed vertically, i.e. each is applied to all instruments before the next indicator/strategy is applied.

→ delete indicators and strategies by selecting an entry and clicking on **Remove**.

FORMAT OPTIONS

In the Portfolio (Classic), the following *Format* buttons are available in the toolbar.

Styles Here you can set the display options of the table, e.g. gray background with orange and yellow text. You can find more information in the chapter Styles.

Sessions Here you can set the trading times. You can find more information in the chapter Sessions, Holidays and Properties.

Edit Prices Here you can manually edit prices of symbols. You can find more information in the chapter Price Editor.

ANALYZE THE PORTFOLIO (CLASSIC)

You can apply indicators and strategies to the Portfolio (Classic). In addition, the Portfolio (Classic) contents can be combined with other functions.

OPTIMIZE A STRATEGY IN A PORTFOLIO (CLASSIC)

You can start the "Optimizer" on page 274 directly from within the Portfolio (Classic). This way, you can optimize the strategies for all symbols of the Portfolio (Classic).

Click on the button **Optimize** in the group *Strategies* of the toolbar to start the Optimizer. You have the choice between several methods, and you can choose the parameters that should be used for optimizing. The Optimizer then runs through all chosen parameters for the symbols included in the Portfolio.

For more information see chapter "Optimizer" on page 274.

ACTIVATE THE ORDER ROUTING FOR A PORTFOLIO (CLASSIC)

You can use Automatic Order Routing for a Portfolio (Classic). The following conditions have to be met:

→ The Order Routing has to be set up correctly. See chapter "Automatic Order Routing" on page 307.

→ The Option **Strategy Automation Option** has to be set. For this, click on the small plug symbol in the lower right corner of the equity subchart to open the menu, and select your broker.

The Order Routing can now be started by clicking **Start Automatic Order Routing** in the **Order Routing** tab in the toolbar.

USE THE POSITION MANAGER WITH THE PORTFOLIO (CLASSIC)

As soon as you have assigned strategies to a Portfolio (Classic), you can also open the Position Manager for it. If not defined otherwise, the Position Manager uses the position information of the current workspace, in this case the symbols in the Portfolio (Classic). To avoid losing the overview, it is useful to use the filter function for searching information for specific symbols.

Tip: You can find more information in the chapter "Position Manager" on page 246.

USE THE PERFORMANCE REPORT WITH A PORTFOLIO (CLASSIC)

You can generate a Performance Report for a Portfolio (Classic). The resulting report will include performance information for the complete Portfolio as well as

for each symbol.

Tip: You can find more information in the chapter "Performance Report" on page 287.

MONEY MANAGEMENT

The global Money Management settings can also be used for the Portfolio (Classic). Note that in the Portfolio (Classic), the Money Management is applied to all instruments as a whole. You can enter the initial capital and values for Stop Loss and Trailing Stop. It is also reasonable to use some of the Position Sizing strategies offered by the software. This allows you to distribute the available capital onto the symbols in the Portfolio (Classic) as positions of the same size.

Tip: You can find more information in the chapter "Money Management" on page 236.

CHANGE THE HISTORY LENGTH OF THE PORTFOLIO (CLASSIC)

You can set the history length of the Portfolios in the properties of the Portfolio (Classic), setting **History Length**. Keep in mind that for long histories and large portfolios, a considerable computational effort results, which may impair your computer's free resources. Therefore, it is recommended that backtests and the real trades should be performed in separate workspaces with different history lengths.

SORT THE COLUMNS

You can sort the Portfolio (Classic) columns by clicking on the respective column header. A small triangle appears (pointing up or down, depending on the sorting direction). To change the direction, click on the column header again. Alternative you can use the sorting from the context menu. Click with the right mouse button inside of the column and choose the sort direction.

OPEN A CHART FROM WITH THE PORTFOLIO (CLASSIC) AND PAGE THROUGH CHARTS

To view the chart for a symbol from within the Portfolio (Classic), open the context menu of the table row and select **Open** for the entry **Chart**. The chart is opened with the selected symbol, its period and all included indicators and strategies. The chart will also be linked automatically to the Portfolio (Classic) via symbol linking. Please note that in contrast to "Scanner" on page 71 and "Watchlist" on page 77, the history length of the portfolio will not be used.

If you want to go through the whole list of symbols in a Portfolio (Classic) to see each chart, use the red, arrow buttons on the top left of the header. As soon as

you open one chart of a Portfolio (Classic) entry, you can page through the full list of symbols this way.

USING THE RESULTS WITH DRAG-AND-DROP

USE SYMBOLS IN ANOTHER TABLE

You can reuse symbols from a Portfolio (Classic) in a Watchlist, a Scanner or another Portfolio.

If you want to start with a new table, open one by clicking the button **Portfolio** (or Scanner or Watchlist) in the **Insert** tab of the toolbar and closing the wizard with **Done**. An empty table is opened. Alternatively, you can use existing tables.

In the Portfolio (Classic), click into a table cell of the symbol you want to reuse. A little plus sign and a rectangle appear under the mouse cursor. Now drag the cursor into the other table. The symbol is copied into the table.

In a similar way, you can drag symbols from a Scanner or Watchlist into a Portfolio.

SAVING SYMBOLS IN A PORTFOLIO (CLASSIC) AS SYMBOL LIST

From within the Portfolio (Classic), you can save interesting symbols as a new symbol list.

01. To save the symbols as a new list, click on the entry **New Symbol List** in the *Related Tasks* area of the symbol manager in the toolbox. Choose the option **User-Defined Symbol List** and name the list but keep it empty.

02. In the Portfolio, click into a table cell of the symbol you want to reuse. (By pressing **Shift** or **Ctrl** while clicking with the mouse, you can select more than one row.) A small plus sign and a rectangle appear below the cursor.

03. Since a first click opens the properties tab, click again on the button **Symbol Lists** in the toolbox to open the symbol manager.

04. Drag the selected symbols to the new symbol list. The symbols are added to the list.

EXPORTING PORTFOLIO (CLASSIC) DATA

The table contents of the Portfolio (Classic) can be copied to other programs.

For more information see chapter "Publish to Office" on page 346

CORRELATION MATRIX

The Correlation Matrix document is a type of scanner that calculates the results of a chosen correlation-type function for each item in a symbol list against each other item in the same (or different) symbol list.

CORRELATION MATRIX

Any indicator that takes two data inputs can be selected for the correlation function, and any predefined or user-defined symbol list may be selected for either the row or column list.

Either list may contain formula, combined or continuation symbols in addition to normal symbols. After changes are made to the composition of the Correlation Matrix, select *Home > Table > Start Scan*.

Multiple indicators (or the same indicator multiple times with different inputs) can be added to the Correlation Matrix.

The correlation document provides a comprehensive set of conditional formatting tools, see "Formatting the Correlation Matrix Output" on page 272.

Correlation Matrix documents, like other scanners, can be scheduled via *Home > Table > Start Scan > Schedule Scan*. Scheduled scans can be managed by clicking on the Scheduled Jobs button to the right above the ribbon (next to the connection status and clock). For details, see "Schedule Jobs" on page 349.

CREATING A CORRELATION MATRIX

01. Click on the **Correlation Matrix** button in the Insert tab of the toolbar to open the wizard.

02. Add the symbol list or symbols to appear as a row.

03. Add the symbol list or symbols to appear as a column. As default the option *Use the row symbol list* is checked.

04. Select the indicator(s) to be used in the correlation.

05. Click on **Finish**. A pop-up appears, asking if the calculation should be started.

PROPERTIES OF THE CORRELATION MATRIX

The general properties are available via
"Settings" on page 157 in the home tab.

Settings of the indicators themselves are
accessible in the "Mini Toolbar" on page 45
with a click on the indicator.

↑ SETTINGS FOR CORRELATION
   MATRIX AND INDICATOR
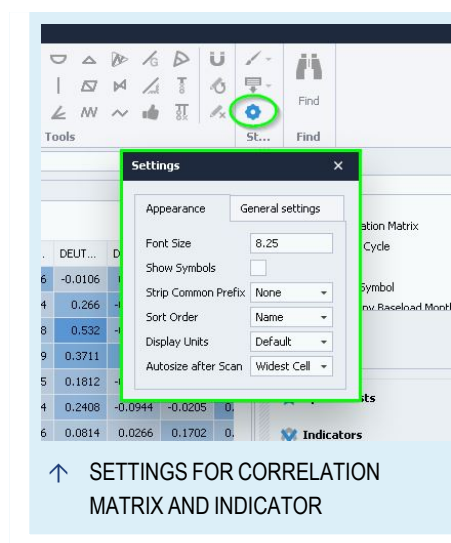
APPEARANCE

Font Size Here you can select the font size.

Show Symbols Select whether the symbol short
codes or the display names should be
displayed in the grid

Strip Common Prefix If not false, are the titles of
columns, rows or both automatically shorted by removing any common prefix

Sort Order Select whether the sorting should be based on either the display name
(the default) or the order of the items added

Display Units Here you can change the display units, e.g. with how many decimal
places or fractions the prices should be displayed. The default display unit will be
read from the symbol properties. You can customize the default display unit via
sessions.

Autosize after Scan Select to what the autoscaling should align to after the scan:
manual only (no resize), widest (data) cell or widest header or cell

GENERAL

Currency By default, the currency related to the exchange on which the symbol is
traded will be displayed; you can change the default currency to your preferred
one.

History Length Enter the length of the price history here. The maximum length in
Tradesignal is 500000 data points, which effectively means the length is limited
by your data provider.

Only closed bars If true, are only closed bars used for the calculation of the
indicators

SCAN BUTTON IN THE TOOLBAR

In the toolbar, the **Start Scan** button is available with the following options.

Start Scan Start the scan.

Stop Scan End the scan.

Pause Scan Pause to get an intermediate result of the scan. You can start the scan again by clicking on Resume.

Resume Scan Resume the optimization.

Schedule Scan Schedule the scan. For this, the workspace needs to be saved first. For details, see "Schedule Jobs" on page 349.

↑ START SCAN MENU
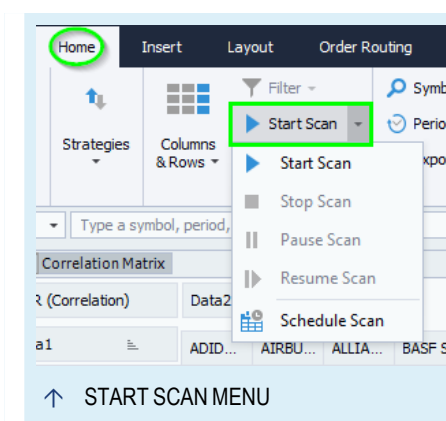
FORMATTING THE CORRELATION MATRIX OUTPUT

To make the interpretation of the Correlation Matrix visually easier, rules for colors and highlights can be created and applied to the Correlation Matrix.

There are two ways to access the formatting:

- → Via the toolbar, *Home > Table > Columns & Rows > Conditional Formatting*.

- → Via the context menu. For this, right-click on the Correlation Matrix.

↑ CORRELATION MATRIX CONTEXT MENU
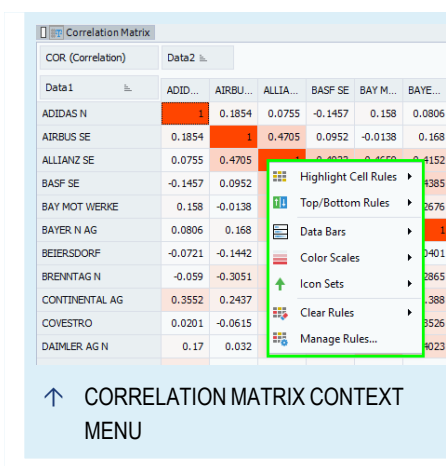
EXAMPLE: CORRELATION MATRIX WITH CUSTOM COLOR SCALE

In a Correlation Matrix, your goal usually is to distinguish symbols that are highly correlated (directly or inversely) from symbol combinations that are correlated very little. To achieve this, the Correlation Matrix comes with two pre-defined rules.

However, it is also possible to adjust the color scale to your preferences.

01. Create a new Correlation Matrix for a list of symbols (e.g. a watchlist). Choose the Correlation indicator.

02. Right-click on the Correlation Matrix and choose **Manage Rules...**. The Conditional Formatting Rules Manager opens

03. Click on **Add** to create a new rule. The New Formatting Rule window opens.

↑ ADDING A FORMATTING RULE

04. Choose the Format Style "3-Color-Scale", switch all to type "Number" and enter the values -1, 0 and 1 as can be seen in the screenshot. The closer to 0, the less correlation, while the extreme values are more correlated.

05. Click **OK** when done to return to the Conditional Formatting Rules Manager.

06. In it, set the row and column it should apply to (in our example, Data1 and Data2).

07. Select the rule and click **Apply**. The color set is applied to the Correlation Matrix, and the most and least correlated combinations are instantly visible.
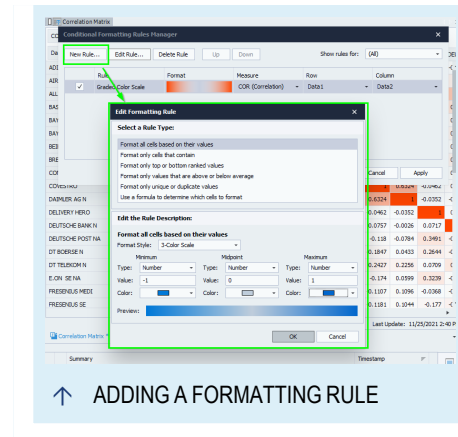
Data 1	ADID...	AIRBU...	ALLIA...	BASF SE	BAY M...	BAYE...	BEIER...	BREN...	CONT...	COVE...	DAIML...	DELIV...	DEUT
ADIDAS N	1	0.1887	0.068	-0.1516	0.1397	0.0805	-0.069	-0.0547	0.3446	0.0147	0.1625	0.2856	-0
AIRBUS SE	0.1887	1	0.4601	0.1062	-0.012	0.1634	-0.1461	-0.3038	0.2367	-0.0538	0.0262	-0.0344	
ALLIANZ SE	0.068	0.4601	1	0.5058	0.4907	0.4126	0.1885	0.3384	0.3997	0.2447	0.3168	0.1398	
BASF SE	-0.1516	0.1062	0.5058	1	0.6558	0.4487	0.2356	0.026	0.2973	0.7149	0.3888	-0.1469	0
BAY MOT WERKE	0.1397	-0.012	0.4907	0.6558	1	0.2684	0.1628	0.1467	0.2694	0.6477	0.5975	-0.0295	0
BAYER N AG	0.0805	0.1634	0.4126	0.4487	0.2684	1	0.0373	0.283	0.3864	0.3605	0.4006	0.0214	0
BEIERSDORF	-0.069	-0.1461	0.1885	0.2356	0.1628	0.0373	1	0.1407	-0.0305	0.0861	-0.1871	0.0466	0
BRENNTAG N	-0.0547	-0.3038	0.3384	0.026	0.1467	0.283	0.1407	1	0.0102	0.1066	0.2217	0.1993	0
CONTINENTAL AG	0.3446	0.2367	0.3997	0.2973	0.2694	0.3864	-0.0305	0.0102	1	0.216	0.3257	0.3407	0
COVESTRO	0.0147	-0.0538	0.2447	0.7149	0.6477	0.3605	0.0861	0.1066	0.216	1	0.6324	-0.0462	0
DAIMLER AG N	0.1625	0.0262	0.3168	0.3888	0.5975	0.4006	-0.1871	0.2217	0.3257	0.6324	1	-0.0352	-0
DELIVERY HERO	0.2856	-0.0344	0.1398	-0.1469	-0.0295	0.0214	0.0466	0.1993	0.3407	-0.0462	-0.0352	1	0
DEUTSCHE BANK N	-0.0106	0.266	0.532	0.3711	0.1812	0.2408	0.0814	0.2516	0.0454	0.0757	-0.0026	0.0717	
DEUTSCHE POST NA	0.2397	-0.3406	-0.1722	-0.394	-0.0381	-0.0944	0.0266	0.2196	-0.1125	-0.118	-0.0784	0.3491	-0
DT BOERSE N	0.2345	0.09	0.0902	-0.3331	-0.1237	-0.0205	0.1702	0.1613	-0.0006	-0.1847	0.0433	0.2644	-0
DT TELEKOM N	-0.0457	-0.053	0.4111	0.4703	0.473	0.3089	0.1298	0.0957	0.2965	0.2427	0.2256	0.0709	0
E.ON SE NA	0.2453	0.0356	0.1386	-0.3928	-0.1331	0.0881	-0.1744	0.4748	0.0887	-0.174	0.0599	0.3239	-0
FRESENIUS MEDI	0.0341	0.2537	0.0245	0.0496	0.1841	0.0917	-0.0882	-0.217	-0.1238	-0.1107	0.1096	-0.0368	-0
FRESENIUS SE	-0.1369	0.0988	-0.0263	0.0259	0.1254	0.0442	0.0826	-0.0067	-0.2478	-0.1181	0.1044	-0.177	-0

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↑ CORRELATION MATRIX WITH GRADED COLORS

REMOVING RULES

To remove a rule from the display, select some cells, right-click to open the context menu, choose **Clear Rules** and then specify whether you want to remove the applied rule from just some or all measures.

To delete a rule completely, right-click to open the context menu, choose **Manage Rules**, select the rule and click **Delete Rule**.

OPTIMIZER

With the Optimizer, you can do the following:

↑ OPTIMIZER

→ Evaluate the performance of a newly developed trading system

→ Select the settings that give the best performance for a trading system

→ Test trading systems for stability and profitability
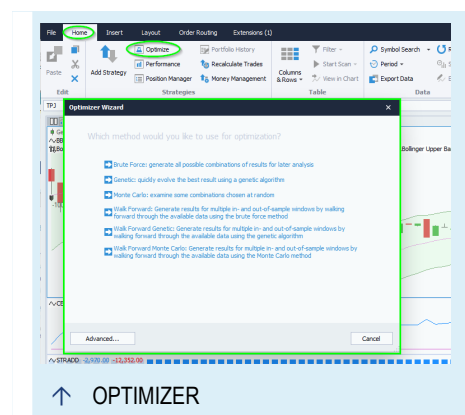
→ Generate statistical results for different parameter settings

→ Configure trading systems for the usage in the Portfolio

In Tradesignal, the Optimizer is also able to optimize "in-sample" and "out-of-sample" ranges with the start and end bars defined by you. This way you can see how the trading system acts over a defined time span and if the parameter settings could also be applied successfully to other time spans.

The Optimizer can only be used when you already have applied a strategy.

START THE OPTIMIZER

To start the Optimizer Wizard you can

→ Click on the Optimize button in the Strategies area in the Toolbar or

→ Select the menu entry Optimize... in the context menu of a symbol or symbol list in the Symbol Lists toolbox

The Optimizer Wizard can be resized so that you have a better overview. Click on the lower right corner, keep the mouse button pressed and enlarge by dragging the mouse.

In addition it is possible to start and rerun the optimizer via an Equilla script. Please see the Equilla help for **OptimizerPresets**, **Optimize** and **RequestOptimization** for more information.

CALL UP THE OPTIMIZER AND CHOOSE A METHOD

The Optimizer in Tradesignal offers you several optimization methods from which you have to select the best one depending for your goals. Also note that some methods take longer to calculate the results than others.

Brute Force Depending on the parameters to be optimized and the set boundary values, the Optimizer runs through all possible combinations of parameters. This method is especially useful if you want to use the results for further analysis, e.g. in Excel. The disadvantage is the possibly high number of combinations, which may lead to a long calculation time.

Genetic Depending on the parameters to be optimized and the set boundary values, the Optimizer runs through the possible combinations of parameters with genetic algorithms that strive to find the best results. The advantage of the method is its lesser calculation time. The disadvantage is that the table of results does not include all possible combination of parameters.

Monte Carlo Depending on the parameters to be optimized and the set boundary values, the Optimizer runs through the selected number of random-without-duplicates simulations (per symbol in the case of symbol list optimization). The advantage of this method is identifying quickly a representative set of data. The disadvantage is that the table of results does not include all possible combination of parameters; non-tested combinations will be shown as white. The Monte Carlo optimizer will not repeat combinations it has already simulated.

Walk Forward Depending on the parameters to be optimized and the set boundary values, this method outputs complete results over defined ranges. You can define the length of the ranges. Tradesignal lists the results as "in-sample" and "out-of-sample" values. This way, you get an overview of the trading system works for smaller time samples and how stable the results are. The advantages and disadvantages are the same as for "Brute Force".

Walk Forward Genetic This method combines the defined ranges with the genetic algorithm. The advantages and disadvantages are the same as for "Genetic".

Walk Forward Monte Carlo This method combines the defined ranges with the Monte Carlo algorithm. The advantages and disadvantages are the same as for "Monte Carlo".

SET UP PARAMETER

After choosing the method, you have to select the parameters you want to optimize.

↑   SELECTING PARAMETERS

→ In the list on the left, you can find all optimizable inputs visually grouped by their corresponding strategy, indicator or money management items. (Note that in the default settings, strategies come with automatic application of Strategy Drawdown and Strategy Equity indicators and the Portfolio Leave Exit strategy.)
If you optimize for multiple symbols, e.g. in a Portfolio, the option "Unify similar parameters" unifies the parameter sets so that all instances of the parameter will use the same value (although still being independent of each other). An additional result column will be added containing a combined summary of the unified values. Uncheck the option to see all parameters per symbol.
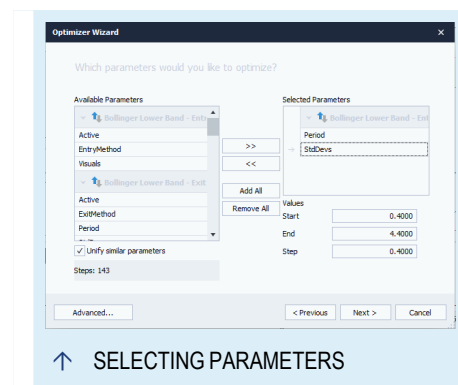
→ In the list on the right, the parameters to be optimized are to be found.

→ To move a parameter from the right to the left and vice versa, either select it and click on the respective double-arrow button, or double-click the parameter.

→ You can also move a whole group by clicking on its heading and then clicking on the double-arrow button.

→ You can also select more than one parameter at the same time by holding down the Shift key (selecting several consecutive parameters) or the Ctrl key (selecting several parameters) while clicking on the parameters. To move all parameters at once from one side to the other, select Add All or Remove All.

→ For the selected parameters, you can enter further values, e.g. for start, end and steps. For that, select the parameter in the list on the right. The fields for the adjustable values show up at the bottom of the dialog.

→ For selected parameters, e.g. *Active*, values may be set to *False* which excludes the related strategy from the individual optimization process.

→ When optimizing the Active property of several scripts for both true and false values (e.g. when applying more than one indicator), only a single script can have the true (active) value during a given run. If this happens, the Values area and the information text "*Multiple activation parameters are applied mutually exclusive*" appears. This feature allows the optimization of a strategy component without generating additional unnecessary combinations that consume significant time. Example: Indicators A, B, C in the optimization means that there will be three optimization rounds: 1) for A true (active), B and C false (inactive); 2) B true, A and C false; 3) C true, A and B false. Note that you can have an always active indicator in your document, but you cannot optimize for that indicator.

Note: Depending on the current chart type, different chart type properties are available for optimization.

MULTIPLE ACTIVATOR PARAMETERS

(GENETIC OPTIMIZER) STATISTIC AND FINISHING CONDITION

For the genetic optimizer, you have to select which statistic should measure the success of the optimization.

→ Select whether the highest or lowest value should be used.

→ Select the parameter that should be used as the key parameter for the evaluation (default: *Total Net Profit*).

→ Select the instrument from which the statistic should be taken. To have a list of options here, independent graphs and strategies have to be available in the current document.
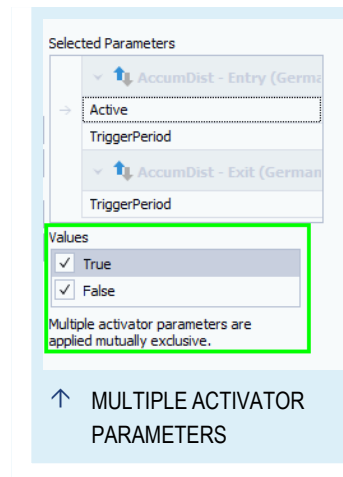
In the next step, you have to set the stop point for the genetic optimization:

After no better result was found (in minutes) This can result in a long optimization duration, since you only set the time limit after finding the optimal value.

After a fixed period of time (in minutes) This allows for a very quick optimization, but might yield suboptimal results.

DEFINE THE DATA RANGE

Define how much of the historic data should be used for the optimization:

Use all available data This corresponds to the History Length in the chart properties.

Use data within the following range of bars Set a range of data to be used. The maximum range is also given by the History Length in the chart properties.

Use data between the following dates Set a Start and End date for the optimization. To change the dates, either click on the calendar to select a date, or click in the area of day/month/year to change each of the values.

(WALK FORWARD) DEFINE THE SAMPLES

For the Walk Forward methods, you can define the in-samples and out-of-samples bars per sample. The method works as follows:

01. If you set in-sample to "100" and out-of-sample to "50", the optimizer will use the first 100 bars after the start point for the optimization, and then calculate the values for the next 50 bars with the results from the first 100.

02. After this, the starting point is moved forward by the range of the out-of-sample length, and the optimization calculation above described will be executed again. This will be repeated as long as enough data is available to fill the in- and out-of-sample ranges.

The wizard also provides a method to calculate the in- or out-of-sample width, based on the corresponding sample size and the desired number of samples. For example, to have a single out-of sample with a width of 100 bars, enter "100" in the out-of-sample field, then click on the **Calc in-sample** link and enter the number "1" for the number of samples. The in-sample value will then be set to the remaining bars in the selected data history.

If you choose the option **Anchor in-sample: Start always at the beginning of specified data range**, the start point is not moved. Instead, the in-sample starts always at the beginning of the data range, so the in-sample increases in size over time.

The *Number of calculatable samples (approximated)* shows how many samples are approximately available with your data set.

START THE OPTIMIZER

Start the optimization by clicking on the Optimize button in the wizard.

OPTIMIZER BUTTONS IN THE TOOLBAR

In the toolbar, the Table group offers the following functions:

OPTIMIZER GROUP IN THE TOOLBAR

Columns&Rows Via this button menu you can find the following options:

Toggle Column Toggles between enable and disable column grouping.

Add/Remove Column Here you can define which columns should be displayed (on the right) and which not (on the left). The indicators correspond to the ones in the "Performance Report" on page 287.

Start Optimizer
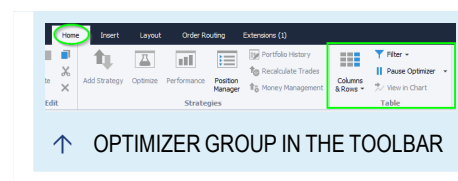
Start Optimizer Start the opimization.

Stop Optimizer End the optimization.

Pause Optimizer Pause to get an intermediate result of the optimization. You can start the optimizer again by clicking on Resume.

Resume Optimizer Resume the optimization.

↑ START OPTIMIZER

Schedule Optimization Schedule the optimization. For this, the workspace needs to be saved first. For details, see "Schedule Jobs" on page 349.

View in Chart Apply the values selected in the table. Use the context menu on the optimizer grid to open a new chart.
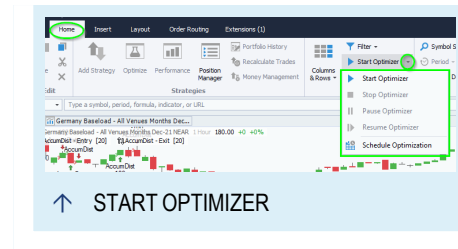
PROPERTY INSPECTOR SETTINGS

The general properties are available via "Settings" on page 157 in the home tab.

Runs Here you can find a list of all runs of the optimizer with date and time. Select an entry from the list to call up the data of that run. Note that the list only displays multiple runs of a specific optimization (called up with Start). When you create another optimization, the counter starts anew for this optimization and another graph and table with results will be displayed.

Heatmap Color 1 / **Heatmap Color 2** / **Heatmap Color 3** Set the colors for the heatmap for the lowest, middle and highest values.

Graph Color Set the color of the Optimizer results graph.

Heatmap Scaling Set the scale of the points in the heatmap.

Show Graph Controls whether the Optimizer results graph is displayed or hidden.

Include recent chart/portfolio changes Set to "Yes" if the latest changes in the source chart or portfolio should be imported before the optimization run.

Automatically apply top results Set to "True" if the top filtered and sorted results from the optimization run should be applied automatically to the chart or portfolio. The default is "False". This option will be respected when using scheduled optimization.

ADVANCED OPTIMIZER SETTINGS

Via the Advanced button you can open a dialog with more options.

ADVANCED GENERAL OPTIMIZER OPTIONS

Number of optimizer threads Enter a number higher than one, if several optimization routes should be calculated at the same time. You should change the value only if you have a computer with a multi-processors and should ideally not be higher than the amount of CPUs.

Thread Priority Select high, normal or low. This regulates how much system resources the Optimizer is allowed to use.

Use a longer history length when optimizing Allows you entering a history length independent of the chart properties.

Auto-start Excel after optimization If you select this option, the calculation results will be opened automatically in Excel after the optimization.

ADVANCED GENETIC OPTIMIZER OPTIONS

Only keep better results Only the best results are kept and displayed.

Show all Results This will keep and display all results. This may lead to a very long table.

POSSIBLE OPTIMIZATIONS

OPTIMIZING A SINGLE SECURITY

You can optimize a trading system for a single chart or symbol.

- → If you have an active chart with a strategy, the **Optimize** button in the symbol bar is available. Click on it to start the Optimizer wizard.

- → Alternatively, you can choose the entry Optimize in the context menu of a symbol.

OPTIMIZING A SYMBOL LIST

You have several choices for starting the Optimizer for a list of symbols.

FULL SYMBOL LISTS

The easiest method is optimizing a complete symbol list. To do this, choose the entry **Optimize** in the context menu of a symbol list.

LIST IN THE SCANNER OR WATCHLIST

The second way is optimizing from within a "Scanner" on page 71 or "Watchlist" on page 77. When you have a list of symbols in the Scanner/Watchlist, click on

the **Optimize** button in the "Toolbar" on page 42.

SEVERAL SYMBOLS IN A CHART

The third way is optimizing a chart that includes on or more symbols. To do this, click on the **Optimize** button in the "Toolbar" on page 42 while the chart is active.

PORTFOLIO

Another possibility is the optimization of a Portfolio. To start optimizing a Portfolio, click on the Optimize button in the Toolbar while the Portfolio is active.

The difference between a "Portfolio" on page 251 and a "Scanner" on page 71, "Watchlist" on page 77 or "Chart" on page 96 with several symbols is the combination of strategies and a single account with several symbols in the Portfolio. This way, you can trade several symbols in one Portfolio and generate global trading statistics. Therefore, you receive realistic results for the superposition of trading several symbols at various times in the Optimizer. It allows you to test various trading systems and gives you access to all statistics resulting from all possible parameter combinations.

ANALYZING AND INTERPRETING THE OPTIMIZATION RESULTS

USE THE TABLE

On the right side of the optimization window, a table with the optimization results is displayed.

→ You can change the sorting order by clicking on the column header. For example, sort for the longest period of a positive trade.

→ You can also group columns. For this, drag the column header into the very top of the table. This way, you can group any columns to one single group, which can be opened and closed much like the folder tree in Windows Explorer.

USE THE FILTER

Especially in large tables it is hard to keep the overview. It is also often preferable to ignore certain indicator values. To filter the view, click on the Edit Filter button. A simple example would be filtering for "Total Net Profit > 0".

You can find more information in the chapter "Filter" on page 94.

APPLY RESULTS TO OTHER DOCUMENTS

To apply optimized values to the optimized chart/portfolio, double-click the respective table row. You will be asked if you really want to apply the values. Note that you cannot apply single cell contents, only the full row. The used row will be highlighted and with *Goto Line* the used is focused. In addition it is possible to apply the results via drag-and-drop to the chart. Thereby the result of the optimizer can be applied to any chart which contains the optimized strategy.

To use the values in a new chart or portfolio, choose the options you prefer in the button menu **View in Chart** in the Toolbar.

EXPORT OF OPTIMIZER RESULTS

The results of the Optimizer can be exported via the file menu. Choose the menu entry **Export Data** in the Toolbar. If more than one run exists, a request appears. Choose whether you want to export all runs or only the latest. The file dialog opens in which you can specify the directory, file name and file type for the export file before saving it.

GRAPHIC ANALYSIS

The interpretation of statistic data is often easier when the data is visualized in a diagram. Tradesignal offers a visualization function. As soon as the Optimizer has finished (or is paused), you can find diagrams on the left of the table. Three axes are available; values can be set via the drop-down lists. There are two kinds of diagrams:

3D (SURFACE) DIAGRAM

This is the standard setting. It shows parameters of the trading system for both the x- and y- axes, and a key figure like "Total Net Profit" for the z-axis. You can always select other parameters from the lists. If you set the z-axis to "none", only the 2D diagram described below will be displayed.

The colored surface shows the development of the key figure in relation to the parameter combination. The different colors mark different values of the key figure (green = positive, yellow = neutral, red = negative). Therefore, the diagram can be read as an elevation profile. When you click on a colored square, the corresponding row in the optimization results table is focused.

In the properties of the optimizer different parameters like colors and heatmap scaling can be changed.

2D DIAGRAM

The simpler variant is the 2D profile. It is automatically displayed below the 3D profile as diagram with the key figure for the y-axis and one of the parameters for the x-axis. Here you can have a look at the effect of a single parameter in the trading system. The height of the columns shows the maximum values. The black lines in the columns mark the trading systems results.

The 2D chart style can be selected from the options Points, Line, Bars and Range Bars. Note that not all chart styles make sense for all parameters.

The values of the tables and the diagrams are connected.

→ If you click on a value in the table, cross-hairs mark the corresponding position in the diagram.

→ If you click on a position in the surface or the column diagram, the corresponding value in the table is focused.

In addition, you can see the numeric values of the position beneath the mouse cursor to the right of the diagram headlines.

EXAMPLE: OPTIMIZING THE STRATEGY BOLLINGER BAND BREAKOUT FOR APPLE COMPUTER, INC. (AAPL NAS)

01. Call up the *Apple Computer, Inc. (AAPL NAS)* symbol (e.g. via the NASDAQ 100) and choose **Open in Chart** from the context menu - or alternatively, double-click the symbol, or drag and drop the symbol into the workspace.

02. In the Strategies group in the toolbar, click on **Add Strategy**.

03. On the tab *Complete Systems*, select the strategy **Bollinger Band Breakout**.

04. On the tab *Position Sizing*, select the strategy **Pos Sizing - Percent Volatility**.

05. Click **OK** to apply the strategies.

06. In the next windows, select the data inputs for both strategies to be Apple.

The next step is to optimize these settings to yield a higher net profit for historic values.

01. In the toolbar, click on the **Optimize** button.

02. Select the method *Genetic*.

03. Remove all select parameters from the list except *Period and StdDevs* (for example by double-clicking the parameters in the right list).

04. You can select different ranges and step sizes for each parameter, but in this example we use the default settings. Confirm with Next.

05. For the finishing condition, select the fixed period of time and set it to "1" minute.

06. For the data range, use all.

07. Start the Optimizer.

The Optimizer calculates the best results for the strategy. After one minute, the Optimizer stops and the table of results and the diagrams are displayed.

CONDITIONAL EVALUATION OF STRATEGIES

↑   OPTIMIZER RESULTS

Tradesignal allows you to generate optimizer results where the strategies in the chart are selectively enabled and disabled in the same way as other parameters are varied. For example, to determine the most successful among a range of strategies for a specific optimization period.

01. Add the *Active* property of each strategy in the optimization wizard.

02. Select both *True* and *False* as possible values.

After the optimization is complete, all combinations of activations of the selected strategies will be included in the result set.

COMPARING THE PERFORMANCE OF STRATEGIES

The *Active Count* and *Active Items* columns contain the number and name of all chart items that were made explicitly active during a run. Adding a filter on this column where the *Active Count* value equals one is a simple way to compare the results of exactly one of the selected strategies being active at a time.

STEP 1: OPTIMIZING

01. Add two or more strategies to a chart.

02. Optimize the *Active* parameters for the selected strategies.

03. Run the optimizer.

The optimizer results are displayed.

STEP 2: ADDING A FILTER

01. Add a filter by clicking **Filter > Edit filter**.

02. Delete existing expressions.

03. Click **New**.

04. From the drop-down menu, select *Active Count* as the column to test.

05. Enter *1* as the value to test against.

06. Click **OK**, then **Finish**.

The Total Net Profit for each strategy is displayed.

TIPS ON IMPROVING OPTIMIZATION TIME

The *Active* property allows users to optimize a set of strategies while having the optimizer turn specific strategies on and off. Chart objects that have no effect on optimization results can be selectively disabled in the optimizer wizard in order to improve the optimization time of the chart.

01. In the optimizer wizard, select the *Active* property of those chart objects that should be disabled.

02. Select *False* as the only possible value for this property.

Note: Disabling chart objects should only be done on items that have no effect on the strategies in the chart. Indicators that set global variables or form inputs into strategies should not be disabled.

Note: Applying a result row containing disabled indicators to a chart will disable the indicator in the chart.

PERFORMANCE REPORT

The Performance Report offers statistical data from the operation or backtest of a trading system. Use the Performance Report for the following:

PERFORMANCE REPORT

→ Evaluating the profitability of your trading system

→ Finding out if a real trade would be reasonable

→ Evaluating the risks that can develop during the trade

→ Estimating the need for capital

→ Comparing the distribution of profits over time

→ Keeping an eye on the development of real trading results

In the Performance Report, statistical results are offered as tables and diagrams.

The navigation to the left of the performance report can be toggled by clicking on the small arrow to the right of the title.

Control of which items get printed can be found in the **Publish** group of the property inspector.

Where values for per-trade Drawdown and Runup are calculated a property exists to configure if this is calculated Entry to Valley (or Peak), or Peak to Valley (or Valley to Peak). In general, Max Adverse/Favorable Excursion graphs benefit from the Entry-to-Valley method despite the Peak-to-Valley being more correct.

CALLING UP THE PERFORMANCE REPORT

Note: The Performance Report is available for "Chart" on page 96 and "Portfolio" on page 251.

→ Click on the **Performance** button in the *Strategies* group in the "Toolbar" on page 42 to open it.

The results are calculated for the current workspace.

AVAILABLE INFORMATION

STATISTICS

This is the default setting. In this view, you can see the results for the complete history length as a Strategy Performance Report. The results are offered in three columns:

→ The first column shows the respective key figure for all trades.

→ The second shows the key figure for long trades only.

→ The third shows the key figure for short trades.

Key Figure	Explanation
Total Net Profit	Sum of all trades (profit and loss trades) after subtraction of all costs and slippages
Gross Profit	Sum of all winning trades
Gross Loss	Sum of all losing trades
Select Net Profit	Select Net Profit is the sum of Select Gross Profit and Select Gross Loss, excluding trades more than three standard deviations from the average trade during the specified period.
Select Gross Profit	Gross profit, excluding trades more than three standard deviations from the average trade during the specified period.
Select Gross Loss	Gross loss, excluding trades more than three standard deviations from the average trade during the specified period.
Profit Factor	The ratio of Gross Profit and the negative Gross Loss. This factor is a benchmark for how large the expected profit per units of capital would have been in the test data.
Open Position P/L	Value of an open position during the analysis
Total Number of Trades	Total number of trades
Percent Profitable	Percentage of profitable trades for the total number of trades
Number of Winning	Number of profitable trades

Trades	
Number of Losing Trades	Number of unprofitable trades
Number of Even Trades	Number of trades closed with neutral result
Number of Winning Bars	Number of trading periods/candles/bars over which the profitable trades lasted
Number of Losing Bars	Number of trading periods/candles/bars over which the unprofitable trades lasted
Number of Even Bars	Number of trading periods/candles/bars over which the neutral trades lasted
Average Trade Net Profit	Average result of all trades, calculated as Net Profit/Total Number of Trades
Average Trade Net Profit per Share	Average result of all trades, calculated as Net Profit/Total Number of Shares
Standard Deviation of Trade Net Profit	As name implies
Average Winning Trade	Average profit of the winning trades, calculated as Gross Profit/Number Winning Trades
Standard Deviation of Winning Trades	As name implies
Average Losing Trade	Average profit of the losing trades, calculated as Gross Loss/Number Losing Trades
Standard Deviation of Losing Trades	As name implies

Ratio Average Win. / Average Los.	Ratio of Average Profit/Average Loss
Largest Winning Trade	The largest profit
Largest Losing Trade	The largest loss
Max. Consecutive Winning Trades	Longest series of profitable trades
Max. Consecutive Losing Trades	Longest series of unprofitable trades
Average Bars in Total Trades	Average number of periods per trade
Total Bars in Trade	Sum of all trading periods/candles/bars over which open positions were held
Average Bars in Winning Trades	Average duration of profitable trades in periods/candles/bars
Average Bars in Losing Trades	Average duration of unprofitable trades in periods/candles/bars
Average Bars in Even Trades	Average duration of neutral trades in periods/candles/bars
Max. Shares / Contracts Held	Biggest single position
Total Shares / Contracts Held	Sum of all traded shares

Total Commission	Sum of all costs
Total Slippage	Sum of slippage over all trades
Account Size Required	Necessary account size to trade the system
Return on Initial Capital	Percentage return of the Total Net Profit to the initial starting capital (including commissions and slippage).
Return on Account	Percentage development of the invested capital, essentially the amount of money you would make (net profit) versus the amount of money required to trade the strategy (account size required).
Annual Rate of Return	Rate of return of all trades over the time period shown as an annualized percentage (based on initial capital)
Sharpe Ratio	Index for the profitability of an investment compared to the risk
Sortino Ratio	Index for the profitability of an investment compared to the risk (modified Sharpe ratio)
Froehlich Factor	Complex indicator for evaluating the quality of the trading system results
Reward/Risk Ratio	The ratio of Select Total Net Profit to percent time in the market and average drawdown.
Return Retracement Ratio	Similar to Sharpe Ratio, but distinguishes the difference between upside and downside return fluctuation
Start Date	Date of the first period
End Date	Date of the last period
Trading Period	Timespan of the data (History Length)
Time in the Market	Number of days or intraday periods in which positions were open, including weekends and holidays (absolute value)
Percent of Time in the Market	Percentage of days with open positions

Max. Drawdown	Largest cutback in profit
Max. Drawdown Date	Date of the largest cutback in profit
Net Profit as % of Max. Drawdown	Total Net Profit divided by Max Drawdown
Max. Drawdown as % of Initial Capital	Largest cutback in profit as a percentage of initial capital
Max. Intraday Drawdown	Largest cutback of profit since the last open equity maximum
Max. Intraday Drawdown Date	Date of the largest cutback in intraday profit
Net Profit as % of Max. Intraday Drawdown	Total Net Profit divided by Max Intraday Drawdown
Max. Intraday Drawdown as % of Initial Capital	Largest intraday cutback in profit as a percentage of initial capital.
Average Drawdown	Average drawdown of all closed out trades
Max Trade Drawdown	Largest Intraday drawdown experienced on a single closed out trade.
Max Run-up	The greatest profit run-up (across all trades) from the lowest previous equity drawdown.
Max. Drawdown Date	Date of the largest run-up in profit

Max. Run-up as % of Initial Capital	Largest profit run-up as a percentage if initial capital.
Total Positions	Number of held positions. If partial trades are used, higher values result than for full trades.
Position Changes	Number of switches between Long and Short trades
Total Closed Positions	Number of positions kept by the system. If partial trades are used, this key figure is higher than the Total Number of Trades.

RETURNS

The returns are shown in three ways. As key figures, the % Gain (return for the period relative to prior periods, as if all positions were implicitly closed at the end of the period), Closed Profit, Realized Profit, Number of Trades and Percent Profitable are displayed.

Monthly Display the performance development for each month of the test period.

Quarterly Display the performance development for each quarter (three months) of the test period.

Yearly Display the performance development for each year of the test period.

It is possible to show column summaries in the footer of this view by right-clicking on a column's footer and selecting one or more of the summary calculations.

TRADES

DISPLAY BY TRADES

Column	Description
#	Serial number of the trade
Quantity	Number of items traded.
Command	Labeling whether the trade was sell or buy, short or long.
Symbol	Traded security
Signal	Part of the trading system that set off the trade, for example entry or stop indicators

Fill Date	Day of the trade
Fill Price	Exact price of the purchase
Profit	Absolute profit of the trade
Duration	Absolute duration of the trade
% Profit	Normalized profit of the trade with respect to initial investment
Drawdown/Runup	The maximum drawdown and runup that the trade experienced.
% Drawdown/runup	The normalized maximum drawdown and runup that the trade experienced with respect to initial investment.
Commission	Commission as entered in Money Management
Slippage	Slippage as entered in Money Management

It is possible to show column summaries in the footer of this view by right-clicking on a column's footer and selecting one or more of the summary calculations.

For the **entry and exit fill price summary** are following options available: WAverage, Sum, Min, Max, Count and Average. WAverage is quantity weighted average base don the following calculation:

SUM(Price * Quantity) / SUM(Quantity)

DISPLAY BY FILLED ORDERS

Column	Description
#	Serial number of the trade
Command	Labeling whether the trade was sell or buy, short or long.
Symbol	Traded security
Fill Date	Day of the trade
Fill Price	Exact price of the purchase
Profit	Absolute profit of the trade
Signal	Part of the trading system that set off the trade, for example entry or stop indicators
Com.	Commission as entered in Money Management
Slip.	Slippage as entered in Money Management

It is possible to show column summaries in the footer of this view by right-clicking on a column's footer and selecting one or more of the summary calculations.

GRAPHS

The general properties are available via "Settings" on page 157 in the home tab.

The chart type can be set for all equity graphs to area, line, step line or bar.

DISPLAY BY FILLED ORDERS
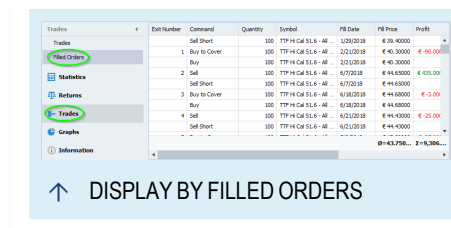
Equity by Trade The equities are shown in the trade sequence.
The option **Monte Carlo Trade Shuffling** will randomly order the trades based on a Monte Carlo simulation. **Monte Carlo Samples** defines the number of curves and any change will trigger a recalculation. The option is disabled by default.

Equity by Date The equities are shown in the sequence of dates. The **mode** of that graph can be set to Equity (default), monthly, quarterly or yearly return which represent the % gain by month, quarter or year chart.

Graph - Equity Underwater, this means the drawdown/cutback:

Equity Underwater (Monthly) Phases in which the profit was declining, in absolute values of the traded currencies or units.

Equity Underwater % (Monthly) Phases in which the profit was declining, in percentage values. This diagram makes it possible to compare drawdown phases over longer time spans.

> **Note:** The chart styles and colors can be changed by selecting the options in the property inspector.

Maximum Adverse Excursion Plots trade drawdown against profit/loss for each trade. Can use absolute or percentage values.

Maximum Favorable Excursion Plots trade runup against profit/loss for each trade. Can use absolute or percentage values.

INFORMATION

General information about the optimized chart are found her.

VIEWING RELATED TRADES IN CHARTS/TRADES LISTS

VIEWING RELATED TRADES IN CHARTS

This option is available in the

- → Trades List
- → Filled Order List
- → Maximum Adverse Excursion Graph
- → Maximum Favorable Excursion Graph

To view a trade from the Trades/Filled Orders list in the chart

- → click on **View in chart** in the context menu of the respective trade or
- → select the respective trade and click on **View in chart** in the toolbar or
- → double-click on the respective trade.
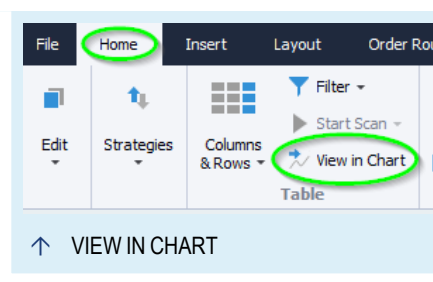
To view a trade from the Maximum Adverse Excursion/Maximum Favorite Excursion graph in the chart

- → click on **View in chart** in the context menu of the respective point in the graph or
- → double-click on the respective point in the graph.

VIEWING RELATED TRADES IN TRADES LISTS

This option is available in the

- → Equity by Trade graph
- → Maximum Adverse Excursion graph
- → Maximum Favorable Excursion graph

To view an element in a trades list

- → click on **Go to source** in the context menu of the respective element.

TOTAL COMMISSION AND SLIPPAGE

Here you can find detailed information on the commission and slippage key figures in the "Performance Report" on page 287.

TOTAL COMMISSION

This sum is an important, but often overlooked key figure. It shows you how much money you spent only for the trading activities. Usually, this sum has to be set in relation to the system profit . The ratio should lie far on the profitable side.

TOTAL SLIPPAGE

Usually, the slippage is seen as an uncertainty factor. Between signal generation, order entry and order filling there is a time in which the price moves, possibly against you.

To see the effects of such price movements in the backtest, the slippage is subtracted from the profit or is added to the loss. The sum shows you how much smaller the realized profit would be in comparison to the maximum in the backtest.

MAX DRAWDOWN

Here you can find detailed information on the drawdown key figures in the "Performance Report" on page 287.

PERFORMANCE REPORT

MAX. DRAWDOWN

A phase of declining profit is called a drawdown phase. The key figure Max. Drawdown displays the highest absolute profit drawdown in the time range of the test. The Performance Report also shows the date on which that max. drawdown occurred.

A drawdown phase starts when at a profit maximum a declining development starts with one negative trade. Often, a series of losses and overly small profits adds up to a longer drawdown phase. The size and time range of the drawdown are important criteria for evaluating a trading system.

The drawdown is calculated on basis of closed positions. Therefore, it does not reflect that for held positions, much larger drawdowns might take place.

MAX. INTRADAY DRAWDOWN

The key figure is calculated on basis of the complete profit, including open positions. Therefore, it includes all price movements that cause a drawdown for

open positions, although these drawdowns might be reduced or neutral once the position is closed.

With the help of this key figure you get an impression of the maximum loss of your system, i.e. the losses you should be prepared for financially and mentally.

FROEHLICH FACTOR

The Froehlich Factor (FF) is a complex key figure that is supposed to measure the quality of the trading system results.

Using the Froehlich Factor, the changes in quality of a system can be investigated. This key figure also takes into account that rare extreme values can distort the system performance. Because of this, the biggest deviations from the standard are used as divisors in the calculation.

↑ FROEHLICH FACTOR IN PERFORMANCE REPORT

The formula of the FF is calculated as follows:

```
Netto Profit * Percent Winning Trades * (Profit Factor + (Average Win /
Average Loss)
              Max. Winning Trade + Max. Losing Trade + Max. Drawdown
```

A value of FF = 5 for intraday and of FF > 10 for EOD systems should be expected, according to Stefan Froehlich.

SHARPE RATIO

The Sharpe Ratio is a key figure for the profitability of an investment in relation to its risk. It gives a feeling for the profit/risk ratio during the trade.

The calculation is based on a reference value for a "risk-free investment", for example a bond or a fixed deposit account. On this basis, the resulting interest for the investment is

↑ PERFORMANCE REPORT - SHARPE RATIO

calculated. When calculating the risk of a trade, the standard deviation is used as a measure of the volatility.

Sharpe ratio = sqrt(12) * avg(all monthly returns) / stdev(all monthly returns)
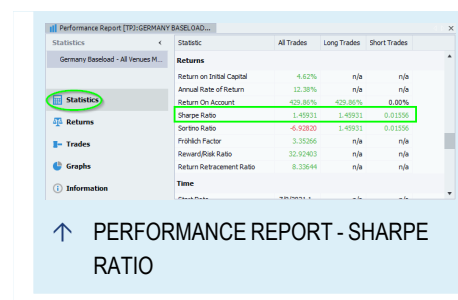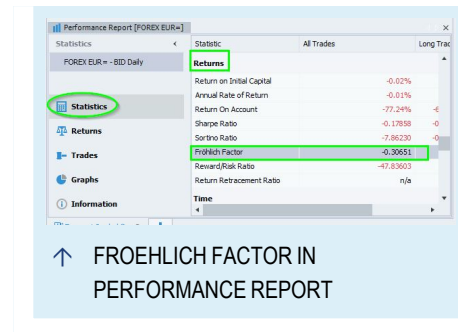
The Sharpe Ratio is calculated for monthly periods, like the profits and the volatility. It is always calculated for the whole portfolio.

It may be queried from Equilla or used for optimization.

SORTINO RATIO

The Sortino ratio is used to score a portfolio's risk-adjusted returns relative to an investment target using downside risk.

It is a modification of the Sharpe ratio but penalizes only those returns falling below a user-specified target or required rate of return, while the Sharpe ratio penalizes both upside and downside volatility equally.

↑   PERFORMANCE REPORT - SORTINO RATIO

The calculation is based on the difference between the realized returns and the target return (also known as the minimum acceptable return) divided by the target semi-deviation (downside deviation). The latter is used as a measure of the volatility.

Sortino ratio = (realized returns - target returns) / downside deviation

The Sortino ratio is calculated for monthly periods, like the profits and the volatility.

It may be queried from Equilla or used for optimization.

PERCENT PROFITABLE

Percent Profitable is a key figure in the Performance Report. With this key figure you get an information about the percentage of profitable trades in relation to all trades. This value is an important piece of information for testing and optimizing your trading system.

However, it cannot be evaluated without context. Depending on the configuration of the trading systems, completely different hit rates can result.

↑   PERFORMANCE REPORT

→   Trend-following systems usually show lower hit rates, but the profit/loss ratio is higher.

→ Trading systems with higher hit rates often have a smaller profit/loss ratio, which is additionally influenced by the increased cost caused by larger trading volumes.

```
Percent Profitable Trades = (Number of Winning Trades / Total Number of
Trades) * 100
```

AVERAGE TRADE NET PROFIT

Here you can find detailed information about the Average Trade key figures in the "Performance Report" on page 287.

In the Performance Report, all figures are displayed as cumulated valued for all trades and also for long and short trades separately.

↑ PERFORMANCE REPORT

AVERAGE TRADE NET PROFIT

This value gives the average profit of all trades for the data. For this, the **Total Net Profit** is divided by the **Total Number of Trades**. The Average Trade Net Profit is a key figure of the trading system statistics. With its help, different results for one or several systems can be compared. The value should also be compared to the commission and slippage per trade. It helps you estimate the probability that after deducting all costs, the trading system will still be profitable.

```
Average Trade Netto Profit = Total Net Profit / Total Number of Trades
```

AVERAGE TRADE NET PROFIT PER SHARE

This value gives the average profit of all shares for the data. For this, the **Total Net Profit** is divided by the **Total Number of Shares**.

```
Average Trade Net Profit per Share = Total Net Profit / Total Number of
Shares
```

AVERAGE WINNING TRADE

This key figure gives the average of all profitable trades. Compare this value with the average of all losing trades to get an impression of the trading system performance.

```
Average Winning Trade = Gross Profit / Number of Winning Trades
```

AVERAGE LOSING TRADE

This key figure gives the average of all losing trades. Compare this value with the average of all winning trades to get an impression of the trading system performance.

```
Average LosingTrade = Gross Loss / Number of Losing Trades
```

RATIO AVERAGE WINNING TRADE / AVERAGE LOSING TRADE

This key figure gives the ratio of the two key figures above. It is important for judging the system performance. By combining it with further figures, e.g. for the number of loss and win trades, the potential of the system can be estimated.

LARGEST WINNING TRADE

This key figures gives the largest single profit of the data set. It is often preferable to ignore this value and to remove it from the backtest result. This way, random results are less likely to influence your system.

LARGEST LOSING TRADE

This key figures gives the largest single loss of the data set. The explanation given above applies. It is often preferable to ignore this value.

POSITION SIZING

In the course of their career, many traders realize that their success at the market is less governed by entry signals, filter techniques or analysis routines. Money management, i.e. controlling the risks and the investment of capital are the crucial factors for successful trading. One of the most important aspects of the money management is the position sizing, i.e. the number of shares/contracts per position.

↑ POSITION SIZING

In the following chapter, various methods are given for position sizing.
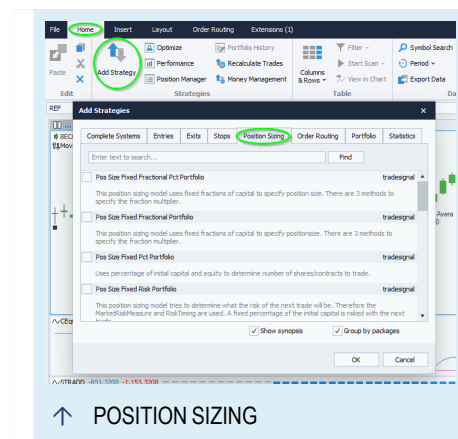
ADDING THE POSITION SIZING STRATEGIES

01. In the *Trading Systems* area of the toolbar, click on the **Add Strategies** button.

02. Click on the tab **Position Sizing**.

Now you can select up to six strategies for position sizing to be added to your chart or portfolio.

METHODS

FIXED FRACTIONAL

This position sizing model uses fixed fractions of capital the to specify position size. There are four methods to specify the fraction multiplier.

FixedFracModel Here you can choose between four models for the calculation of the fixed fractions:

Units Here you can enter a fixed amount of capital; for instance, use 5000 to trade 1 contract for every 5000 euro (%Toinvest = 1 / X).

MaxRisk Here you can specify the expected biggest loss in points to use this model.

Capital This is used for future trading only, you can take the margin into account.

FixRisk

FractionofCapital Enter what fraction of capital (according to the calculation above) is to be used per trade.

BiggestLoss For the MaxRisk model, enter the biggest loss in points here.

X For the Units model, enter the "X" value here.

FixedRisk When using the model Fixed Risk, enter the value for the fixed risk in points here.

InitialMargin Here you can enter the initial margin. It determines how much you can invest in order to ensure your account has sufficient reserves to cover a potential margin call

MaxLeverage Here you can enter the maximum leverage as multiplier that you have available. If you use 2x leverage, you get a loan from the broker equivalent to 100% of your investment.

Reduce Some of the options may lead to overstepping the originally calculated investment capital or risk parameters. For such cases, you can activate this option to ensure that the position sizes are reduced to meet the criteria of the main method.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

FIXED FRACTIONAL - PERCENT

This position sizing model uses fixed fractions in percent of capital to specify position size. There are four methods to specify the fraction multiplier.

FixedFracModel Here you can choose between four models for the calculation of the fixed fractions:

Units Here you can enter a fixed amount of capital; for instance, use 5000 to trade 1 contract for every 5000 euro (%Toinvest = 1 / X).

MaxRisk Here you can specify the expected biggest loss in points to use this model.

Capital This is used for future trading only, you can take the margin into account.

FixRisk

FractionofCapital Enter what fraction of capital (according to the calculation above) is to be used per trade.

BiggestLossPercent For the MaxRisk model, enter the biggest loss in percent here.

X For the Units model, ener the "X" value here.

FixedRisk When using the model Fixed Risk, enter the value for the fixed risk in points here.

InitialMargin Here you can enter the initial margin. It determines how much you can invest in order to ensure you account has sufficient reserves to cover a potential margin call.

MaxLeverage Here you can enter the maximum leverage as multiplier that you have available. If you use 2x leverage, you get a load for the broker equivalent to 100% of your investment.

Reduce Some of the options may lead to overstepping the originally calculated investment capital or risk parameters. For such cases, you can activate this option to ensure that the position sizes are reduced to meet the criteria of the main method.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

FIXED PERCENT

This method is one of the simplest. It invests a fixed percentage of the available capital and equity in the next trade. Neither the current market situation nor any information about past trades are considered.

The example chart shows the strategy Stochastic Momentum - Entry (delivered with Tradesignal). The position sizing strategy invests a fixed 5% of the initial capital of 10000 USD into the first trade. The broker offers a leverage of 1:20, so that with a capital of 10000 EUR, 7784 shares at a quote of 1.2846 USD can be traded.

OPTIONS

PercentToInvest Percent of initial capital to invest in the next trade.

FixedMargin Here you can enter a fixed margin, e.g. when trading currencies.

MaxShares Here you can set a maximum share per position.

Reset Here you can specify after which time you take your profits from the market and the invested capital is reset to the original initial capital. You can choose between yearly, monthly, Never (all capital is reinvested continuously) or **No Position Sizing**.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

FIXED RISK

This position sizing model tries to determine what the risk of the next trade will be. A fixed percentage of the initial capital is risked with the next trade.

This method is especially useful when you define a stop loss for each trade. The method calculates the volatility of the base value and multiplies it with a factor set by you. This way, the position size can optimally be linked to the market conditions.

The method assumes that you are using a stop loss. It is recommended that you use a volatility-driven stop. The position size is calculated so that the maximum loss per trade set by you is not exceeded.

The example chart shows the strategy *Stochastic Momentum - Entry* (delivered with Tradesignal). Once the program has measured the volatility, the risked capital is divided by the volatility. If a leverage is used, it is included in the calculation. If you have set a fixed margin, the risked capital is divided by the fixed margin. In all other cases, the calculated risked amount is divided by the current close price of the base value.

OPTIONS

PercentToInvest Percent of initial capital to invest in the next trade.

FixedMargin Here you can enter a fixed margin, e.g. when trading currencies.

MarketRiskMeasure To measure the volatility of the base value, you can either use the standard deviation or the Average True Range.

RiskTiming Set the calculation period for the volatility measurement.

Reset Here you can specify after which time you take your profits from the market and the invested capital is reset to the original initial capital. You can choose between yearly, monthly, Never (all capital is reinvested continuously) or **No Position Sizing**.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

PERCENT VOLATILITY

This method works similar to the "Fixed Risk" method. It measures the volatility of the base value and scales the position sizing accordingly. As additional parameter, you have to enter a multiplier for the maximum expected loss. The result of the multiplication of this factor and the measured volatility is used as basis for the calculation of the position sizing.

OptionsFractionofCapital Enter how much fraction of capital is to be used for each trade.

VolatilityModel To measure the volatility of the base value, you can use the Average True Range or the momentum. The momentum is given as absolute value from one bar to the next one. With the result, a moving average over the "volatility period" is calculated for smoothing.

VolatilityPeriod Enter the period over which the volatility is calculated.

BiggestVolaLoss Enter a multiplier for the measured volatility. This value gives the highest maximum loss possible as multiple of the volatility.

Profit (Factor Profit) With this multiplier, the amount of accumulated gain is included in the calculation of position sizes.

MaxLeverage Enter the maximal leverage.

Reduce Some of the options may lead to overstepping the originally calculated investment capital or risk parameters. For such cases, you can activate this option to ensure that the position sizes are reduced to meet the criteria of the main method.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

MARKET'S MONEY

This method works similar to the "Percent Volatility" on the previous page method. In addition to it, it reinvests profits with leverage. If your capital has decreased, the position size will be reduced.

If *FactorProfit* is set to the same value as *BiggestVolaLoss*, the method reacts identical to the "Percent Volatility" method.

OPTIONS

FractionofCapital Enter how much fraction of capital is to be used for each trade.

VolatilityModel To measure the volatility of the base value, you can use the Average True Range or the momentum. The momentum is given as absolute value from one bar to the next one. With the result, a moving average over the "volatility period" is calculated for smoothing.

VolatilityPeriod Enter the period over which the volatility is calculated.

BiggestVolaLoss Enter a multiplier for the measured volatility. This value gives the highest maximum loss possible as multiple of the volatility.

Profit (Factor Profit) With this multiplier, the amount of accumulated gain is included in the calculation of position sizes.

MaxLeverage Enter the maximal leverage.

Reduce Some of the options may lead to overstepping the originally calculated investment capital or risk parameters. For such cases, you can activate this option to ensure that the position sizes are reduced to meet the criteria of the main method.

Instrument Count Here you can enter the number of instruments in the chart. This way, a portfolio can be simulated in a single chart. It allows you to distribute your available funds across multiple instruments in one chart.

AUTOMATIC ORDER ROUTING

Under order routing, the routing of trading signals of a mechanical trading system to a connected broker is understood. The function can be used to:

→ Route signals of a trading system automatically to the stock exchange via a broker

→ Route signals of a trading system manually to the stock exchange via a broker

→ Test a trading system under live conditions via the demo access of a broker

Note: Automatic order routing is not available for every data provider.

Note: Data vendors (and 3rd party data files) may deliver erroneous data that may be represented as valid data. Data vendors may change their interface at any time and without prior notice, such an update can introduce breaking changes. Access to data from a data vendor may be delayed or fail due to network congestion, network errors, server outages, power failure and other factors.

HOW THE ORDER ROUTING WORKS

To use the order routing function, a number of preferences have to be set:

→ Create an account and configure settings in the "Order Routing Options" on the next page

→ Activating the order routing for a chart or portfolio in the Automation Options of the Trading System

→ Starting and stopping the order routing via the Order Routing toolbar, see the section Button Menu Order Routing.

Several levels of automation are possible, up to fully automated trading without interference from outside.

Tip: When automatic order routing is active a small routing icon will be displayed above the toolbar, to the left of the clock. This icon may be clicked to Stop All Order Routing.

ORDER ROUTING OPTIONS

Tip: Some brokers do not provide a mechanism to take multiple manageable positions in the same security. Without this feature, it is not possible to correctly manage multiple independent strategy positions for the same security on the same physical account. Tradesignal will prevent order routing from being started if it is already active for a given security on the same physical account in such cases.

BROKER ACCOUNTS

A Broker Account is the terminology used in Tradesignal to refer to a connection to an account with a specific broker and associated settings. It is possible to have multiple named broker accounts to the same physical account at the same broker but with different settings. Doing so allows different strategies to be created for trading different security types with the same physical account for example.

↑   ORDER ROUTING OPTIONS
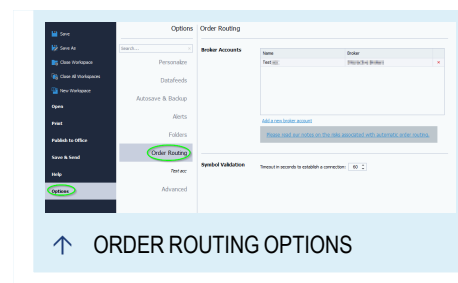
Add a new broker account Accounts are added in the options menu under File > Options > Order Routing > Broker Accounts by clicking on the Add new broker account link.

Remove Account Accounts can be removed by clicking the X button next to the account in the list of accounts.

Edit Account Account settings can be modified by clicking on the account name listed below Order Routing under File > Options.

CONFIGURATION OF THE ORDER ROUTING ACCOUNT

In this menu, all settings for the broker account and the general handling of the orders are entered. Do not change the port number and IP address.

↑ ORDER ROUTING ACCOUNT SETTINGS

Selection of the Broker and name for the account are only available in the wizard when first creating the account.

Enter a name for the order routing account Enter an account name that is used for this broker within Tradesignal.

Port Port number of the broker's trading application, e.g. in IB TWS.

> **Note:** If you use more than one TWS on one machine, you have to change the portnumbers in the TWS. After this enter these Portnumber here. Otherwise the orders can appear in both TWS

IP Address IP of the broker's trading application.

Account Code Your account at the broker, e.g. the "Interactive Brokers Account Code" for IB.

> **Note:** The correct Account Number is only for synchonizing neccessary. The Orders will be directed to the TWS via the correct Portnumber

Order Transmission Select here whether the orders are routed in the Automatic or Manual mode.

Action on Session End Configure here how orders shortly before the session end will be handled. They are either routed to the broker as a market order (Map Close Orders to Market Order) before session end (also see section "On-Close Orders" on page 314) or routed as Map Close Orders to Market-On-Close Order. In the latter case, the execution depends on the definition for this order type at your broker. A "Market Order" is routed instantly, while a ""Market on Close Order" is routed at a certain time before the session end.

Log Level Here you can set the log level for details of the order processing and related tasks. The level System logs the least detailed data, the level Details the most. We recommend that you keep the default setting.
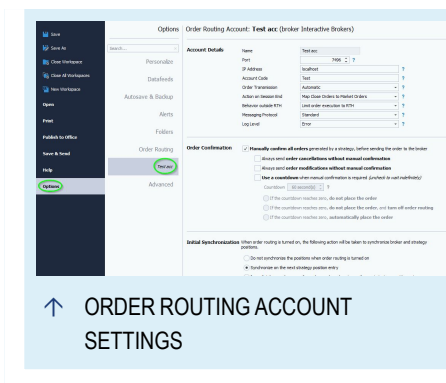
The information appears in the output window in the lower area of the window. It can be opened by a click on the grip bar.

Note: Brokers may deliver erroneous data that may be represented as valid data. Brokers may change their interface at any time and without prior notice, such an update can introduce breaking changes. Instructions sent to a broker or access to quotes may be delayed or fail due to congestion, network errors, server outages, power failure and other factors. Broker-supplied software may be required for connection between Tradesignal and a broker. Such software may have stability issues or exhibit errors under some circumstances.

ORDER CONFIRMATION

In this menu, you define whether Tradesignal should send the orders automatically to the broker or if certain constraints should be applied to the order routing.

Note: In the settings of the broker account, similar settings for order routing are entered. However, those determine the behavior of the order software of the broker.

Manually confirm all orders Select this option for manual confirmation of automatically generated orders. There are several settings available, some of them depending on time. The options range from indefinite waiting to order cancellation. If this is not set, orders will be automatically sent.

ORDER CONFIRMATION

The remaining settings configure exceptions to manual confirmation, namely:

→ Send order cancellations without manual confirmation

→ Send order modifications without manual confirmation

→ Wait only a specific period of time to obtain manual confirmation and then take a default action:

01. Do not place order

02. Do not place order and stop order routing

03. Place the order

INITIAL SYNCHRONIZATION

In this menu, you can define which actions are to be undertaken during the start process of the order routing.

When starting the order routing, Tradesignal is able to synchronize the positions in the trading system with the account positions. Several options are available.

↑   INITIAL SYNCHRONIZATION

Do not modify the account position Positions are not changed.

Modify account to strategy position with the first entry order from the strategy The positions are only synchronized with the first entry order. This standard setting minimizes the trading costs.

Cancel pending orders and modify account position with the first entry order Pending orders are canceled and the positions are synchronized with the first entry order after the start. This may cause increased trading costs.

Cancel pending orders and modify account position with a market order Pending orders are canceled and the positions are instantly synchronized with an order. This may cause increased trading costs.

STOPPING ORDER ROUTING

Here you can set what is to happen when the order routing is stopped.

↑   STOPPING ORDER ROUTING

Cancel pending orders Pending orders are canceled without closing positions.

Cancel pending orders and close positions Pending orders are canceled and open positions are closed.

Do not modify account position Positions are not changed.

SYNCHRONIZATION

Here you can define how Tradesignal will react when the account positions are no longer synchronized with the positions in the trading system. Several settings are available, from automatic synchronization with market orders to the stop of the automatic order routing with an alert.

↑   POSITION SYNCHRONIZATION
      SETTINGS

If the account and strategy positions are no longer synchronized:

Cancel all pending orders and generate a market order to synchronize positions Pending orders are canceled and a new order is issued to instantly synchronize the positions. This may cause increased trading costs, especially if the synchronization is frequently lost.

Cancel all pending orders, generate exit orders and synchronize with the next entry order Pending orders are canceled, current positions are closed and new entry positions are opened. This may cause increased trading costs, especially if the synchronization is frequently lost.

Synchronize position on the next entry order Pending orders remain open, and the positions are synchronized only with the next entry order issued from the trading system. The entry order is changed (increased/decreased) to include the position synchronization. Note that this can only be done with a market order or one limit/stop order. Systems with several limit orders, e.g. with limit order above and below the current quote, cannot be synchronized this way.

Cancel all pending orders, close account position and synchronize position with the next entry order Pending orders are canceled, current positions are closed and new entry positions are opened. This may cause increased trading costs, especially if the synchronization is frequently lost.

Stop automatic order routing and notify user with an alert The order routing is stopped (any pending orders and positions remain open).

Notify user with an alert The order routing is not stopped but an alert is issued.

Do nothing

Seconds to wait for account and strategy positions to synchronize Enter the duration in seconds that the synchronization may take. If synchronization fails, the timeout counter below starts. An out-of-sync chart will be highlighted.

Seconds to wait for account and strategy positions before synchronization timeout Enter the duration in seconds before the above entered settings for handling the synchronization loss are applied.

> **Note:** If the Send On-Close orders a few minutes before session end option is enabled, the position sizes will not be checked within the specified number of minutes before session end. As soon as the session is closed, Tradesignal will continue to check the position sizes in order to ensure the strategy and account positions are synchronous.

DATAFEED

Action to take if the datafeed loses connection or any instrument becomes stale for an extended period.

→ Send an alert and turn off automatic order routing - All automatic order routing will shut down, an alert will be generated.

→ Send an alert - Automatic order routing continues, an alarm is generated.

→ Do nothing - No action is taken.

Stale duration before action is taken An instrument is stale if either the connection to the upstream data provider has been lost, or the upstream data provider has indicated that the price information for this instrument is no longer up-to-date.

STOP AND LIMIT ORDER

Tradesignal offers you two methods for how generated stop or limit orders are to be treated at the session end. These options determine how much the back test results may differ from real trading results.

→ Wait for Tradesignal to report a fill then send as a Market Order - Tradesignal issues a stop or limit order only after the last order was confirmed as filled by the broker.

→ Send the order to the broker as-is; take no actions if the order is not filled as expected - Tradesignal issues stop or limit orders independently of fill confirmations.

→ When using the IB TWS, this option should be deactivated. When the option is deactivated, the existing stop or limit orders are updated at every new bar/tick in Tradesignal. If the option is active, all existing orders are canceled and new orders are issued. This may result in problems, especially for fast-trading stocks or futures, as the orders cannot be canceled quickly enough by the trading software.
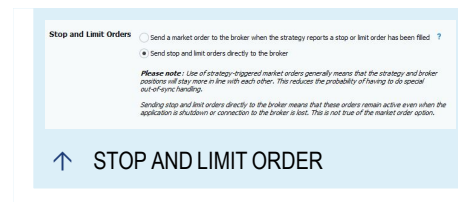
ON-CLOSE ORDERS

Here you can define how an order is routed when it is classified as "on-close" by the trading system.

ON-CLOSE ORDERS

→ Send on-close orders at the end of the session

→ Send On-Close orders a few minutes before session end - Select this option if the on-close order is to be issued before the set session end. You can enter a time in *Number in Minutes* or click on the spin buttons. Please note that you can set similar order routing settings in the account settings of the broker. If your broker supports real on-close orders, you may be able to send them right at the session end.

→ Cancel active limit and stop orders after on-Close orders are generated - Select this option if unfilled stop or limit orders are to be canceled when an on-close order is generated. This will keep the system from accidentally filling several orders.
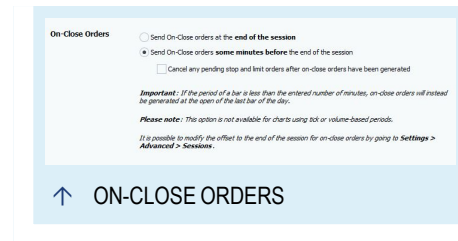
TIME-IN-FORCE

→ Orders should stay active until canceled - If selected, the order may stay active for longer than the trading day.

TIME-IN-FORCE

→ Orders should stay active for the trading day - If selected, the order is only active for the current day and deleted at session end, if not filled.

→ Always generate new orders when a bar opens - Select so that pending orders are canceled and new orders are generated at each new bar. This option should not be used for short time periods, but may make sense for trading systems with long periods, e.g. weekly.
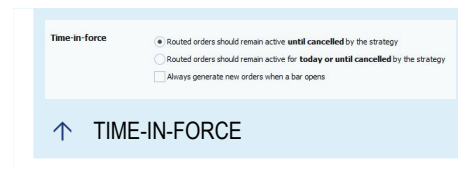
SYMBOL MAPPING

Symbol Mapping in Tradesignal means mapping the symbols of the online data provider and the broker that refer to the same underlying instrument.
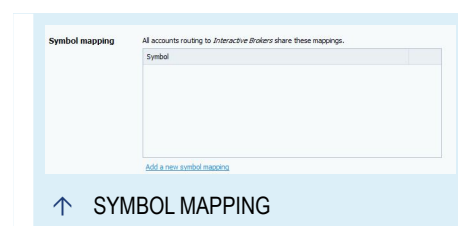
SYMBOL MAPPING

For the order routing to work, the program has to know this mapping. The correct settings are very important for trading.

> **Caution:** If the wrong symbols are entered or mapped here, the wrong symbol may be traded by the broker.

Editing Symbol Maps

New Enter a new symbol map. A dialog opens, see next section.

Edit Edit the selected symbol map.

Delete Delete the selected symbol map.

Delete All Delete all symbol maps.

Configuring Order Routing Symbol Mapping

In this dialog you can create a new symbol map or edit an existing map.

ENTER THE SYMBOL FROM THE DATA PROVIDER:

When a chart with a symbol is open and selected, this symbol is automatically entered here. Otherwise, click on the Browse button to start the symbol search in Tradesignal. Note that many symbol names are a combination of symbol shortcut and exchange name.

↑ ORDER ROUTING SYMBOL MAPPING DIALOG BOX

ENTER THE SYMBOL DETAILS FOR THE BROKER:

Underlying Enter the asset's underlying ticker symbol.

Exchange Select the exchange from the list at which the symbol is traded.

Security Type Select the symbol type from the list. Most brokers use this setting to assign the shortcut to the right exchange.

Currency Select the currency delivered against the purchase of the underlying currency.

Expiry Date Enter an expiry date for the underlying, if available.

> **Caution:** Please check the settings to ensure that the right symbols are ordered.
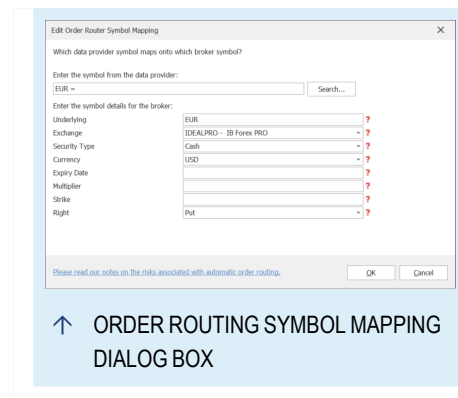
ORDER ROUTING TOOLBAR

Open this toolbar by clicking on the Order
Routing tab above the toolbar.
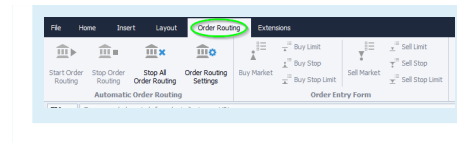
Start Automatic Order Routing Start the order
routing for the selected chart or portfolio. To
start all order routings, press the Ctrl key while clicking.

Stop Automatic Order Routing Stop the order routing for the selected chart or
portfolio.

Stop All Automatic Order Routing Stop the order routing for all charts and portfolios.

Order Routing Options Opens the "Order Routing Options" on page 308 in the
Tradesignal Options.

STRATEGY AUTOMATION OPTIONS

This menu is opened by clicking on the small plug symbol on the lower right of the
chart or a portfolio. Here you can activate different levels of automation for the
order routing. The following settings are available:

NO ORDER ROUTING

Select this option if no automatic order routing is used. No signals are output by
the strategy. The Position Manager remains empty.

POSITION MANAGER ONLY

Select this option to send the signals generated by the strategy to the Position
Manager. To submit the orders, you have to enter them manually into your
broker's order software.

BROKER

Select this option to route the orders automatically. The signals of the trading
system are displayed in the Position Manager and also routed to the broker. The
limitations for this automation are set in the Order Verification settings of the
Order Routing Settings in the Tradesignal Options, see above.

After selecting an option, you can start the order routing from the *Order Routing*
button menu. Click **Start Automatic Order Routing**.

CONTROLLING HOW AND WHEN ORDERS GET FILLED

When using order routing the one of the major issues is ensuring that fills
generated in the strategy closely match fills in the brokerage account. The

"Money Management" on page 236 property **Realtime Price Source** can be used to tell Tradesignal to use best bid and best ask prices from the Broker instead of using last prices from the data source. The following settings are available:

Bid/Ask Tradesignal uses the best bid / best ask data provided by either the broker (if an order routing module has been connected) or the data provider. If neither the broker nor the data provider is delivering bid/ask prices, Tradesignal uses the last price instead (for example in the case of indices). Best bid and best ask prices are generated when a market participant wants to buy or sell a number of shares/contracts while a last price represents an actual trade that has been made. Therefore this option has the benefit of more accurate fills for your orders. The caveat is however that the results collected in real time will not match the results of back-testing which will always only use the last price.

Last Tradesignal uses the last price delivered by the data provider. This is the same price as the one used to back-test the strategy. A last tick represents a trade that has been made in the market. When using this mode, Tradesignal can only fill and order after a trade has been made, even if there was a matching offer/request in the market prior to the trade. This mode ensures that real time results are closer to back-test results.

MANUAL ORDER ROUTING

Tradesignal allows users to manually place orders (such as limit orders in Trayport Joule) directly from your workspace. This is done via an external dialog window accessible from a number of locations. Accessing this feature will trigger Tradesignal to show the appropriate third-party order entry mask.

> **Note:** This option is only available if the respective symbol's feed supports this capability.

→ To access the order window, select the desired option under **Order Entry Form** on the *Order Routing Tab* on the main ribbon.

→ To access the order window from charts, watchlists, portfolios, market profile, level II, the output window or from trading alerts, click **Order Entry Form** from the respective context menu.
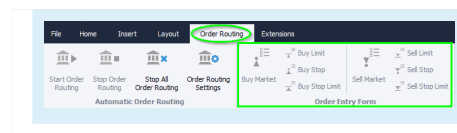
OpenConnect feed developers can also implement the order form interfaces to expose this functionality (in the same way the Trayport Joule feed does), with the addition of market limit, market stop and stop limit orders. Additional information can be found in the Tradesignal OpenConnect API guide.

↑ EXAMPLE OF A THIRD PARTY ORDER FORM.

MISCELLANEOUS FEATURES

TRADESIGNAL OPTIONS

In the Tradesignal options, you can find general settings for Tradesignal, for example

$\rightarrow$ preferred view and chart type

$\rightarrow$ data connections and order routing

$\rightarrow$ timescale and scope of data backup

You can open the window Tradesignal Options

$\rightarrow$ by clicking on the File menu in the header bar and selecting Options from the menu, or

$\rightarrow$ by double-clicking on the connection icon above the toolbar.

↑ TRADESIGNAL OPTIONS
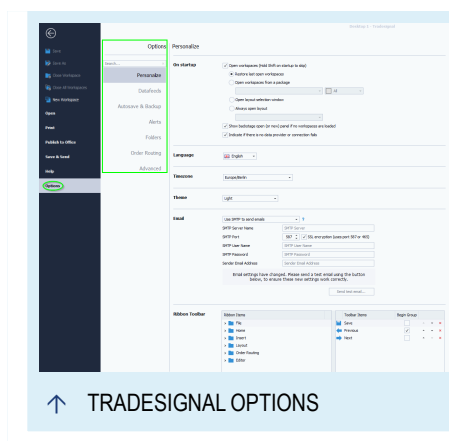
In the following chapter, you will find information about the settings or links to other chapters with detailed information.

SEARCHING THE OPTIONS

In addition to drilling down search for an option by label, it is possible to use the search box located to the top left of the options pane to search for an option by keyword.

$\rightarrow$ Enter the search term, e.g. "Excel"

The available options matching the keywords will be displayed as you type

To reset the search click the **X** button next to search box, or click on a options category.

PERSONALIZE

ON STARTUP

Which workspaces to open, which layout to use or to show the backstage automatically on start up.

LANGUAGE

Which application language to use, changing this setting will require a restart of the application.

TIMEZONE

Set the local timezone. This setting is used to adjust time values in charts to the local timezone.

THEME

Which application theme to use.

EMAIL

The settings to use when the application needs to send an email. There are two methods:

SMTP Requires the SMTP servers details to be added. Most reliable solution for sending emails from the application.

MAPI Will use the locally installed email software to send emails. May cause problems with security settings.

RIBBON TOOLBAR

Tool to configure the "Quick Access Toolbar" on page 48. All possible functions are listed in a tree in the left pane. These functions can be added to the right pane and will appear in the Quick Access Toolbar above the regular toolbar. Options next to each Toolbar item allow it to be repositioned, removed or grouped.

PRINTING

Options to configure standard printing options, most notably the default watermark and header/footer layout.

RESTORE DEFAULTS

Clicking on this button will restore all system settings to their default values, a dialog will be displayed to confirm this action.

Individual settings may be restored to their factory setting by right-clicking on the label for the option and selecting **Reset**.

DATAFEEDS

DATAFEED

The settings and login to be used for the datafeed connection.

CSV FILES

Define one or more folders that contain CSV files for import.

AUTOSAVE & BACKUP

AUTO SAVE

AUTOMATICALLY MAKE A PERIODIC RECOVERABLE BACKUP OF ANY OPEN DOCUMENTS

This is the default setting. When selected, the work is saved in regular intervals (given by the parameter Frequency in minutes to save open items) and available as backup. You can edit the frequency value.

APPLICATION BACKUP

Here you can enter settings for the backup of your current configuration. The following information is saved:

→ Packages with all their files, including information whether they are write-protected (date and time are not saved!)

→ Symbol lists

→ Symbol settings for automatic order routing

→ User settings

→ Edited quotation data

This way you can save the current state of Tradesignal and then use the resulting backup to restore your settings on another computer - or on your computer, for example after a new installation of the operating system.

The following options are available:

Create daily backup at Here you can enter a time at which the backup will take place. Note that this only will be done as long as the application is running.

Create a backup when the application shuts down When selected, the data is saved as backup before shutdown.

Backup Location This is the folder where the backups are saved to. To enter another one, click on **Browse** and select one in the Windows file dialog.

Number of recent backups to keep This is the maximum number of backups that will be kept. When going beyond this number, old backups will be overwritten, starting with the oldest. Max. number is 100.

→ Click on **Create a backup now** to create a backup for the current settings and data.

→ Click on **Restore a previous backup** to restore an old backup. For this to work, all open workspaces have to be closed. This is done fastest when you select **Close All Workspaces** from the file menu.
Select one of the available backup files from the dialog. Then choose whether you want to **Restore all files including settings restore all saved data as listed above** or **Restore all package files restore the package files only**.
In addition, you can select the option **Restore exclusively missing files** so that already available files are not overwritten. Confirm the warning. After the restoration, the application is closed so that the new settings can take effect upon restart.

ALERTS

Detailed information about the alert setting options can be found in the chapter "Alerts" on page 329.

FOLDERS

PACKAGES

Detailed information about the package options can be found in the chapter "Package and File Management" on page 334.

SHARED SYMBOL LIST FOLDERS

Here you can add/remove folders containing symbol lists in XML format as exported from Tradesignal, see "Managing Symbols and Symbol Lists" on page 63.

By having these folders on a network share, you can share symbol lists between users. Shared symbol lists are read-only.

EQUILLA PATHS

C-API Extension DLLs In this folder, special Equilla interface files are saved. Do not change this path.

PrintToFile output In this folder, files are written by Equilla scripts (see chapter "Data Output via File Interface" on page 451).

RSS FEED

Here you can configure RSS feeds. RSS feeds are added to the news displayed in the news window.

New Add a new feed. A dialog opens where you can enter the URL of the feed. Make sure that it starts with "http://".

Edit Edit the URL of the selected RSS feed.

Delete Remove the selected RSS feed from the list.

ORDER ROUTING MODULES

Folder where order routing modules are located.

LEAVERS & JOINERS SYMBOL LISTS

Folder where joiners and leavers symbol lists created by export of the Portfolio history will be saved, see "Portfolio History" on page 255.

ORDER ROUTING

Detailed information about the order routing options can be found in the chapter "Order Routing Options" on page 308.

ADVANCED TRADESIGNAL OPTIONS

Many options to configure default behavior are found in this section organized by the following categories

EQUILLA EXTENSION

These options are available in and offer the option to enable or disable support for Equilla extension DLLs.

No extensions allowed

Only C API extensions allowed Allows Equilla extensions that use the C API. This is the default setting.

Only COM API extensions allowed Allows Equilla extensions that use the COM API.

Both C and COM API extensions allowed Extensions for both APIs are allowed.

Check **Use isolated Python version** to run a cut-down, isolated version of Python that is independent of any other Python version installed on this system. The isolated version has no access to any non-default Python modules unless they are copied

into the python folder below the Tradesignal installation folder. This option should be checked if no full Python version is installed on the system.

CHART STYLE

Default style The chart type that will be used for all newly created charts (excluding tick-by-tick charts).

Tick chart style The chart style to use for new tick-by-tick charts.

Value scale mode The value scale mode to use for newly created charts (Linear or Logarithmic).

Allow panning by grabbing charts with the right mouse button When checked, the chart can be moved directly.

Sync value of stop lines with the same name in the same workspace see also "Synchronize stop line values" on page 176.

Query empty symbol input properties when adding an indicator or strategy

INSTRUMENTS

This section allows configuration of the default history length to use for charts and other document types in various periods.

Default history length The default history length to use for newly opened charts and portfolios.

Default period The default period to use for newly opened charts and lists. The default period is daily.

Open instruments in a new subchart Check this box to always add new instruments as a sub chart to an existing chart. Uncheck the box to always add the new instrument to the main chart.

Resolve ambiguous symbols When a symbol is entered on the command line or in an inline instrument, this option determines how the symbol should be resolved to an instrument if the symbol is multiply defined.

Display a warning if instrument currencies in a portfolio do not match Check this to be warned of diverse currencies within a portfolio. Not all strategies work on such portfolios.

Display a warning if a chart is created from a watchlist with different history length

WORKSPACES

Maximum number of open workspaces Increase this number to allow more simultaneously open workspaces, the default is 30. Please note that opening more workspaces will require more system resources.

Maximum number of items in a workspace Increase this number to open more items in a workspace. The default value is 30. Please note that opening more items in a workspace will require more system resources.

Show close button on selected workspace tab Otherwise, workspace tabs have to be closed via the context menu.

Hide titles of non-selected workspace items If checked, titles of items within the workspace will be hidden.

Show unremove bar at the bottom of the screen Otherwise, the unremove option will be displayed to the right of the title bar of the application.

Automatically close a floating desktop when the last workspace has been closed If checked, empty desktops are closed automatically, which reduces system load.

Automatically save a closed workspace if it only contains modified trades or serialized variables

Set the workspace tab button size Select an option from the list. This setting only refers to the buttons, not the workspace tabs.

Target cursor highlighting when Ctrl is held Select an option from the list.

PROPERTY INSPECTOR

Show deprecated property inspector When checked, the property inspector in the toolbox is acivated

Always show properties when a new item is selected *(only available for deprecated property inspector)* When checked, the property settings are instantly opened upon selecting an item.

COMMAND LINE

Generate OHLC outputs for one-line formula-based symbols When this item is selected and a spread formula is entered on the command line, an instrument will be created with open, high, low and close values based on the entered formula, instead of just using the close value.

Display security name for one-line formula-based symbols When this option is checked, the application will substitute a symbols display name for the symbol in formulas.

Correct symbols used in formulas used on the command line This option prepends the prefix to a symbol used in a formula if it has been forgotten.

Clear command line history Resets the command line history.

SYMBOL LISTS

Show Symbol Lists toolbox after inserting a chart into a workspace

Use preferred period and FID when opening new charts from a symbol list Some symbols in a symbol list may also specify a preferred period and FID. If they do, and this option is selected, the instrument added to a chart will override the charts default FID and period and use the preferred settings instead.

Show all symbols collected on a DataConnect server in a separate symbol list

Symbol display format How symbols in the Symbol List toolbox show be displayed.

PERFORMANCE

Prevent system suspension/hibernation while the application is running When checked, the system will not go to sleep during your work with Tradesignal.

Prevent log-off if there are unsaved changes in any workspace Otherwise, changes will be lost.

Allow full-text searching of help files When checked, all help file contents will be searchable.

Unload optimizer results for non-visible documents When checked, memory consumption of optimizers will be reduced by unloading the results after the specified delay time.

Reduce the evaluation frequency for non-visible charts When checked, this might improve performance. Note that alerts and signals will also be delayed by the given Evaluation interval time.

Initial evaluation delay (in milliseconds) Controls the delay (in milliseconds) before a new sequence of ticks will trigger the initial Equilla evaluation

Consecutive evaluation delay (in milliseconds) Controls the delay (in milliseconds) before a new sequence of ticks will trigger the subsequent evaluations for the same uninterrupted stream of ticks

Maximum visible instruments The maximum number of instruments that may be simultaneously open.

Minimum memory for optimizer/scanner (MB) The minimum amount of system memory that must be available to start a new scan or optimization task.

Log memory and handle usage When checked, the application log will contain details on memory and handle usage.

INDICATORS & STRATEGIES

Automatically add the following items when a strategy is added to a chart

Click on **Add new item...** to add further items. To edit an item, click on it and then select another item from the dropdown list, or delete it by clicking on x. By default, Strategy Equity Portfolio and Strategy Drawdown Portfolio are added.

Automatically add the following items when a strategy is added to a portfolio

Click on **Add new item...** to add further items. To edit an item, click on it and then select another item from the dropdown list, or delete it by clicking on x. By default, Portfolio Leave Exit strategy, Strategy Equity Portfolio and Strategy Drawdown Portfolio are added.

Do not show the input mapping dialog if all inputs can be automatically mapped Otherwise, the mapping dialog will always be shown, which makes it easier to apply the element to unopened symbols.

Clicking on **Recompile all user indicators and strategies** will force all user indicators and strategies to be recompiled. Progress will be shown and the result of the compilation indicated.

STRATEGY ORDERS

Select under which conditions historic trades generated by trading strategies should be recalculated, e.g. on Insert, Replace, Delete of items.

Generate order from the last save point, when a workspace is opened

> **Tip:** For manual changes of orders, see the "Order Editor" on page 233.

SESSIONS

Period before session end that strategies may generate on-close orders (when enabled to use a virtual session end) Set here exactly when On-close orders are generated in order routing.

CSV FILE EXPORT

Field separator when exporting data Choose between comma and semicolon as separator. Default is the semicolon character.

Language used for formatting numeric values Choose between Application Language, System Language and US English.

Enclose values in quotes Enable to enclose values in quotes

Export all optimizer runs in the optimizer results Check this to export all run results (see chapter "Optimizer" on page 274).

CLIPBOARD

Field separator when copying data Choose between comma, semicolon or tab (\t) as separator. Default is the tab character.

Language used for formatting numeric values Choose between Application Language, System Language and US English.

Enclose values in quotes Enable to enclose values in quotes

TEMPLATES

Allow to update the templated charts when the base template change If this option is checked, charts that have been created based on a template will automatically be updated when the template is changed and saved. It is checked by default.

Show formula symbol templates in the toolbox Enable to display templates for formula symbol in the toolbox under Indicators.

Show default symbol templates in the formula wizard Enable to display templates for formula symbols in the wizard

TELEMETRY

Enable Telemetry Enable Telemetry to send data about the usage, analogous to the support information, in order to help with the development and improvement of Tradesignal.

Anonymize Data Enable to exclude information that allows a personal identification.

ADVANCED INSTALLATION OPTIONS

The information in this article is only relevant for system administrators who need to use different settings or additional features of Tradesignal.

During installation of Tradesignal you can select **Show the advanced installation options page** (recommended only for administrators) which allows you to specify some additional options.

PASSWORD PROTECT DACS ID

With this option you can select a password for the DACS ID.

DATA PATHS

You can change both the application data and the user data path.

If you leave either of these fields blank, the default settings will be used.

SHARED DATACONNECT SETTINGS

You can specify the file location of an INI file containing connection settings for the Tradesignal DataConnect and "Importing External Data in Tradesignal" on page 513. This way there is a central point at which to configure connection settings for all your installations and new installations are easily configured to use your existing data sources.

This option sets the registry key *HKLM\Software\Tradesignal\TradeSignalEnterprise\ConnectionSettingsFile*.

UPDATE WEB SERVICE

This allows you to specify an URL which is to be checked periodically for updates of Tradesignal.

If you select this option, the registry key *HKLM\Tradesignal\SystemSoft\TradeSignalEnterprise\SiteUpdateService* will be set.

ALERTS

The alert function helps you keep an overview even when working with a large number of running processes and functions. Use the alert function in Tradesignal for the following:

↑ ALERT AREA

- → Trading systems that alert you of certain activities

- → Indicators that offer an inbuilt alert function in their codes
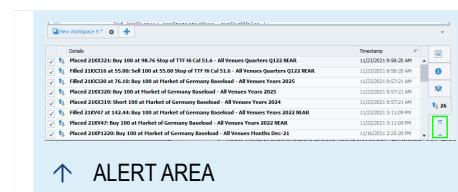
→ The chart tools trend line, trend channel, regression channel, stop line and the Fibonacci Retracement

→ Your own programs in which you can include offer alerts

→ Placing orders through "Manual Order Routing" on page 317

ALERT WINDOW

ALERT AREA IN THE WORKSPACE

There is a specific alert window on the bottom of the workspace. The displays differ slightly depending on the alert category. In Tradesignal you can choose which columns to display for each category by selecting Add/Remove columns from the alert window's context menu.

→ Alerts coming from chart tools or indicators are listed in the "Indicators & Tools" tab, with the triggering symbol and reason, for example a trend line crossing or an indicator crossing a signal line.

→ Alerts coming from trading systems are listed in the "Strategies" tab. Here, the triggering symbol and all events of the trading system are listed, like opened or canceled orders, and also feedback from your broker in case of activated automatic order routing. The latter depends on your settings in the Order Routing options.

→ Application level alerts such as losing the connection to your data feed are shown in the "Application" tab.

Each tab will show the number of unread alerts next to the tab's icon.

MAXIMIZING THE ALERT PANE

The small maximize icon shown directly below the alert pane tabs can be used to maximize the alert pane to fill the entire main application window (with the exception of Toolbar and toolboxes). Clicking the same button a second time will restore the alert pane to its original position.

COLLAPSING THE ALERT PANE

The small minimize icon shown below the alert pane maximize button can be used to collapse the alert pane. When collapsed the alert pane will be shown as a single button (bearing an **i** icon) to the far right of the workspace tabs. If there are any unread alerts, the will be displayed next to this button.

FLOATING ALERT WINDOW

In the context menu the alert window can be shown as a floating window. It is possible to open up to ten floating windows which duplicates all alerts triggered by the application, indicators, tools and strategies. The floating window can be positioned freely. The position and the size of a floating window are saved and will be restored.

OUTPUT WINDOW

Output area in the workspace showing compiler errors

The tab labeled "Output" contains the output of Equilla's **Print()** command and also the errors and warnings generated by the Equilla compiler. The text box at the top allows filtering of its entries to show only matching lines.

The output window contains a maximum number of 100,000 entries. If you need a larger number of entries, you can edit the file tse.ini in the application data folder of Tradesignal by adding a value up to 10,000,000 for the setting *MaxOutputMessage* in the *General* section. However be advised that increasing this number may negatively affect your performance.

↑   OUTPUT AREA SHOWING COMPILER ERRORS
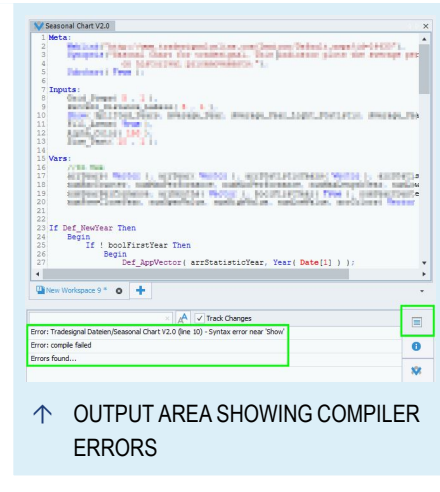
ALERTS IN TRADING SYSTEMS

General alerts for trading systems are set in "Tradesignal Options" on page 319. Additional settings are available in the"Settings" on page 157.

ALERT FUNCTIONS IN INDICATORS

Many indicators included in the software are equipped with an alert functionality. As default, the alerts are deactivated. However, you can switch on the alerts in the "Mini Toolbar" on page 45 via setting the option **ShowAlerts** to Yes. As of that moment, signals like line crossing or extremes are reported as alerts.

↑   ALERTS IN SETTING
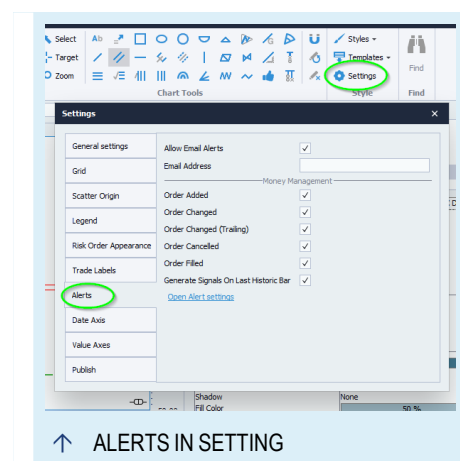
ALERT FUNCTIONS IN MONEY MANAGEMENT

The Money Management alerts in four different situations:

→ Order added

→ Order changed

→ Order cancelled

→ Order filled

The alerts are reported by the trading system.

ALERT FUNCTIONS IN CHART TOOLS ALARM

For tools please enable the alerts also in the "Mini Toolbar" on page 45.

↑ ALERT MODE OPTIONS

SET AN ALERT MODE

For the chart tools trend line, trend channel, regression channel, stop line and Fibonacci Retracement, the following alert modes are available:
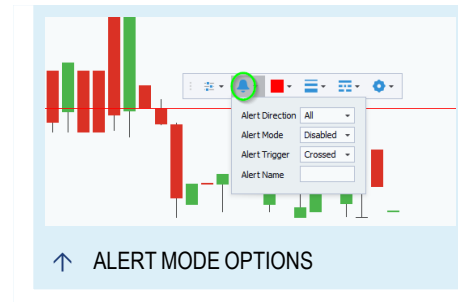
Always An alert is always set off when the condition is met, e.g. a line crossing. In realtime operation, this can result in multiple alerts from the same tool, if the stock crosses the line several times.

Once Per Bar An alert is only set off once per Bar. For example, if the price crosses the threshold several times during the period, only one alert is issued and all others are ignored. Once a new Bar has been created, a new alert will be issued when the condition is met.

Once An alert is set off only the first time the condition is met. All other events are ignored.

SET AN ALERT DIRECTION

You can also set an alert direction for the chart tools to define in which "direction" the crossing has to take place to set off an alert.

All Alerts are set off no matter whether the lines are crossed downwards or upwards.

Support (downwards) Alerts are only set off in the case of a downwards crossing.

Resistance (upwards) Alerts are only set off in the case of an upwards crossing.

SET AN ALERT TRIGGER

You can define when the alert should be triggered.

Crossed An alert is triggered when the price crosses the tool.

Hit or Crossed An alert is triggered when the price crossed or hits the tool.

Break-in / Break-out *(only available for channel type tools)* An alert is triggered when the price breaks into/out of the tool's channel.

GLOBAL ALERT SETTINGS IN TRADESIGNAL

In the "Tradesignal Options" on page 319, you can define several global settings for the alert output, like an E-Mail address or the behavior for each type of alert. For this, open the file menu and select the "Tradesignal Options" on page 319.

↑   ALERT OPTIONS IN TRADESIGNAL

EMAIL ALERTS

You have the option to enable or disable email alerts:
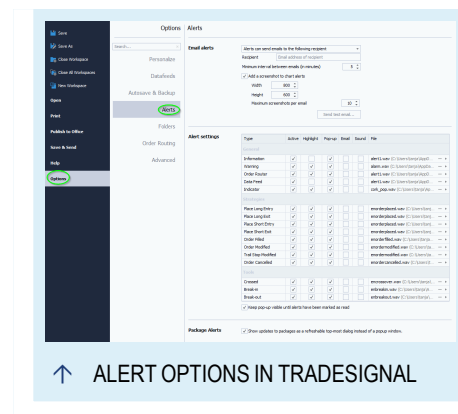
Alerts can send emails to the following recipient Tradesignal will send an email in case an alerts occurs.

Alerts must not send emails Tradesignal will not send an email in case an alerts occurs.

Recipient The email address email alerts will be sent to.

Minimum interval between emails (in minutes) The minimum time between email alerts.

Add a screenshot to chart alerts Tick the checkbox if you want to include screenshots in email alerts.

Width/Height The dimensions of the screenshots.

Maximum screenshots per mail The maximum number of screenshots allowed in a single email.

ALERT SETTINGS

Active Here you can enable or disable alerts of this type.

Highlight With this option enabled, alerts are highlighted in the alert window and if **Pop-up** is enabled too, the pop-up window will not close automatically.

Pop-up If this option is enabled, the alert is displayed in a special pop-up on the bottom of your screen. If **Highlight** is also enabled, the pop-up will be shown until closed, otherwise it will hide after a short amount of time.

E-mail Enable this to send an E-Mail when an alert of this type is triggered. It is only sent when **Send an E-Mail when an alert occurs** is enabled.

Sound Here you can select whether an alert sound shall be played for each alert. Click on ... to choose a different sound file from a file dialog. To preview the sound, click on the triangle button.

Keep pop-up visible until alerts have been marked as read If unselected, the pop-up will hide after a short amount of time.

PACKAGE ALERTS

Show updates to packages as a refreshable top-most dialog instead if a popup window. If selected, updates to packages are shown as top-most dialog.

PACKAGE AND FILE MANAGEMENT

Packages correspond to folders on the computer and offer some additional functions for organizing and managing your data.

You can use packages for the following:

- → Setting up a folder structure in the Tradesignal data folder
- → Sharing data with other users
- → Saving data for backup
- → Export Data

The following data can be saved in a package:

- → Indicators
- → Strategies
- → Functions
- → Templates
- → Saved workspaces

Packages are compressed on export to reduce the file size. Equilla functions are automatically added to the package if necessary.

When working with packages, please remember that they correspond to physical folders on your computer. Therefore, you can - by intention or by accident - rename, move or delete these folders with a program like the Windows Explorer. The result of such actions may be that the packages are no longer visible in the package management of Tradesignal. As long as the folders still exist, however, you can set up packages again, see the section "Package Management in the Tradesignal Options" on page 337.

NEW PACKAGE

→ In the toolbox, click on **New Package** in the area Related Tasks to set up a new, empty package. A file dialog appears in which you can either choose an existing folder or set up a new one via the button **New Folder**.

→ Alternatively, you can set up a new package by way of its contents, as shown in the following example.

EXAMPLE: SETTING UP NEW INDICATORS IN A NEW PACKAGE

01. Click the button Indicators in the "Toolbox" on page 49.

02. Click on New Indicator in the Related Tasks area. The Create Item Wizard opens.

03. Choose the option Download an existing indicator from Tradesignal Online.

04. Select one or more indicators.

05. Confirm with the button Done.

06. Either save the new indicators in an existing package or in a new one by clicking the button **New Package**. Start a new package.

Tradesignal sets up a new folder in which it saves the downloaded indicators. The new folder can be managed with the package and folder management in Tradesignal and also with the normal folder functions of the Windows file system.

SHOW AND HIDE PACKAGES

With the help of packages you cannot only set up a file system with a subfolder structure, but also organize the contents of the toolbox windows. For the latter, however, the packages have to be displayed.

You can toggle the package display by clicking on **Show/Hide Packages** in the Related Tasks area.

→ If packages are shown, the objects (indicators, strategies, workspaces or Equilla functions) are sorted by packages. This is of little importance as long as you are only using the packages provided by Tradesignal.

→ If packages are hidden, all objects are listed alphabetically without any further breakdown.

MOVE PACKAGE CONTENTS

You can move contents like indicators or functions between packages. For this, the packages have to be displayed.

01. Open a tool window in the toolbox, for example *Indicators*.

02. Select an entry in the list and drag and drop it from one folder to the other.

The entry (e.g. the indicator) is moved between the Tradesignal packages as well as physically between the folders on the computer.

EXPORT OR MAIL PACKAGES

Packages can be exported. During export, the folder with all its contents (workspaces, indicators etc.) and all necessary Equilla functions is saved as a compressed file. You can then use this file as a local backup or mail it to other users for sharing.

↑ EXPORTING PACKAGES

01. Select *File > Options > Folders > Packages > Export Package file*. *A dialog opens.*

02. In the *Choose Package* area to the left, select the folder to be exported. The list will show all folders that are registered by Tradesignal. (It is possible that folders below the main folder Tradesignal Files will not be shown because they were hidden in the package management, see below.)
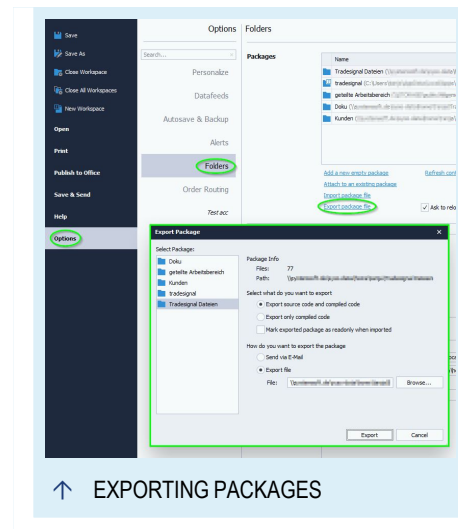
SET THE EXPORT OPTION

Select what you want to have exported:

Export source code and compiled code Select this option if the source code should be included, e.g. when sharing the package content with another user.

Export only compiled code Select this option if the source code should not be included upon export, e.g. if you want to share the data with other users without giving them access to the original source code.

Make exported packages read-only when imported If you select this option, the contents of the package cannot be edited after import.

SET THE EXPORT ROUTE

Send via E-Mail If you select this and then click the Export button, your default mail program will be opened and the file will be attached to a new mail.

Export file Select this if you want to save the file to your computer. '''

Browse and selecting another one (or changing the file name). Click the Export button to start the export.

IMPORT PACKAGE

An exported package can be imported into Tradesignal. For this, the package file has to be available on the hard drive of your computer or on a removable storage drive that can be accessed from your computer.

↑ IMPORTING PACKAGES

→ You can import a package by double-clicking on it in Windows Explorer. (If you received the package as an E-Mail attachment, you can either save it on your desktop or import it directly into Tradesignal by double-clicking on it.)

→ Alternatively, you can select *File > Options > Folders > Packages > Import package file*. Select the package file in the file dialog and confirm the import.
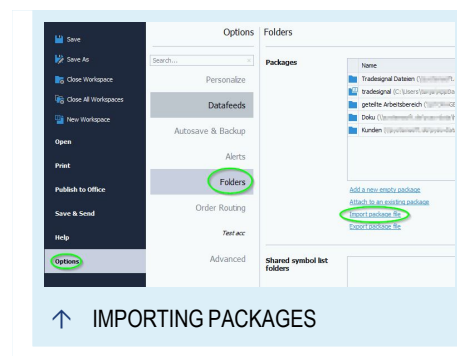
The program then decompresses the data in the package file and creates a new folder with the package name below the main folder Tradesignal Files. The new folder will appear in the toolbox window and the package management.

PACKAGE MANAGEMENT IN THE TRADESIGNAL OPTIONS

Tradesignal offers you several functions for the management of packages.

To access these functions, navigate to *File > Options > Folders > Packages*.

You have the following options:

Add a new package Here you can add a completely new package.

↑ PACKAGE MANAGEMENT

Attach to an existing package Access a previously hidden package. In this case, a file dialog opens in which you can find and select the package.
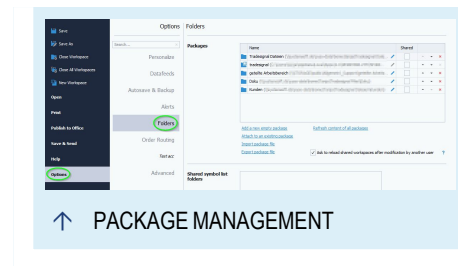
Remove If you select a package and click the **X** next to it, you can either choose

Remove this package, but leave its contents untouched so that other users can still access them In this case the package is only removed from the folder structure in Tradesignal but the physical folder is still available.

Remove this package and permanently delete its contents In this case, all data will be removed from Tradesignal and also physically deleted from the hard drive.

Rename Select the package a click the edit (pen) icon. The function renames both the package and the folder on the hard drive.

Move up/Move down With these buttons you can change the folder sequence in Tradesignal. Note that if you have functions/indicators/strategies of the same name in different folders, changes in sequence may have effects on the processing order. When compiling an indicator/strategy, Tradesignal tries to find the necessary functions/indicators in the same package. If they cannot be found there, all packages are searched according to the given sequence, and the first find is used for the compilation.

Shared Tick this check box to enable notifications in case files are added, removed or modified by another user. In combination with the checkbox *File > Options > Alerts > Package Alerts > Show updates to packages as a top-most dialog with refresh option* this allows you to refresh packages as soon as they are updated.

If a change to a shared folder is detected a dialog window will be displayed. This dialog window will contain information on the detected changes as well as an option to update packages in the toolbox and/or affected workspaces.

Refresh contents of all packages The contents of the package folders are checked by Tradesignal only upon start. Therefore, if Tradesignal is running and files are changed outside of Tradesignal (added, renamed, or deleted), you need to click **Refresh** so that the package contents are updated in Tradesignal. This is especially important in cases such as:

→ While Tradesignal was running, you received a workspace attached to an E-mail and saved it into a package folder.

→ You are working with packages on a network drive and other users changed the package contents.

Ask to reload shared workspaces after modification by another user Tick this check box to enable notifications in case an open workspace from a shared package is modified by another user. Notifications will show an option to automatically update the open workspace. If the user decides to reload the modified shared workspace the currently open version of the workspace will be closed an reopened with the new changes.

> **Note:** Any modifications by the user will be lost if a copy of the workspace is not saved before reloading.

> **Note:** Updating an open workspace will discard any scroll positions and/or other local changes.

> **Tip:** You can find the **Refresh** function also in the context menu of packages in the toolbox.

> **Tip:** You can also create, rename or delete packages in the *Open* dialog. You can call up this dialog by opening the file menu and selecting **Open**, or by pressing the key combination **Ctrl + O**.

SHARING WORKSPACES

Tradesignal allows you to share workspaces with other users and automatically subscribe to changes made to them.

> **Note:** In order for workspaces to be shared, they must be included in a folder designated as a shared folder.

To add a shared folder, proceed as follows:

01. Go to *File > Options > Folders > Shared symbol list folders*.

02. Click **Add a shared symbol list folder**.

03. Select the folder on your network drive which contains the symbol list.

04. Click **OK**.

The selected folder is now designated as shared. You will automatically be notified of any changes made to workspaces contained in it and any other shared folder.

PRINT

Your charts, strategies, indicators or Equilla codes do not have to be limited to your computer. All documents can be published right out of Tradesignal (as printouts or files), for example in Internet forums, print media or by E-Mail. In the other direction, it is also possible to import documents in Tradesignal from Internet forums or by E-Mail .

This way, you can exchange content with friends, colleagues and supervisors and work on Equilla code together, for example.

For exchanging complete packages, please see the chapters "Export or Mail Packages" on page 336 and "Package and File Management" on page 334.

PRINTING CHARTS AND TABLES

You can print all documents (Charts, Scanner, Watchlist, Equilla code etc.). Click on the **Print** button in the File menu. The Print Wizard opens. Here you can choose what in the currently selected workspace should be printed.

After selection, a Print Preview pane opens. Here you have the following options:

Print Start the printing. The standard Windows printer dialog opens.

Copies Number of copies of the workspace to print.

Printer The printer to which to print.

↑   PRINT OVERVIEW
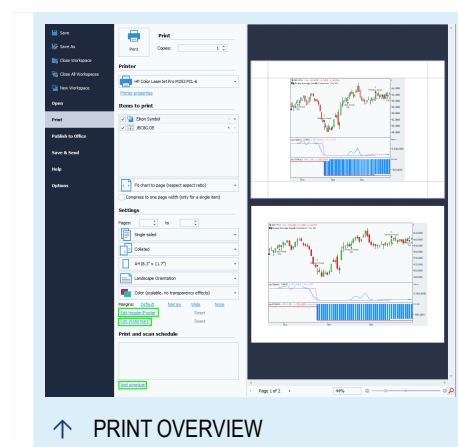
Printer Properties Advanced configuration of the selected printer.

Items to Print List of items in the workspace to print (including an extra page containing the workspace as a whole. The items are printed in the order listed. The arrow buttons can be used to change the print order of the items.

Chart Scaling Determines how charts should be scaled to fit the printed page.

Compress to one page width (only for a single item) When you have selected only one item, this option leads to a horizontally fit print output. This feature is of particular use when printing wide grid-based items like watchlists with many columns.

Pages Enter page numbers if only a certain range should be printed.

Duplex Mode Depending on the duplex/simplex capabilities of the printer.

Collation Options to control how pages are collated.

Paper Size Selection of the paper size.

Orientation Portrait or landscape.

Color Mode Select whether the document should be printed in Full Color (with transparency) (24 bit RGB with alpha channel), Full Color (without transparency) (24 bit RGB without alpha channel) or as Black and White. If the image is scaled on your printer (e.g. into a larger format), select Full Color (without transparency) for better results.

Margins Some predefined margin options. Margins can also be manually adjusted using click and drag directly in the preview pane.

Edit Header/Footer Shows the *Header and Footer* dialog where text and various macros can be set for the page header and footer. The alignment of text and font can also be changed. The following macros are available:

Document title

Page Number

Page Count

Print Date

Print Time

Print User

↑ EDITING THE HEADER/FOOTER

Edit Watermark Show the *Watermark* dialog where a watermark based on text or an image can be specified for each page on the printed output. The *Watermark* dialog presents many options to configure how the watermark is displayed, including

↑ EDITING THE WATERMARK

Text, Text direction, Font, Color and Size

Image file and alignment

Translucency

Positioned in front or behind

Page range to apply watermark to

For a chart and performance report, you can find additional print-out options in the toolbox, category **Publish**. You can change the axes' colors and the header.

The print options selected for a workspace will be remembered following printing. General options for printing (including setting a standard watermark and header/footer) are available in the options under *File > Options > Personalize > Printing*.

PRINT AND SCAN SCHEDULE

If you want to print documents on a regular basis, e.g. an overview of important indexes every morning, you can use the scheduling function of Tradesignal.

To be available for this function, the documents have to be saved as a package in workspaces. If the documents are not found there, either the wrong documents or none may be printed. We recommend that you test each print schedule after its set-up.

Set up the print schedule via

File > Print > Print and scan schedule > Add new schedule

For details, see "Schedule Jobs" on page 349.
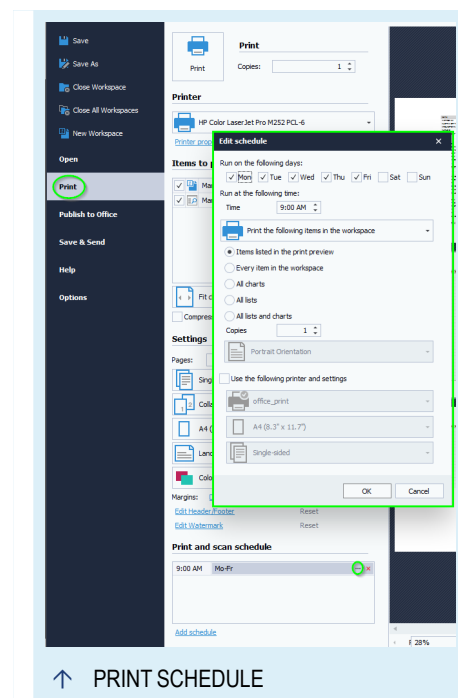
↑ PRINT SCHEDULE

PUBLISHING WITH THE WINDOWS CHART VIEWER

If you are often confronted with the task of creating publications with chart analysis, you can ease the work by using Tradesignal documents as Chart Viewer Object objects. This is a *Windows Object* that can be used in many programs, e.g. word processing.

In the following paragraphs, you can find the step-by-step instructions for MS Word (up to Word 2003) and MS Word 2007.

MS WORD (UP TO WORD 2003)

01. Open your word processor.

02. From the **Insert** menu, select the **Object** entry.

03. From the list of objects, select **Tradesignal Chart Viewer**.

04. Right-click on the newly appearing border in the text document.
    The context menu opens.

05. From the context menu, select **Tradesignal Chart Viewer Object** and then select **Properties** from the submenu.

Here you have to enter the package in which the requested workspace is saved. For example:

→ Package: Tradesignal Files

→ Workspace: Chart Nasdaq

You can edit the format of the graph by editing the height and width. It is possible to enter more than one chart in the new document.

Save your document, e.g. as a template for your analysis. The name and folder can be freely chosen.

When you open the document again, the following steps are necessary to update the graph.

01. Start Tradesignal.

02. Right-click in the graph in your document (e.g. in MS Word) to open the context menu.

03. In the context menu, select the **Properties** of the **Chart Viewer**.

04. Click on **Update** and then on **OK**.

The chart is now refreshed with the data given by Tradesignal.

MS WORD 2007

When using MS Word 2007, the *Developer* tab has to be available. If this is not the case, proceed as follows:

01. Click on the **Microsoft Office** button and then click on **[program] Options**. The program is the name of the current program, i.e. "Word".

02. Click on **Popular** and check **Show Developer Tab** in the Ribbon.

03. Click on the tab **Developer**.

04. In the controls, select **Legacytools**. Then, under **More Controls**, select **Tradesignal Chart Viewer**.

05. In the configuration window, enter the package in which the requested workspace is saved.

For example:

→ Package: Tradesignal Files

→ Workspace: Chart Nasdaq

You can edit the format of the graph by editing the height and width. It is possible to enter more than one chart in the new document.

Save your document, e.g. as a template for your analysis. The name and folder can be freely chosen.

When you open the document again, the following steps are necessary to update the graph.

01. Start **Tradesignal**.

02. Right-click in the graph in your document (e.g. in MS Word) to open the context menu.

03. In the context menu, select the **Properties** of the **Chart Viewer**.

04. Click on **Update** and then on **OK**.

The chart is now refreshed with the data given by Tradesignal.

MS WORD 2010+

When using MS Word 2010 or above, the *Developer* tab has to be available. If this is not the case, proceed as follows:

01. Click on the *File tab* on the toolbar and then click on **Options**.

02. Click on **Customize Ribbon** and in the box on the far right that lists all ribbon tabs, check the option labelled **Developer**, then click **OK**.

03. Click on the tab **Developer**.

04. Ensure design mode is active by clicking on **Design Mode** button in the *Controls* group if it is not highlighted.

05. In the *Controls* group, select **Legacy** Tools. Then, under **More Controls**, select **Tradesignal Chart Viewer**. The chart viewer object will be inserted into your document.

06. Right-click on the inserted object and select *Tradesignal Chart Viewer Object > Edit* to show the *Properties* dialog.

07. In the *Properties* dialog, enter the package in which the requested workspace is saved.

For example:

→ Package: Tradesignal Files

→ Workspace: Chart Nasdaq

You can edit the format of the graph by editing the height and width. It is possible to enter more than one chart in the new document.

Save your document, e.g. as a template for your analysis. The name and folder can be freely chosen.

When you open the document again, the following steps are necessary to update the graph.

01. Start Tradesignal.

02. Right-click in the graph in your document (e.g. in MS Word) to open the context menu.

03. In the context menu, select the **Properties** of the **Chart Viewer**.

04. Click on **Update** and then on **OK**.

The chart is now refreshed with the data given by Tradesignal.

Note: ActiveX Objects and Add-Ins from third-parties, will generally not work with 64-bit versions of Microsoft Office.

PUBLISH TO OFFICE

The Publish to Office capability lets you add charts contained in your workspaces to Microsoft® Word, Microsoft® Excel and Microsoft® PowerPoint documents. Changes made to charts will automatically reflect in the respective documents. This feature is especially useful when including charts in publications or presentations. Please be aware that the folder where the workspace is saved has to be added to the packages, see "Package and File Management" on page 334.

Note: This feature only supports 32-bit and 64-bit versions of Microsoft® Office 2013 and Microsoft® Office 2016.

ACCESSING THE PUBLISH TO OFFICE FEATURE

01. Open the *File* menu.

02. Click **Publish to Office**.

THE PUBLISH TO OFFICE INTERFACE
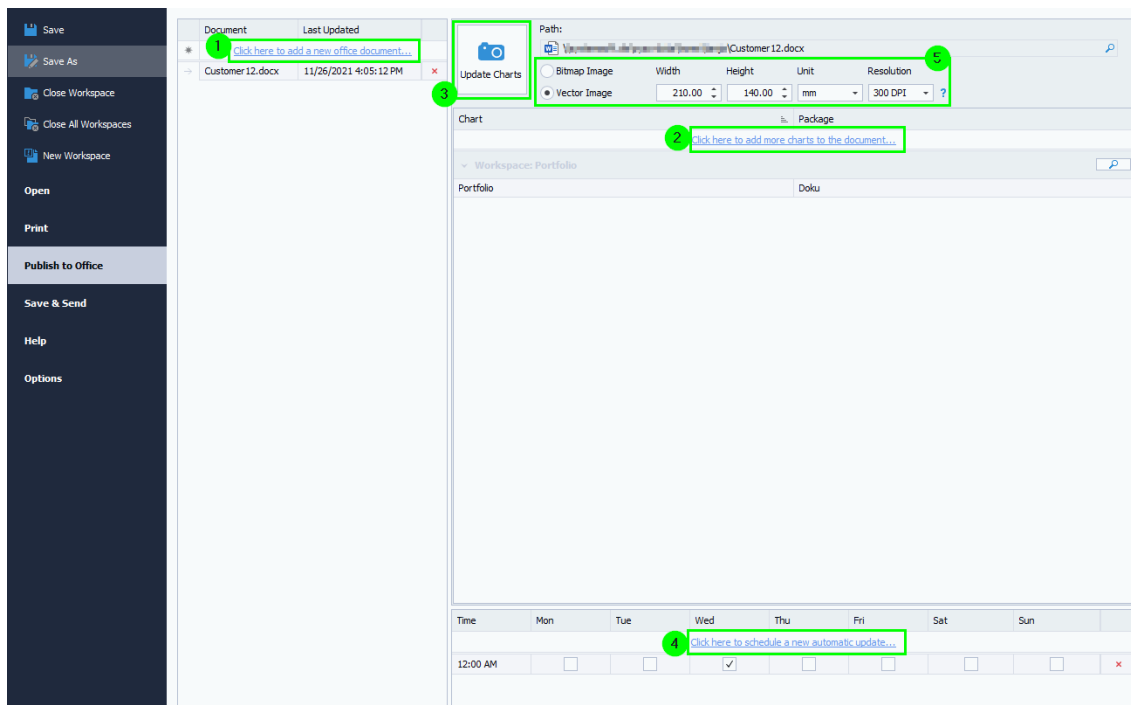
ADDING CHARTS TO A NEW OFFICE DOCUMENT

01. In the *File* menu, click **Publish to Office**.

02. Click **Click here to add more Office documents** in the *Document Pane* (1).

03. Select **Create new Office document**, then click **Next**.

04. Select the document type (Word, Excel or PowerPoint) you wish to create, enter a name for the document and specify a storage location (folder) for the document, then click **Next**.
    The Publish to Office Document Wizard opens. It shows charts in open workspaces.
    The new Office document opens in a new window. This may be behind the currently open window.

05. From the wizard, drag-and-drop the charts you wish to publish to the newly created document.

06. Click **Finish**.

ADDING CHARTS TO AN EXISTING OFFICE DOCUMENT

01. Select the document to which you want to add charts in the *Document Pane*.

02. Click **Click here to add more charts to the document** (2) in the *Workspace Pane*.
    The selected Office document opens in a new window. This may be behind the currently active window.

03. Drag-and-drop the charts you want to add to the document.

04. Click **Back** or save the document from the Office application to finish the process.

ADDING MORE CHARTS TO A KNOWN DOCUMENT

01. In the *File* menu, click **Publish to Office**.

02. Click **Click here to add more Office documents** (2).

03. Select **Add to an existing Office document**, then click **Next**.

04. In the file explorer, select the document to which you want to add charts, then click **Open**.

The selected Office document opens in a new window. This may be behind the currently active window.

05. From the dialog window, drag-and-drop the charts you wish to publish to the newly created document.

06. Click **Finish**.

UPDATING CHARTS

UPDATING CHARTS MANUALLY

Note: Updating documents while the data feed is interrupted will produce empty charts.

To update charts after editing a document, proceed as follows:

01. In the *Document Pane*, select the Office document containing the charts you want to update.

02. Click **Update Charts** (3) in the *Workspace Pane*.

SCHEDULING AUTOMATIC UPDATES

Note: Tradesignal needs to be running in order for the charts to be updated automatically.

01. In the *Document Pane*, select the Office document for which you want to schedule automatic updates.

02. Click **Click here to schedule a new automatic update** (4) in the *Scheduling Pane*.

03. Tick the corresponding check box for each day on which you want to trigger automatic updates.

04. Specify a time of day at which the update should be triggered by entering the desired time into the input box.

Tip: An overview of scheduled jobs can be accessed by clicking on the Scheduled Jobs Button 📇 on the top-right of the application's title bar.

SPECIFYING IMAGE DIMENSIONS FOR CHARTS

The width and height settings can be used to modify the size of the images that are generated before being inserted into the Office document. Changing the width and height does not change the size of the image in the document. This can only be done by resizing it directly within the Office application.

> **Tip:** Setting the width and height to a value much larger than displayed in the Office document will show more information in the chart, but the image will lose some sharpness.

01. In the *Document Pane*, select the Office document for which you want to specify image dimensions for charts (5).

02. Enter the desired image dimensions into the input fields.

The new image settings will be applied to the next publishing procedure.

DELETING DOCUMENTS

To delete a document, click on the **Delete** Button ⊠ next to the document name in the *Document Pane*.

SCHEDULE JOBS

In Tradesignal, four job types can be scheduled. Depending on the desired jobs, start the scheduling from the following starting points:

Print: *File > Options > Print > Print and scan schedule > Add new schedule*

Scanner, Chart, Correlation Matrix: *Ribbon > Start Scan > Schedule Scan*

Optimizer: *Ribbon > Start Optimizer > Schedule Optimization*

The prerequisite for scheduling is that the activities to be scheduled have to be saved as a package in workspaces. We recommend that you test each schedule after its set-up.
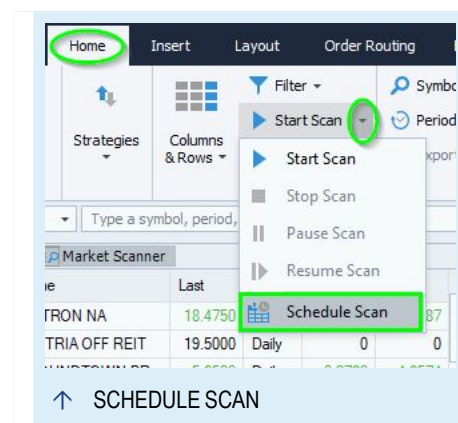
OPTIONS FOR SCHEDULED JOBS

When the *Edit Schedule* dialog is displayed, the following options are available.

Days On which days of the week the job should run.

Time At which time to print. To run a job at multiple times on the same day, add a second schedule.

Dropdown selection for the job type

Relevant only for print schedules:

Items to print This option offers various ways to print different items in a workspace

Items listed in the print preview

Every item in the workspace

All charts

All lists (Watchlists, etc.)

All lists and all charts

Copies How many copies of the document to print.

Orientation When not using the normal print settings, it is also possible to set the orientation for printing.

Use the following printer and settings If you want to use another printer as usual, set up the printer, sheet size and side options here.

Click **OK** to save the schedule settings.

↑ EDIT SCHEDULE FOR PRINT JOB
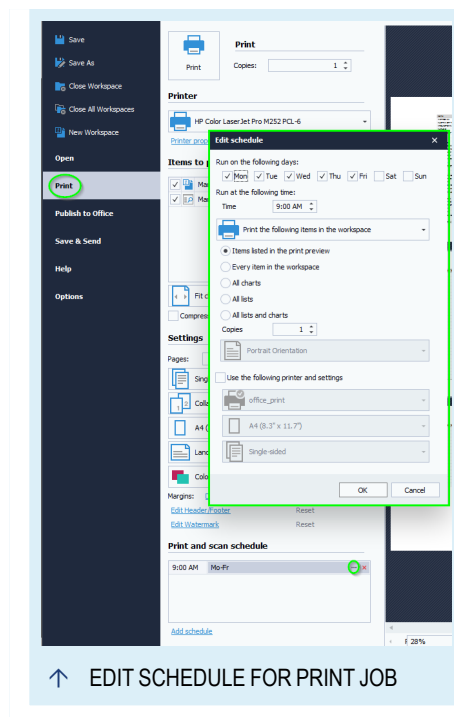
MANAGING EXISTING SCHEDULES

Existing schedules for a workspace can be recognized by the "Jobs scheduled" icon on the top right next to the connection status.

Move the mouse over the icon to see the job information (number of jobs for which workspace, next run).

Click on the job information so see the full list. At the right of each job, you can click on [**...**] to edit the job or on [**x**] to delete the scheduled job.

↑ JOBS SCHEDULED FOR THE WORKSPACE

↑ SCHEDULED JOBS WINDOW
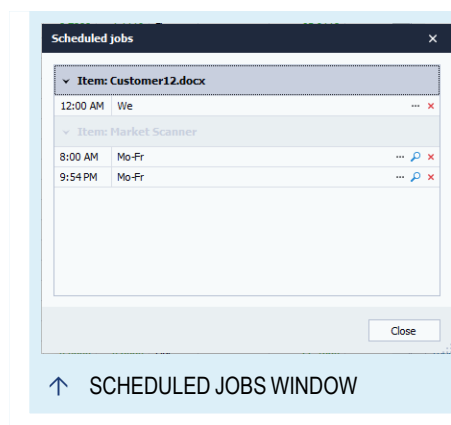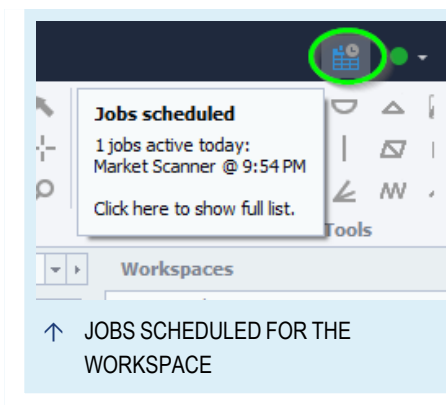
SAVE & SEND

SENDING A WORKSPACE BY EMAIL

You can send workspaces via Email right out of Tradesignal.

↑ SENDING WORKSPACES BY MAIL

01. Click *File > Save & Send > Send Using Email* .
     The E-Mail wizard opens.

02. Select whether to include a preview image of the workspace.

03. Click **Send Email** to open a new email and attach the workspace.
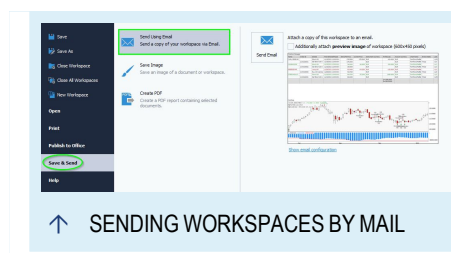
SENDING EQUILLA SCRIPTS VIA EMAIL

To send an Equilla script and its dependent function files via email:

01. Open the desired Equilla script.

02. Select *Editor > Export > Send by Email* on the "Toolbar" on page 42.

The Email client with attached portable script file and a code preview opens.

IMPORTING WORKSPACES OR EQUILLA CODE FROM AN EMAIL

When you received an E-mail with Tradesignal documents, you can import them into Tradesignal.

01. Save the E-mail attachment in a folder that is also a package in Tradesignal.

02. In Tradesignal, open the "Toolbox" on page 49.

03. With packages displayed, right-click on the package and select Refresh from the context menu.

When the display is refreshed, you can find the new documents in the package.

SAVING DOCUMENTS AS IMAGES

You can save the workspace as image, e.g. to use it later in text documents or E-Mails.

→ Click *File > Save & Send > Save*.

The Save Image pane opens. At the bottom of the pane you will see a preview of the image.

↑ SAVING DOCUMENTS AND WORKSPACES AS IMAGES
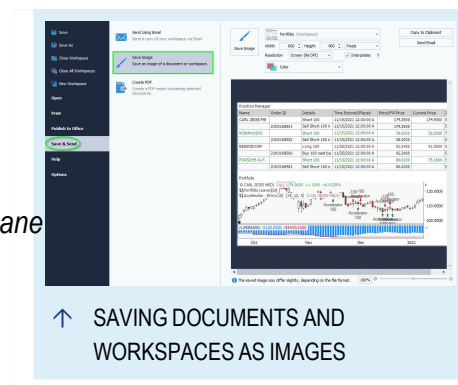
OPTIONS FOR SAVING AS IMAGE

→ Pick what you would like to save an image of, the entire workspace or a single element in it.

→ Enter an image size in pixels, inches or millimeters. Take care that the freely adjustable height and width of the image do not lead to distortion.

→ Select the Color Mode, either Color (color image with 24 bit RGB and alpha channel) or Black and White (no colors).

→ Select the resolution for the image. 96 DPI (dots per inch) is normal screen resolution, use higher resolutions if the image is intended for print output or zooming out using interpolation is intended.

→ Select whether to use interpolation. Interpolation will essentially render the image at the selected resolution, then scale it down to fit the desired dimensions. This will create a zoomed-out look to an image at the cost of some precision.

Finally, click on of the following buttons:

→ **Save Image** This saves the selected item as an image file. A new dialog opens. Choose the target folder and the file format. Six image formats are available: jpg, png, bmp, gif, tif and emf (emf is a scalable, vector format, although the generated image may not be identical to the preview).

→ **Copy to Clipboard** This generates a copy of the image in the Windows clipboard in bmp format.

→ **Send Email** Create the image in png format and attach it to a new email.

SAVING PDF DOCUMENTS

Any items that can be printed can also be saved as a PDF file. To save a PDF file, click on *File > Save & Send > Create PDF* to display the PDF preview pane.

The PDF preview pane present most of the same options that the print preview pane offers, and uses previously saved settings associated with a workspace.

↑ PDF WIZARD
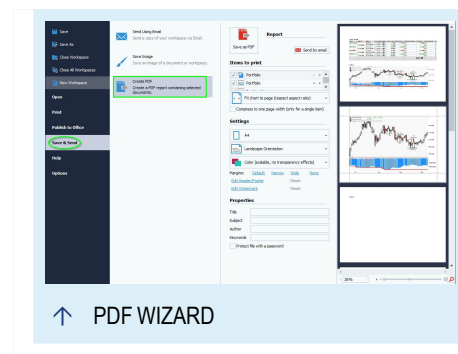
Save as PDF Save the PDF file.

Send by Email Create a PDF file and attach it to a new Email.

Items to Print List of items in the workspace to print (including an extra page containing the workspace as a whole. The items are printed in the order listed. The arrow buttons can be used to change the print order of the items.

Chart Scaling Determines how charts should be scaled to fit the printed page.

Paper Size Selection of the paper size.

Orientation Portrait or landscape.

Color Mode Select whether the document should be printed in Full Color (with transparency) (24 bit RGB with alpha channel), Full Color (without transparency)

(24 bit RGB without alpha channel) or as Black and White. If the image is scaled on your printer (e.g. into a larger format), select Full Color (without transparency) for better results.

Margins Some predefined margin options. Margins can also be manually adjusted using click and drag directly in the preview pane.

Edit Header/Footer Shows the *Header and Footer* dialog where text and various macros can be set for the page header and footer. The alignment of text and font can also be changed. The following macros are available:

Document title

Page Number

Page Count

Print Date

Print Time

Print User

Edit Watermark Show the *Watermark* dialog where a watermark based on text or an image can be specified for each page on the printed output. The *Watermark* dialog presents many options to configure how the watermark is displayed, including

Text, Text direction, Font, Color and Size

Image file and alignment

Translucency

Positioned in front or behind

Page range to apply watermark to

Document Properties Title, subject, author and keywords meta data that will be embedded in the PDF file.

Protect file with a password When checked and the PDF is saved, a dialog will be displayed where the following passwords can be set.

Password to open the PDF document

Password to edit the PDF document

Restrictions on printing

Restrictions on editing

Restrictions on copy portions of the file

COPYING DOCUMENTS VIA THE WINDOWS CLIPBOARD

If you want to transfer graphs and tables quickly to other documents, for example to further analyze the data, you can use the Windows clipboard. This way, you can copy a chart into a text document or copy the results of the Optimizer into a table. This copying also works with other tables or with Equilla codes. Instead of using the key combinations, you can also use the buttons in the Edit group of the toolbar.

COPYING CHARTS

01. In an active chart, press the key combination **Ctrl + C** to copy the chart.

02. Switch to the target document, e.g. publishing software.

03. There, press the key combination **Ctrl + V** to paste the chart.

   The chart is inserted in bitmap format.

If the target document is a table, for example in MS Excel, you can copy the price data as well as any indicators or strategies included in the chart into the Excel table. To do so, select the price data in Tradesignal and then drag the data into the Excel table with the mouse.

COPYING TABLES

01. Select the rows in the source table that you want to copy (the source may be a Scanner, Watchlist, Portfolio or Optimizer). To select all rows, press **Ctrl + A**.

02. Press **Ctrl + C** to copy the rows.

03. Switch to the target document, for example a Microsoft Excel table.

04. Press **Ctrl + V** to paste the table contents into the target document.

COPYING TEXT

01. Select the lines that you want to copy, either in an Equilla Editor, an HTML Editor or a News window. To select all lines, press **Ctrl + A**.

02. Press **Ctrl + C** to copy the lines.

03. Switch to the target document, for example a text editor, and press **Ctrl + V** to paste the contents.

WEB BROWSER

The scope of the stock market is not limited to one's own office. Information from all over the world has to be gathered and exchanged with other users or colleagues. To do so, Tradesignal offers you an integrated web browser. This way, you have access to the web contents of tradesignal.com and every other web page in the Internet. Use the web browser for

→ surfing the Internet

→ communicating in Internet forums

→ contacting the support staff

→ displaying web-based help contents

Tradesignal also offers an"HTML Editor" on the next page as a language interface to JavaScript. With it, many functions of the Tradesignal software can be controlled. You can program your own tools to make working with Tradesignal easier and faster.

For information about distributing content on the Internet, for example in forums, please refer to the chapter Publishing.

USING THE WEB BROWSER

→ In the Insert tab in the toolbar, click on the button **Web Browser**.

→ You can also open a web browser **by entering a URL in the command line** and **selecting New Browser** from the menu.

→ To replace an existing website, **enter the URL** in the command line and **select Replace Web Page** from the menu.

→ To navigate back and forth between sites, click on the small green arrows to the right of the entry field in the command line.

→ To close a browser window, either press **Ctrl + F4** or open the context menu of the tab and select the entry Close [window name...].

HTML EDITOR

Tradesignal possesses a built-in HTML editor. With it, you can do the following:

↑ HTML EDITOR

→ Use HTML code to design a GUI or control elements like buttons, lists or entry fields

→ Use active elements written in JavaScript (JS), for example to list all active workspaces. This way you can write control elements that use program functions of Tradesignal.
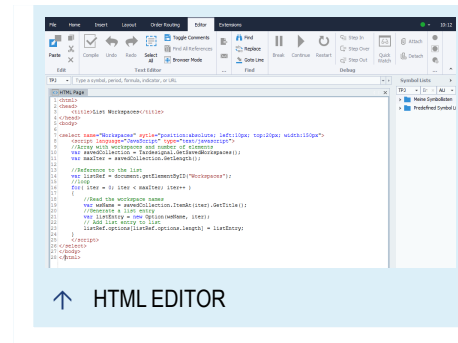
USE THE HTML EDITOR

→ On the **Insert** tab on the toolbar, choose **HTML Page**.

An editor window opens. In the toolbar, the Editor tab appears with the following buttons:

Undo Undo the last action (multiple undoes possible).

Redo Repeat the last action (multiple repeats possible).

Select All (Ctrl+A) Selects all code. You can use the standard Windows key commands to copy the code with "Ctrl+C" and then paste with "Ctrl+V", e.g. into a text editor.

Toggle Comments Switches between commenting/uncommenting the selected lines using HTML comment syntax.

Browser Mode Interprets the HTML or JavaScript Code and displays the result in a browser. Click on it again to switch back to the editor.

SEARCH AND REPLACE

For editing the code, the Find group in the toolbar is available.

→ Click on **Find** to enter a search term in a search pane.

→ With **Replace** you can replace one or all appearances of a code text with another text.

→ For very long scripts, you can use **Goto Line** to jump to a code line.

JAVASCRIPT IN THE HTML EDITOR

JavaScript offers you a connection to the inner workings of Tradesignal. With JS and a number of interface commands it is possible to control various functions of Tradesignal. Here a list of possible script commands:

```
// Global variable to access the TSEPublic object, e.g.:
//
// var selectedWorkspace = TradeSignal.GetSelectedWorkspace();
//
TradeSignal

// The Tradesignal script root element, reachable with JavaScript by either
using window.external or the TradeSignal global variable
class TSEPublic
    // Returns a collection of all saved workspaces
    GetSavedWorkspaces() : TSEWorkspaceCollection

    // Returns a collection of all open workspaces
    GetOpenWorkspaces() : TSEWorkspaceCollection

    // Returns the currently selected workspaces
    GetSelectedWorkspace() : TSEWorkspace

    // Returns the last selected workspace, selected before the
    // current workspace was selected, this is useful for operating
    // on a target workspace from within an HTML page in another
    // desktop
    GetLastSelectedWorkspace() : TSEWorkspace

    // Returns the total RAM managed and used by Tradesignal
    GetTotalMemory() : int

    // Returns the current timezone set by the user in
    // Olsen format (e.g. Europe/Berlin)
    GetUserTimeZone() : string

    // Returns the current version number of Tradesignal (x.y.z)
    GetVersion() : string

    // Like the Bang! Command !new
    Create( whatToCreate : string, parameters : string ) : TSEDocument

    // Opens a new chart and returns it with an instrument
    CreateNewChart( symbol : string ) : TSEDocument

    // Opens a new chart with an instrument optionally allowing
    // the chart type and scale alignment to be set.
    // Use a parameter string of the form:
    //
    //   "charttype=line(open); scale=left; subchart=false"
    //
    // valid values for scale are left|right|both
```

```
    // valid values for charttype are:
    //     line(field), bar, candlestick, candlevolume,
    //     equivolume, symbol(field), stepped(field),
    //     area(field1, field2), forest(field), linkedforest(field),
    //     renko(field), pointfigure, heikinashi, kagi, tlb
    // valid values for subchart are true|false
    // valid values for field are open|close|high|low|volume|openinterest
    CreateNewChartEx(symbol : string, parameters : string) : TSEDocument

    // Opens a new Market Profile and returns it with an instrument
    CreateNewMarketProfile( symbol : string ) : TSEDocument

    // Opens a new chart and returns it with an indicator
    CreateNewInstantIndicator( equillaCode : string ) : TSEDocument

    // Opens a new chart and returns it with an indicator series
    CreateNewInstantIndicatorSeries( equillaCode : string ) : TSEDocument

    // Opens and returns a new webbrowser containing the given url
    CreateNewBrowser( url : string ) : TSEDocument

    // Opens and returns a new scanner with an instrument
    CreateNewMarketScanner( symbol : string ) : TSEDocument

    // Opens and returns a new workspace
    CreateNewWorkspace() : TSEWorkspace

    // Passes the entered key string as the value of an additional
    // parameter called sessionkey that will be appended to all
    // TXML data requests to a server identified by the URL
    // parameter
    SetMixinDataSessionKey(url : string, key : string)

    // Shows the Tradesignal Help
    ShowHelp()

    // Shows the Equilla Help
    ShowEquillaHelp()

// A collection of workspaces. The collection is zero (0) based
class TSEWorkspaceCollection

    // Returns the workspace of a certain position in the collection
    ItemAt( index : int ) : TSEWorkspace

    // Returns the number of workspaces in the collection
    GetLength() : int

    // Returns the workspace with a certain name
    Find( workspaceName : string ) : TSEWorkspace

// An element representing a certain workspace in Tradesignal
class TSEWorkspace
```

```
    // Returns the workspace title
    GetTitle() : string

    // Returns true in case the workspace is open, otherwise false
    IsOpen() : bool

    // Returns true in case the workspace is included in the currently open
file list, otherwise false
    IsRecent() : bool

    // Returns true if the workspace was open at the last shutdown of
Tradesignal, otherwise false
    WasPreviouslyOpen() : bool

    // Opens the workspace or activates it, if it is already open
    Open() : bool

    // Closes the workspace; optionally other saving dialogs can be
suppressed
    Close( suppressDialogs : bool ) : bool

    // Like the Bang Command !new except that it selects the workspace first
    Create( whatToCreate : string, parameters : string ) : bool

    // Selects the workspace if it is open
    Select() : bool

    // Returns a collection of all documents in the workspace
    GetDocuments() : TSEDocumentCollection

    // Returns the currently selected document in the workspace
    GetSelectedDocument() : TSEDocument

// A collection of workspace elements (documents), the collection is zero
(0)
// based
class TSEDocumentCollection

    // Returns the document of a certain position in the collection
    ItemAt( index : int ) : TSEDocument

    // Returns the number of documents in the collection
    GetLength() : int

    // Returns the document with a certain name
    Find( wokspaceName : string ) : TSEDocument

// An object which represents an element in the workspace, this could be
// a Chart, Browser, Scanner, etc.
class TSEDocument

    // Returns the document name
    GetDocumentTitle() : string
```

```
    // Returns the name of the selected element in the document
    GetSelectedItemTitle() : string

    // Returns the document type: Chart, Browser, TextEditor,  PriceEditor,
    //MarketProfile, MarketScanner, WorkspaceInterfaceScript, Statistics,
Trades or Optimiser
    GetDocumentType() : string

    // Selects the document
    Select() : bool

    // Selects the document and executes !replace
    Replace( itemToReplaceSelectedItem : string ) : bool

    // Selects the document and executes !replaceall
    ReplaceAll( itemToReplaceAllCurrentItems : string ) : bool

    // Selects the document and executes !add
    Add( itemToAdd : string ) : bool

    // Selects the document and adds an item optionally allowing
    // the chart type, scale alignment and subchart to be set.
    // Use a parameter string of
    // the form:
    //
    //   "charttype=line(open); scale=left; subchart=false"
    //
    // valid values for scale are left|right|both
    // valid values for charttype are:
    //    line(field), bar, candlestick, candlevolume,
    //    equivolume, symbol(field), stepped(field),
    //    area(field1, field2), forest(field), linkedforest(field),
    //    renko(field), pointfigure, heikinashi, kagi, tlb
    // valid values for subchart are true|false
    // valid values for field are open|close|high|low|volume|openinterest
    AddEx( itemToAdd : string, parameters : string) : bool

    // Selects the document and executes a setp property action,
    // valid property names and values are:
    //
    //   "period" - period in seconds (0 for tick, 86400 for daily)
    //   "dateaxismode" - normal|seasonal
    //   "historylength" - number of bars of data to load
    Set( propertyName : string, value : string ) : bool

    // Selects the document and executes sets the value for all
    // instruments in all subcharts, see Set() for available
    // properties
    SetAll (propertyName : string, value : string) : bool

    // Evaluates the Equilla Code and adds it to the document
    Eval( equillaScript : string ) : bool

    // Evaluates the Equilla Code Series and adds it to the document
```

```
EvalSeries( equillaScript : string ) : bool

// Selects the document and executes !close document
Close() : bool
```

EXAMPLE: LISTING ALL AVAILABLE WORKSPACES WITH JAVASCRIPT

In this tutorial we will design a simple JavaScript that will display a list of all available workspaces.

STEP 1: START A HTML PAGE AND ENTER THE PAGE FRAME

Open a new, empty workspace. Then on the **Insert** tab on the toolbar, choose **HTML Page**.

An empty HTML editor opens.

For a correct page frame, please enter the following source code:

```
<html>
<head>
    <title>List Workspaces</title>
</head>
<body>

</body>
</html>
```

STEP 2: ADDING THE LIST ELEMENT AND THE SCRIPTING AREA

Now copy the following line between the **Body** Tags:

```
<select name="Workspaces" style="position:absolute; left:10px; top:20px;
width:150px" >
</select>
```

The line includes the HTML code for the list with position and width values. When you now click on **Browser Mode** in the toolbar, you can see the new page with an empty list. Click on **Browser Mode** once more to edit the code again.

Now we can define the area for the JavaScript source code. Copy the following code into the line below the list. The code assigns the collection of all saved workspaces to a variable.

```
<script language="JavaScript" type="text/javascript">
    //Array with workspaces and number of elements
```

```
    var savedCollection = TradeSignal.GetSavedWorkspaces();
    var maxIter = savedCollection.GetLength();
</script>
```

STEP 3: DESIGNING AND TESTING THE JAVASCRIPT

In the upper part we have set up a HTML page and the basis for a JavaScript. The list of workspaces was copied into a variable. To be able to read out the list later, we need the number of included elements. This value is also saved as a variable.

In the following script, a reference to the list is set, so that we can add a list entry for every workspace in the collection. To read out the collection, we need a loop that runs over all workspaces. Add the following lines in the script area:

```
//Reference to the list
var listRef = document.getElementById("Workspaces");
//loop
for( iter = 0; iter < maxIter; iter++ )
{
    //Read the workspace names
    var wsName = savedCollection.ItemAt(iter).GetTitle();
    //Generate a list entry
    var listEntry = new Option(wsName, iter );
    //Add the list entry to the list
    listRef.options[listRef.options.length] = listEntry;
}
```

THE COMPLETE SCRIPT

Here you can see the complete code of the script.

```
<html>
<head>
    <title>List Workspaces</title>
</head>
<body>

<select name="Workspaces" style="position:absolute; left:10px; top:20px;
width:150px" >

<script language="JavaScript" type="text/javascript">
//Array with workspaces and number of elements
var savedCollection = TradeSignal.GetSavedWorkspaces();
var maxIter = savedCollection.GetLength();
//Reference to the list
var listRef = document.getElementById("Workspaces");

//loop
for( iter = 0; iter < maxIter; iter++ )
{
```

```
    //Read the workspace names
    var wsName = savedCollection.ItemAt(iter).GetTitle();
    //Generate a list entry
    var listEntry = new Option(wsName, iter );
    //Add list entry to list
    listRef.options[listRef.options.length] = listEntry;
}
</script>

</select>
</body>
</html>
```

To view the result, click on **Browser Mode** again. A list of all workspaces appears.

Note: You cannot save the HTML script itself, only the workspace in which it was created.

PYTHON MODULE EDITOR

Tradesignal possesses a built-in Python Module editor. With it, you can create, modify and view Python packages and modules.

Most standard text editor commands are supported, including Python syntax highlighting.

The Python modules can then be called in Equilla via the command "PyExec".

↑ PYTHON MODULE EDITOR
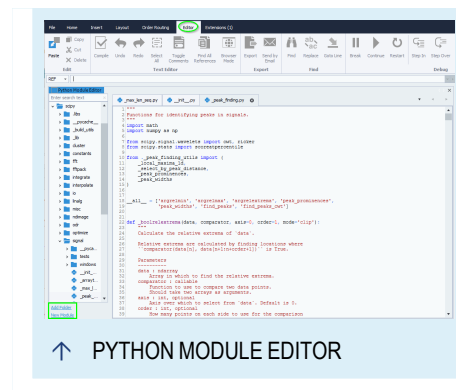
OPEN THE PYTHON MODULE EDITOR

→ On the **Insert** tab in the toolbar, choose **Python Module Editor**.

→ Alternatively, right-click on Python functions in the Equilla editor and select **Open in New Editor (F12)**.

The Python Module Editor opens. On the bottom left side, choose between:

Add Folder Open the file selection window to select a folder with existing Python modules. The folder and files are displayed on the left in

↑ PYTHON MODULE WITH DEMO CODE
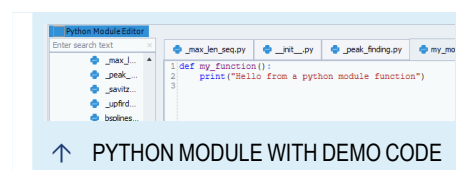
a tree view. (Note that the Python modules delivered with the application are read-only and can only be viewed, not edited.)

New Module Select a folder and enter a new file name. The mandatory file ending is .py. The code area for the new module opens on the right and code can be entered. When more than one module is opened, a tab is visible for each.

EDITING THE PYTHON CODE

When the editor is open, the Editor tab similar to the Equilla editor appears in the toolbar.

For details, see "Editing the Equilla Code" on page 400 and the keyboard shortcuts for "Programming and Debugging" on page 57.

EXAMPLE USAGE

→ Create a new Python module with the name "my_module" and the example code.

```
def my_function():
      print("Hello from a python module function")
```

→ Create a new function (see "Equilla Editor" on page 399) and enter the following code to import and call the module.

```
Once PyExec
      import my_module
End
```

```
If IsLastBar Then
      PyExec my_module.my_function()
End;
```

Tip: See the Equilla code of the Target Return Portfolio strategy on how to include Python modules.

NEWS

News is an important tool for the fundamental chartist to have at their disposal and can be accessed from Tradesignal either from a traditional news reader or as a study within a
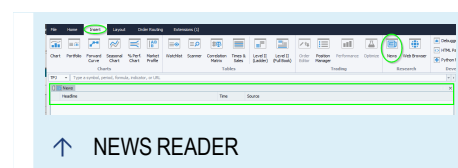
↑ NEWS READER

chart. Tradesignal allows you to view both realtime news from your data feed and also to subscribe to RSS sources available via the Internet or a local intranet.

The news reader uses a split display to show recent headlines in the top pane, and the selected story in the bottom pane. The window sizes can easily be adjusted by dragging the separator between the two panes.

Use the news tools to:

→ View realtime news as it happens

→ View current news for a specific security

→ View historic news in your charts

→ Connect to RSS feeds to view any event-based information

NEWS SETUP

You can view news stories in one of the following ways:

→ To view all recent news headlines, click on the **News** button in the Insert tab of the toolbar.

→ To view all headlines for a specific security, right-click on a security in a "Chart" on page 96, "Watchlist" on page 77, "Portfolio" on page 251, "Scanner" on page 71 or "Symbol Lists" on page 62 to show the context menu, then select the option **Open**, entry **News**.

→ To view news stories in a chart, drag and drop the **News** indicator from the toolbox onto a security in your chart.

LINKING THE NEWS READER TO A WATCHLIST OR CHART

If you want to link a news reader so that it displays relevant news depending on what is currently selected in a watchlist or chart, do the following:

01. Right-click on the tab above the chart or watchlist and pick a color under the Symbol Link menu.

02. Click on News in the Insert tab of the toolbar to display a news reader.

03. Right-click on the tab above the news reader and pick the same color link you chose in the chart or watchlist.

The headline list will now only show stories related to the selected item in the watchlist or chart.

To change the displayed headline, just select a new item in your watchlist, or replace the item in your chart.

WORKING WITH NEWS IN A CHART

By applying the news indicator to a security in a chart as described above, you will get a historic overview of headlines related to that security displayed as hyperlinks above the bar on which the news was published. Just click on one of the hyperlinks to open a news reader in which you will see the full news story.

The news indicator is written in Equilla using the news API. Programmers can make use of this API to create their own indicators or indeed trading strategies based around realtime news. Please refer to the Equilla help system within Tradesignal for more information on this API.

SETTINGS

The general properties are available via "Settings" on page 157 in the home tab.

FORMATTING OPTIONS

The following settings can be used to customize the news window to your preference:

Back color Change the background color for news headlines and stories.

Text color Change the text color.

Font size Change the size of the text in headlines and stories.

Show time Displays the time of the news story in the headline list.

Show source Displays the source (feed) of the news story in the headline list.

Browser alignment Display the headline list to the top, right, bottom or left of the news story pane.

Scroll to New Headline Enable to scroll to newest headline.

FILTER OPTIONS

Show All available news headlines; Headlines for a selected symbol; Stories for a given symbol on a specific day.

Symbol Displays the currently selected security for which headlines are shown.

Days How many days of headlines should be displayed.

Keyword Show only headlines containing the entered keywords.

RSS Feeds Displays how frequently (in seconds) the headlines from RSS feeds should be updated.

RSS FEED

RSS Feeds Displays how frequently (in seconds) the headlines from RSS feeds should be updated.

FUNCTIONS, INDICATORS AND STRATEGIES

INTRODUCTION TO FUNCTIONS, INDICATORS AND STRATEGIES

The hub of all analysis methods in Tradesignal is the available functions, indicators and strategies.

All three tools are written in "Equilla Basics" on page 397. This is a Tradesignal-specific programming language similar to Algol or Visual Basic. No programming knowledge is necessary as long as you use the delivered functions, indicators or strategies. However, if you are interested in programming, see the "Equilla Basics" on page 397 chapters for details.

TOOL CHARACTERISTICS

FUNCTIONS

→ Functions are subordinate portions of the code in which regularly used calculations and subroutines are sourced out. For example, instead of writing the code for the standard deviation again and again, the calculation is put into a function. By calling up the function by its name - and passing the relevant parameter(s) for calculation - the user receives the return value as a result.

→ A function cannot be applied to a chart directly.

Tip: You can find more information in chapter "Equilla Functions" on page 415.

INDICATORS

→ Indicators are mathematical calculations that can be applied to symbol data for technical analysis.

→ Indicators can be applied to charts or other indicators, watchlists, portfolios etc.

Tip: You can find more information in chapter "Using Indicators" on page 372.

STRATEGIES

→ Strategies combine the results of indicators with certain rules and conditions for signal generation, to help setting up a sophisticated trading system.

→ Strategies can be applied to charts, indicators, watchlists, portfolios etc.

Tip: You can find more information in chapter "Using Strategies" on page 381.

EXAMPLE VOLATILITY

→ The function "Volatility" calculates the standard deviation from the moving average of the close price.

→ The indicator "Volatility Ratio" uses the Volatility function over two different periods and then calculates the ratio of the two results. A Volatility Ratio above 0.5 signals a breakout.

→ The strategy "Volatility Ratio Breakout - Exit" combines the indicator with an Ehlers filter, so that long or short positions are closed depending on the development of the volatility.

EXAMPLE BOLLINGER BANDS

→ The function "BollingerBands" calculates a simple moving average and an upper and lower standard deviation as bands.

→ The indicator "Bollinger Bands" calculates and draws the resulting bands. In the mini toolbar, the parameters price (close, high...), period, and standard deviation can be edited.

→ The strategy "Bollinger Lower Band - Entry" combines the results of the indicator with entry signal generation.

EQUILLA CODE OF THE BOLLINGERBANDS FUNCTION

```
Meta:
    Synopsis( "[Bollinger Bands] Calculates the Bollinger band values for
the upper and lower deviation bands and the simple moving average and
returns them as output parameters. Bollinger Bands are an indicator that
allows users to compare volatility and relative price levels over a period
time. The three calculated values are designed to encompass the majority of
a security's price action. Sharp price increases or decreases (volatility)
will lead to a widening of the band. Consolidation will result to a thinning
of the bands." );
```

```
Inputs:
    Price( NumericSeries ),
    Period( NumericSimple ),
    StdDevs( NumericSimple ),
    RefMidBand( NumericRef ),
    RefUpperBand( NumericRef ),
    RefLowerBand( NumericRef );

Variables:
    distance, sumSqr, i;

RefMidBand = AverageFC( Price, Period );

sumSqr = 0;
For i = 0 To Period - 1 Do
    sumSqr = sumSqr + Sqr( Price[i] - RefMidBand );

If sumSqr > 0 And Period > 0 Then
    distance = Sqrt( sumSqr / Period ) * StdDevs
Else
    distance = 0;

RefUpperBand = RefMidBand + distance;
RefLowerBand = RefMidBand - distance;

BollingerBands = 1;
```

EQUILLA CODE OF THE "BOLLINGER LOWER BAND - ENTRY" STRATEGY

```
Meta:
    Synopsis( "Generates a long entry signal when the Close crosses over the
Bollinger Lower Band value, and/or generates a short entry signal when the
Close crosses under the Bollinger Lower Band value. Bollinger Bands are an
indicator that allows users to compare volatility and relative price levels
over a period time. The indicator consists of a moving average and two bands
drawn two standard deviations from the average. These three bands are
designed to encompass the majority of a security's price action. Sharp price
increases or decreases (volatility) will lead to a widening of the band.
Consolidation will result to a thinning of the bands." );

Inputs:
    Price( Close ),
    Period( 20, 1 ),
    StdDevs( 2.0, 0.0 ),
    EntryMethod        ( LongEntry, ShortEntry, Both ) = Both,
    Visuals( False );

Variables:
    longSig, shortSig, avg, upperBand, lowerBand;

BollingerBands( Price, Period, StdDevs, avg, upperBand, lowerBand );
```

```
longSig = ( Close Crosses Over lowerBand ) And ( EntryMethod <> ShortEntry
);
shortSig = ( Close Crosses Under lowerBand ) And ( EntryMethod <> LongEntry
);

If longSig Then
    Buy( "BollingerLWR" ) Next Bar at Market
Else If shortSig Then
    Short( "BollingerLWR" ) Next Bar at Market;

If Visuals Then
    DrawLine( lowerBand, "BollingerLowerBand", StyleSolid, 2 );
```

USING INDICATORS

Technical indicators are mathematical calculations based on securities and additional data. You can use indicators for

→ Signal generation in mechanical trading systems

→ Detecting trends in symbol charts

→ Supporting trading decisions

→ Supporting chart analysis

In Tradesignal, indicators are available which were developed based on material from various sources (publications, media or in-house development). For all indicators, additional information on the source, the calculation basis, the interpretation of results and the appliance is offered.

The indicators in Tradesignal are written in Equilla. You can find more information in the chapter "Equilla Basics" on page 397.

APPLYING INDICATORS

APPLYING INDICATORS TO CHARTS OR INDICATORS

You can apply an indicator to a chart (or an indicator) in various ways.

↑ INDICATOR VIEW IN THE TOOLBOX
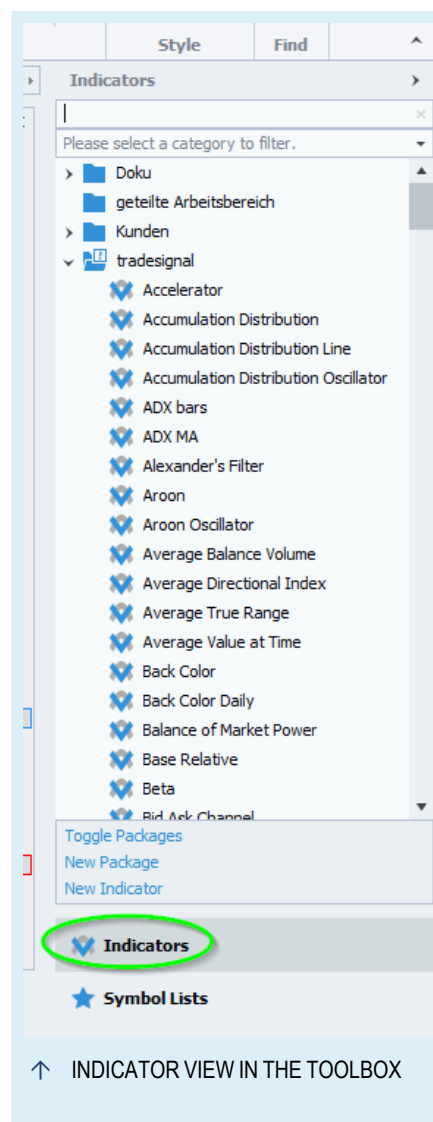
FROM THE INDICATOR LIST IN THE TOOLBOX

→ Drag-and-drop the indicator to the chart.

→ Double-click on the indicator.

→ Right-click on the indicator and choose Apply from the context menu.

Via the command line in the toolbar:

01. Enter a shortcode in the command line, for example "BBD".

02. Select the Add Indicator option in the drop-down menu.

↑ ENTERING A SHORTCODE INTO THE COMMAND LINE
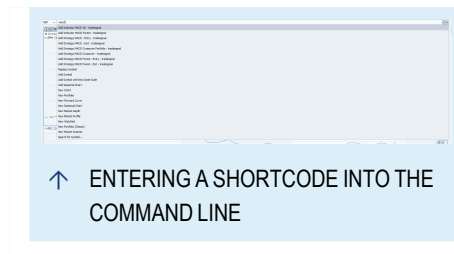
DATA INPUT SELECTION

If you apply an indicator which uses more than one data input, the *Data Input Selection* dialog (see image) is displayed. It allows you to select either an already existing chart object or to open a new symbol via the "Symbol Lists" on page 62 or "Symbol Search" on page 59. There also is an option to always display this dialog so you can apply indicators to symbols which are not themselves displayed.

APPLICATION RULES

→ The indicator is applied to the active chart or subchart, except when using drag and drop.

→ By default, indicators are applied to the top entry in the chart or subchart legend.

→ When you drag the indicator onto a certain entry in the legend of a chart or subchart (for example another indicator), the indicator is applied to this entry.

→ Whether a subchart is created for an indicator depends on the meta tag "subchart" in the Equilla Code of the indicator (see chapter "Equilla Program Structure and Syntax" on page 408).

↑ DATA INPUT SELECTION DIALOG
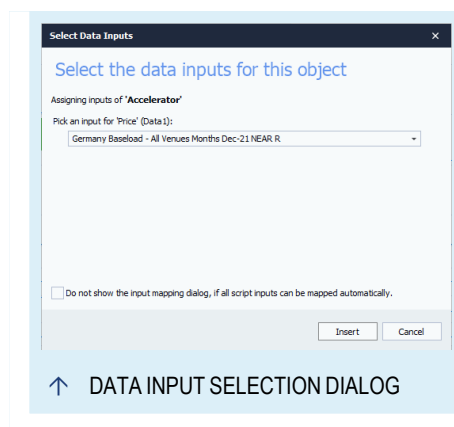
You can see in the legend how to which entry the indicator is applied. It is constructed as *Indicator[Var1, Var2...] value {applied to}*.

EXAMPLE:

→ Chart: DAX P-IN. [.DAX LAST 1 hour]...

→ Subchart#1: Accelerator [Close, 10, 13] 32.02 {.DAX}

→ Subchart#2: Average True Range [14] 122.44 {Accelerator}

EXAMPLE: APPLYING BOLLINGER BANDS TO A CHART

01. Open the .NDX in a chart and set the time span to "1 Year" (via the "Fixed Data Range" entry).

02. In the indicator list in the toolbox, search for "Bollinger Bands".

03. Drag the indicator into the graph. The Bollinger Bands are calculated for the .NDX and enfold the line.

EXAMPLE: APPLYING BOLLINGER BANDS TO AN INDICATOR

A popular combination is the "Relative Strength Index" (RSI) with added Bollinger Bands. Proceed as follows:

01. To your chart, apply the "Relative Strength Index" (RSI) indicator as described above. The result is displayed in a subchart.

02. Select the RSI subchart by clicking into the subchart.

03. Now apply the "Bollinger Bands" (BBD) indicators to the RSI subchart. The Bollinger Bands are calculated for the RSI and enfold its line.

APPLYING INDICATORS TO SCANNER, WATCHLIST OR PORTFOLIO

You can also apply indicators to symbol tables such as the "Scanner" on page 71, "Watchlist" on page 77 or "Portfolio" on page 251.

→ When creating a new Scanner, Watchlist or Portfolio, you can directly add indicators (and strategies).

→ For existing tables, you can add indicators to the selected table by using one of the methods described above. A new column is added for the results.

AUTOMATIC APPLICATION OF INDICATORS AND STRATEGIES

By default, the Strategy Equity Portfolio indicator and the Strategy Drawdown Portfolio indicator are added to a chart with the first strategy. In case of a portfolio, the Portfolio Leave Exit strategy is added in addition to these two indicators.

This can be customized in the options at *File > Options > Advanced > Indicators & Strategies > Automatically insert the following items when a strategy is added to a chart* and *Automatically insert the following items when a strategy is added to a portfolio*, see "Indicators & Strategies" on page 327.

EXAMPLE: SCANNER WITH INDICATOR

The Scanner is intended for screening a high number or securities for certain criteria. For example, create a Relative Strength list for the hundred Nasdaq values by adding the "Relative Strength Levy" (RLS) to the Scanner and starting the scan. The new column is added and displays the RLS for each instrument.

EXAMPLE: WATCHLIST WITH INDICATOR

The Watchlist is intended for realtime data. For example, drag the Momentum indicator into the table, enter a short trading period and activate the alert function of the indicator. Now Tradesignal issues an alert any time a value in the Watchlist triggers a Momentum signal.

APPLYING INDICATORS VIA THE COMMAND LINE

SHORTCODES

All indicators delivered with Tradesignal feature a shortcode. These are part of the original programming in the Equilla code and should not be changed. Via the command line, an indicator can be applied to Charts, Scanners, Watchlists, and Portfolios. This is faster than applying indicators from the toolbox.

The shortcodes can be looked up in the tooltips of indicators in the toolbox. To display a tooltip, move the mouse over the indicator entry.

EQUILLA CODE

Basically, indicators are constructed so that the calculations are done in functions. An Equilla function can be entered in the "Equilla Editor" on page 399 as well as the command line. With a bit of practice, it is possible to enter creative combinations without spending much time on programming. You can find the list of available Equilla functions in the toolbox by clicking on Functions. Most names are constructed to make the connections between the indicators and their functions obvious.

EXAMPLE FOR DIRECTLY ENTERING AN INDICATOR

To apply an RSI (smoothed by an Exponential Moving Average), proceed as follows:

01. Open or activate a chart.

02. Enter the following code in the command line

```
Drawline(XAverage(RSI(Close,14),5))
```

and select the option Add formula in the drop-down menu.

> **Tip:** You can find more information in the chapter "Command Line" on page 38.

DELETING INDICATORS

DELETING AN INDICATOR FROM THE CHART

There are two ways to delete an indicator from a chart:

→ The indicator is displayed in the legend at the top left of the chart or subchart. Right-click on the entry to open the context menu and select Delete.

→ Alternatively, select the entry in the legend and press the **DEL** key.

To delete a complete subchart of an indicator, click on the **X** button on the top right. Empty subcharts are closed automatically.

DELETING AN INDICATOR FROM A SCANNER, WATCHLIST OR PORTFOLIO

To delete an indicator from a table, right-click on the table header and select **Add/Remove Columns**.

Alternatively, click on the **Columns** button and select **Add/Remove Columns** from the button menu.

> **Tip:** You can find more information in the chapters "Scanner" on page 71, "Watchlist" on page 77 and "Portfolio" on page 251.

REMOVING AN INDICATOR FROM TRADESIGNAL

To delete an indicator from the list in Tradesignal, right-click the indicator in the toolbox and select **Delete** from the context menu.

CREATING A NEW INDICATOR

To create a new indicator, click **New Indicator** in the *Related Tasks* area of the toolbox.
A Wizard opens, offering two options:

Use the Equilla Formula Language to write the indicator Select this option if you want to write the indicator yourself.

> **Tip:** You can find more information in chapter "Writing Indicators" on the next page.

Download indicator Select this option if you want to download the indicator from a Extension Repository.

DOWNLOADING AN INDICATOR FROM A EXTENSION REPOSITORY

Browse the provided indicators and **subscribe** the indicator you want to use. To see more information about the indicators itself, please activate **Show Synopsis**. After subscribing the indicator you can see the code with a click on **Show** and the indicator is available in the toolbox.

If there are updates available, you will get a notification and you can decide, whether you want to update or not.

EDITING THE EQUILLA CODE OF AN INDICATOR

↑ EXTENSION BROWSER

→ To edit the source code of an indicator, right-click the indicator in the chart legend and select Edit Equilla Code from the context menu.

→ Alternatively, right-click the indicator in the toolbox and select Edit from the context menu.
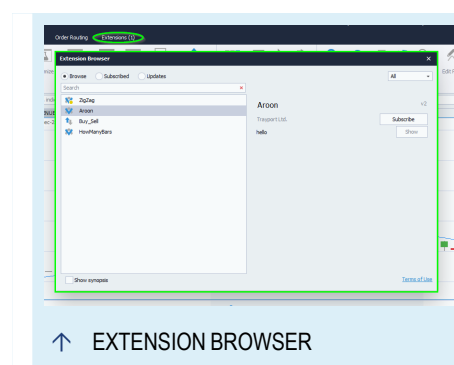
The source code is opened in the "Equilla Editor" on page 399.

> **Tip:** You can find more information in the Equilla chapters.

INDICATOR PROPERTIES

The indicator properties are available in the "Mini Toolbar" on page 45 which is automatically shown when an indicator is selected.

Each indicator offers various parameters like display units, period, weighting factors, multipliers etc. Often, values for additional scale units like oversold or overbought levels are available. Enter all necessary parameters.

For each element in an indicator (i.e. the indicator or its signal lines, graphic symbols or extrema), display properties can be entered such as line widths, colors or shadows. You can also define a custom display name within the legend.

For some Tradesignal indicators it is possible to set an alert, which will be created as soon as a defined condition is met, e.g. for SMA (when the Moving Average Simple crosses the main data curve). Alerts will be displayed as a flashing icon in the system tray and as a pop-up window by default. Furthermore, you can find information about all alerts generated by an indicator in the alert window on the chart alerts tab.

CHANGING THE EVALUATION ORDER OF INDICATORS AND STRATEGIES

In some circumstances, indicators and strategies must be evaluated in a specific order. Normally this is taken care of by Tradesignal, however there are cases where it is not possible to automatically determine which item should go first. For example if multiple indicators use the same Global Variables. By default, indicators and strategies are evaluated in the order they are added to the chart, watchlist, scanner or portfolio. To change this order

01. Click on *Home > Chart > Manage Objects* on the toolbar to show the *Manage Objects* dialog.

02. Click on the item in the list that needs to be evaluated differently.

03. Click on the **Move Up** or **Move Down** buttons to reposition the item. Items closer to the top are evaluated earlier.

04. Click **OK** to commit the changes.

WRITING INDICATORS

In Tradesignal, many indicators are available, either delivered with the software or offered for download from the website.

However, wishes may remain unfulfilled or you may have new ideas that need to be tested. In these cases, you can always program new indicators in Tradesignal by using the Equilla language.

↑   WRITING AN INDICATOR
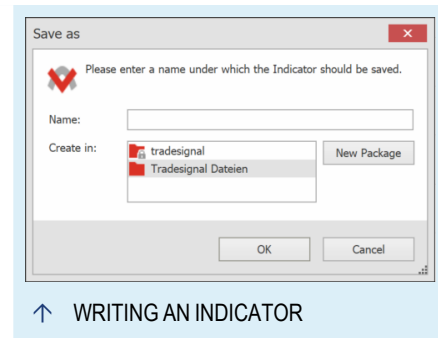
In the following you will find an example showing how to write an indicator using Equilla. It is only intended to give you a basic introduction. For details on Equilla, please refer to the Equilla Basics chapters.

PROGRAMMING TRADING BASED ON A RELATIVE STRENGTH INDEX

CREATING THE INDICATOR

01. In the toolbox, click on the **Indicators** button.

02. In the Related Tasks area, select **New Indicator**.

03. In the next dialog, select the option **Use the Equilla Formula Language to write the indicator**.

04. Select a folder, e.g. "Tradesignal Files".

05. Type the name "RSI-Bands".

06. Click on **Done**.

Now you can enter the source code of the indicator in the "Equilla Editor" on page 399.

ENTERING THE META INFORMATION

In the meta area, global information about the indicator and its display are entered. These are declared using meta tags.

```
Meta:
    Subchart(false);
```

DECLARING THE INPUT PARAMETERS

In the input area, parameters are declared that can later be edited and changed by the user during indicator runtime. In this case, these are mainly a smoothing factor and the calculation period.

```
Inputs:
    Period( 20 , 1 ),
    Smoothing( 10 , 1 ),
    Factor( 1.0 );
```

DECLARING THE VARIABLES

Variables are data containers in which the values of calculation results are temporarily saved and therefore available for future use.

```
Variables:
    rsiValue, upperBand, lowerBand, medLine;
```

PERFORMING THE CALCULATIONS

In this area, the actual calculations are done, whose results are displayed later. In our example, the continuous regression line is taken as mid-line. With it, the Relative Strength Index is calculated, which is a measure for the strength and dynamics of the trend. The actual bands result from simply adding and subtracting the RSI from the mid-line.

```
medLine = LinRegValue( Close, Smoothing, 0);
rsiValue = RSI( Close, Period );
upperBand = medLine + ( rsiValue * factor );
lowerBand = medLine - ( rsiValue * factor );
```

INSERTING THE GRAPH

Finally, the calculation results have to be displayed. This is usually done at the end of the indicator code.

```
DrawLine( medLine, "Average", StyleSolid, 1, black);
DrawLine( upperBand, "Upper", StyleSolid, 2, red );
DrawLine( lowerBand, "Lower", StyleSolid, 2, darkgreen );
```

THE COMPLETE CODE

```
Meta:
    Subchart(false);

Inputs:
    Period( 20 , 1 ),
    Smoothing( 10 , 1 ),
    Factor( 1.0 );

Variables:
    rsiValue, upperBand, lowerBand, medLine;
```

```
medLine = LinRegValue( Close, Smoothing, 0);
rsiValue = RSI( Close, Period );
upperBand = medLine + ( rsiValue * factor );
lowerBand = medLine - ( rsiValue * factor );

DrawLine( medLine, "Average", StyleSolid, 1, black);
DrawLine( upperBand, "Upper", StyleSolid, 2, red );
DrawLine( lowerBand, "Lower", StyleSolid, 2, darkgreen );
```

APPLYING THE INDICATOR

Compile the code either by pressing **F7** or by clicking on the button **Compile Script** in the Equilla Editor group. The code is checked for errors, saved and then available in the list of indicators in the toolbox by the name "RSI-Bands".

You can now apply it to a chart as described in "Using Indicators" on page 372, for example with drag and drop.

USING STRATEGIES

In the traditional sense, trading systems are compilations of rules from which trading decisions of any kind result.

> **Tip:** You can find more information in the chapter "Using Trading Strategies" on page 227.

One of the important aspects of trading systems is the strategies. Strategies combine indicators with entry and exit rules.

In Tradesignal, strategies are available which were developed based on material from various sources (publications, media or in-house development). For all strategies, additional information on the source, the calculation basis, the interpretation of results and the appliance is offered.

The strategies in Tradesignal are written in Equilla. You can find more information in the chapter "Equilla Basics" on page 397.

APPLYING STRATEGIES

Applying Strategies to Charts or Indicators

↑ WINDOW VIEW ADD STRATEGY

→ You can apply a strategy to a chart by clicking on the *Add Strategy* button in the *Home > Strategies* group on the toolbar. This opens a new dialog in which the strategies are sorted in categories and synopses are displayed (if the corresponding option is selected).

→ You can also apply a strategy to a chart (or an indicator) from the strategies list in the toolbox:

01. Open the strategy list in the toolbox by clicking on the Strategies button.

02. Do one of the following:

→ Drag-and-drop the strategy to the chart.

→ Double-click on the strategy.

→ Right-click on the strategy and choose **Apply** from the context menu.

Application Rules

↑ STRATEGY VIEW IN THE TOOLBOX

→ The strategy is applied to the active chart or subchart, except when using drag and drop.

→ By default, strategies are applied to the top entry in the chart or subchart legend.

→ When you drag the strategy onto a certain entry in the legend of a chart or subchart (for example an indicator), the strategy is applied to this entry.

→ Whether a subchart is created for a strategy depends on the meta tag "subchart" in the Equilla Code of the strategy (see the chapter Equilla Program Structure and Syntax).
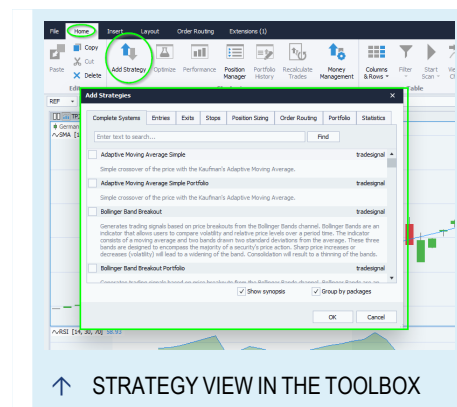
You can see in the legend how to which entry the strategy is applied. It is constructed as

Strategy[Var1, Var2...] value {applied to}.

Example:

Chart: DAX P-IN. [.DAX LAST 1 hour]...

Accelerator - Entry [10, 13, 5] {.DAX}

Since a strategy combines indicators with various conditions, more parameters are possible than for indicators, e.g. for risk control.

EXAMPLE: APPLYING A DMI CROSSOVER SYSTEM TO THE NASDAQ

OPEN AND EDIT A CHART

01. Enter the shortcut for the US Nasdaq ".NDX.X" in the "Command Line" on page 38.

02. Select the option **New Chart** from the drop-down menu.

03. Right-click into the empty area of the chart and select the **Properties** from the context menu.

04. Set the **History Length** to "2500" and press **ENTER** .

05. Double-click the time axis to display the full history.

SELECT THE STRATEGY

01. Click on the **Strategies** button in the "Toolbox" on page 49.

02. Search for the two "DMI Cross Over" systems and drag them into the chart.

ENTER SIMPLE RULES FOR RISK CONTROL

01. Click on **Money Management** in the toolbar.

02. Go to the area *Risk* in the properties.

03. **Set Stop Mode** to *Contract*.

04. Select **Stop Loss** and enter *75*.

05. Select **Break Even** and enter *50*.

06. Select **Profit Target** and enter *300*.

The strategy is now configured.

↑   MONEY MANAGEMENT (DETAIL)
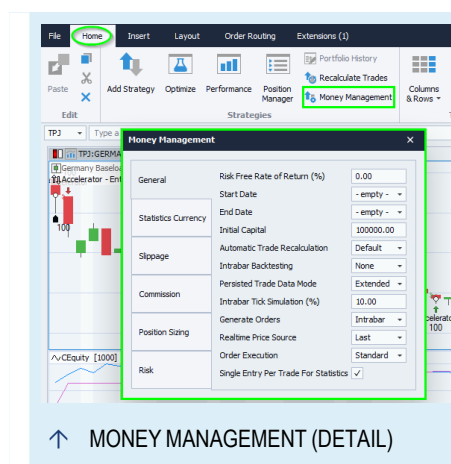
APPLYING STRATEGIES TO SCANNER, WATCHLIST OR PORTFOLIO

You can apply strategies also to symbol tables such as the "Scanner" on page 71, "Watchlist" on page 77or "Portfolio" on page 251.

→ When creating a new Scanner, Watchlist or Portfolio, you can directly add strategies (and indicators).

→ For existing tables, you can add strategies to the selected table by using one of the methods described above. A new column is added for the results.

AUTOMATIC APPLICATION OF INDICATORS AND STRATEGIES

By default, the Strategy Equity Portfolio indicator and the Strategy Drawdown Portfolio indicator are added to a chart with the first strategy. In case of a portfolio, the Portfolio Leave Exit strategy is added in addition to these two indicators.

This can be customized in the options at *File > Options > Advanced > Indicators & Strategies > Automatically insert the following items when a strategy is added to a chart* and *Automatically insert the following items when a strategy is added to a portfolio*, see "Indicators & Strategies" on page 327.

DELETING STRATEGIES

DELETING A STRATEGY FROM THE CHART

There are two ways to delete a strategy from a chart:

→ The strategy is displayed in the legend at the top left of the chart or subchart. Right-click on the entry to open the context menu and select **Delete**.

→ Alternatively, select the entry in the legend and press the **DEL** key.

To delete a complete subchart of a strategy, click on the **X** button on the top right. Empty subcharts are closed automatically.

DELETING A STRATEGY FROM A SCANNER, WATCHLIST OR PORTFOLIO

→ To delete a strategy from a table, right-click on the table header and select **Add/Remove Columns**.

→ Alternatively, click on the *Columns* button and select **Add/Remove Columns** from the button menu.

Tip: You can find more information in the chapters "Scanner" on page 71, "Watchlist" on page 77 and "Portfolio" on page 251.

REMOVING A STRATEGY FROM TRADESIGNAL

→ To delete a strategy from the list in Tradesignal, right-click the strategy in the toolbox and select **Delete** from the context menu.

CREATING A NEW STRATEGY

To create a new strategy, click on **New Strategy** in the *Related Tasks* area of the toolbox.
A Wizard opens, offering two options:

↑ STRATEGY WIZARD

Use the Equilla Formula Language to write the strategy Select this option if you want to write the strategy yourself. You can find more information in the chapter Writing Strategies.
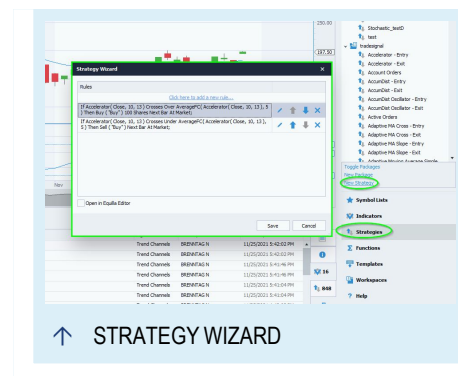
Use the Trading Strategy Wizard to create the strategy Select this option to use the Trading Strategy Wizard. It supports you in creating your own strategies without having to code in Equilla.

Download Strategy Select this option if you want to download a ready-made strategy from a Extension Repository.

For more information see chapter "Trading Strategy Wizard" on page 228.

DOWNLOADING A STRATEGY FROM A EXTENSION REPOSITORY

Browse the provided strategies and **subscribe** the strategy you want to use. To see more information about the strategies itself, please activate **Show Synopsis**. After subscribing the strategy you can see the code with a click on **Show** and the strategy is available in the toolbox.

If there are updates available, you will get a notification and you can decide, whether you want to update or not.

EDITING THE EQUILLA CODE OF A STRATEGY

→ To edit the source code of a strategy, right-click the strategy in the chart legend and select Edit Equilla Code from the context menu.

→ Alternatively, right-click the strategy in the toolbox and select Edit from the context menu.

The source code is opened in the "Equilla Editor" on page 399.

↑ EXTENSION BROWSER
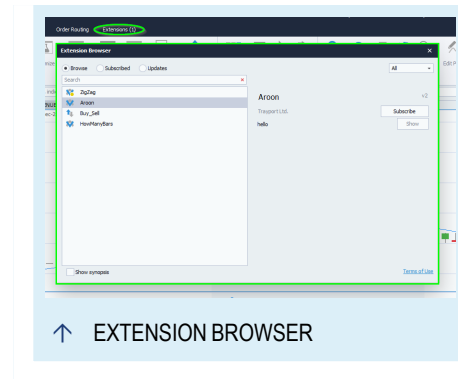
Tip: You can find more information in the Equilla chapters.

STRATEGY PROPERTIES

The strategy properties are available in the "Mini Toolbar" on page 45.

Each strategy offers various parameters such as display units, period, uplevel, entry/exit methods etc. Enter all necessary parameters.

You can also edit the display properties of the trading system, e.g. the colors for long/short entries, price indicators, trade labels etc. You can also define a custom display name within the legend.

For some Tradesignal strategies it is possible to set an alert, which will be created as soon as a defined condition is met. "Alerts" on page 329 will be displayed as a flashing icon in the system tray and as a pop-up window by default. Furthermore, you can find information about all alerts in the alert window. Added, cancelled or filled orders will be displayed on the all alerts tab.

Tip: Strategies can be disabled and exempt from evaluation by setting the *Active* property to **False.**

CONTROLLING HOW AND WHEN ORDERS GET FILLED

In addition to the strategy properties, order execution is affected by the global trading properties located in the "Money Management" on page 236 section. This section controls how orders get generated and filled, specifies how the slippage and commission that should be taken into account and defines the standard risk

stop settings. The following settings directly affect how orders generated in a strategy get executed:

The **Realtime Price Source** property controls which prices are used to fill orders in real time. Tradesignal supports two modes: bid/ask and last.

Bid/Ask Tradesignal uses the best bid / best ask data provided by either the broker (if an order routing module has been connected) or the data provider. If neither the broker nor the data provider is delivering bid/ask prices, Tradesignal uses the last price instead (for example in the case of indices). Best bid and best ask prices are generated when a market participant wants to buy or sell a number of shares/contracts while a last price represents an actual trade that has been made. Therefore this option has the benefit of more accurate fills for your orders. The caveat is however that the results collected in real time will not match the results of back-testing which will always only use the last price.

Last Tradesignal uses the last price delivered by the data provider. This is the same price as the one used to back-test the strategy. A last tick represents a trade that has been made in the market. When using this mode, Tradesignal can only fill and order after a trade has been made, even if there was a matching offer/request in the market prior to the trade. This mode ensures that real time results are closer to back-test results.

The **Generate Orders** property specifies when orders can be generated by the running strategies.

Intrabar Orders can be generated with every intra-bar update (for every tick).

On Bar Close Orders can only be generated when the bar closes. This mode is especially useful when a signal might be invalidated before the bar closes, which typically happens when the signals are generated based on compressed chart types like Point and Figure, Renko, Three Line Break and Kagi (these chart types can all remove bars resulting in trades being executed at prices that may not be reflected in a bar when it is closed).

PERSISTENCE OF EXECUTED STRATEGY ORDERS

Tradesignal will save all historic trades generated when a strategy is first added to a chart or subsequently added in real-time until a user-specified action causes them to be regenerated. This applies to all symbols contained in the respective workspace regardless of these symbols having been actively traded or not. However, historic trades will be regenerated any time the configuration, structure or properties of a chart or its contents change.

When opening a saved workspace containing historic trades new trades will only be regenerated from the current bar forward.

> **Note:** The "Order Editor" on page 233 can be used to manually manipulate and/or regenerate historic trades.

DISABLING RECALCULATION OF HISTORIC ORDERS

Tradesignal provides a way to suspend the recalculation of orders and to configure which actions will cause an automatic full regeneration of historic trades. This is helpful in situations where you want to perform backtests with a set of changed parameters. It allows you to reoptimize (e.g. on a weekly basis) without recalculating previously generated orders. By default all of the available actions will trigger a full regeneration of historic trades.

To instruct Tradesignal not to recalculate orders in case certain actions occur, proceed as follows:

01. Go to *File > Options > Advanced > Strategy Orders*.

02. Select the events not to trigger automatic recalculation of orders by unticking the respective check box.

On Insert Symbol If checkbox is ticked, historic orders will be recalculated in case a symbol is inserted into the chart.

On Insert Indicator If checkbox is ticked, historic orders will be recalculated in case an indicator is inserted into the chart.

On Insert Strategy If checkbox is ticked, historic orders will be recalculated in case a strategy is inserted into the chart.

On Replace Symbol If checkbox is ticked, historic orders will be recalculated in case a symbol is replaced.

On Compile Indicator If checkbox is ticked, historic orders will be recalculated in case a strategy is compiled.

On Compile Strategy If checkbox is ticked, historic orders will be recalculated in case a strategy is compiled.

On Symbol Property If checkbox is ticked, historic orders will be recalculated in case one or more symbol properties have changed.

On Indicator Property If checkbox is ticked, historic orders will be recalculated in case one or more indicator properties have changed.

On Strategy Property If checkbox is ticked, historic orders will be recalculated in case one or more strategy properties have changed.

On Money Management If checkbox is ticked, historic orders will be recalculated in case one or more money management properties have changed.

On Delete Symbol If checkbox is ticked, historic orders will be recalculated in case a symbol is deleted.

On Delete Indicator If checkbox is ticked, historic orders will be recalculated in case an indicator is deleted.

On Delete Strategy If checkbox is ticked, historic orders will be recalculated in case a strategy is deleted.

On Evaluation Order Changed If checkbox is ticked, historic orders will be recalculated in case of a changed evaluation order.

On Symbol Lotsize Change If checkbox is ticked, historic orders will be recalculated in case of a changed symbol lotsize.

On Rollover of rolling, non-continuous contract If checkbox is ticked, historic orders will be recalculated in case of a rollover of rolling, non-continuous contract.

Generate orders from the last save point, when a workspace is opened. If checkbox is ticked, historic orders will be recalculated from the last save point on, when the workspace is opened again.

> **Note:** By default all of the available actions will trigger a full regeneration of historic trades.

EDITING AND DELETING STORED ORDERS

The "Order Editor" on page 233 allows you to modify stored orders.

To open the Order Editor, proceed as follows:

01. Open a chart.

02. Switch to the *Insert* tab on the main ribbon.

03. Under *Trading*, click the button **Order Editor**.

The Order Editor opens.

Note: For more information on how to modify stored orders see chapter "Order Editor" on page 233.

WRITING STRATEGIES

In Tradesignal, many strategies are available, either delivered with the software or offered for download from the website.

However, wishes may remain unfulfilled or you may have new ideas that need to be tested. You can always use the "Trading Strategy Wizard" on page 228 to design a new strategy. You can also program new strategies (or edit available ones) in Tradesignal by using the Equilla language.
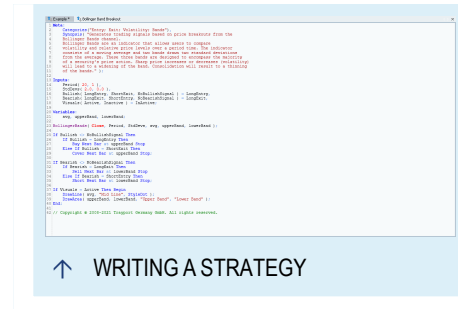
↑　WRITING A STRATEGY

In the following you will find an example showing how to write a strategy using Equilla. It is only intended to give you a basic introduction. For details on Equilla, please refer to articles in the Equilla Basics category.

PROGRAMMING A BOLLINGER BAND - RSI SYSTEM

Writing a new strategy

The strategy calculates the Relative Strength Index for an instrument. Based on these values, Bollinger Bands are then constructed. The crossings between the RSI and the Bollinger Bands are used as trading signals. In addition, Stop Loss and Trailing Stop are calculated. The idea behind this setup is to substitute the static extremes of the Relative Strength Index with more flexible zones that adapt to the movements of the indicator.

CREATING THE STRATEGY

01. In the toolbox, click on the **Strategies** button.

02. In the *Related Tasks* area, select **New Strategy**.

03. In the next dialog, select the option **Use the Equilla Formula Language to write the strategy**.

04. Select a folder, e.g. *Tradesignal Files*.

05. Type the name *Bollinger-RSI-Bands*.

06. Click on **Done**.

Now you can enter the source code of the strategy in the "Equilla Editor" on page 399. The areas are described in the following sections. The complete code can be found at the end of this article.

ENTERING THE HEADER

In the header area, the input parameters of the used indicators and necessary variables are declared. In addition, we enter the meta information for the subchart creation.

```
//Creating a subchart
Meta:
    SubChart( true );

//Defining the input parameters for the indicators
Inputs:
    PeriodAvg( 20 , 1 ),
    PeriodStd( 10 , 1 ),
    FactorStd( 2.0 , 0.0 ),
    PeriodRSI( 14 , 1 ),
    PeriodATR( 10, 1 ),
    FactorAtr( 1.5, 0.0 ),
    PeriodTrail( 20 , 1 ),
    TradeMode( outsideIn, insideOut );

//Declaring the variables that we need for storing calculation results
Variables:
    avgValue, upperBand, lowerBand, rsiValue, stdValue, atrValue,
    stopValue, trailValue, activeStop;
```

PROGRAMMING THE CALCULATIONS FOR THE INDICATORS AND STOPS

In this part, the indicator calculations are entered. For most of them, we will use available Equilla Functions. However, a new calculation is written for the Bollinger Bands, as we want to use the RSI as their basis.

```
//Calculating the RSI
rsiValue = RSI( Close, PeriodRSI );
//Calculating the Bollinger Bands constituents (based on the RSI)
avgValue = Average( rsiValue, PeriodAvg );
stdValue = StdDeviation( rsiValue, PeriodStd );
//The upper band is calculated with the average and the added standard
deviation
upperBand = avgValue + ( FactorStd * stdValue );
//The lower band is calculated with the average and the subtracted standard
```

```
deviation
lowerBand = avgValue - ( FactorStd * stdValue );

//Calculating the Average True Range for the Stop Loss
atrValue = Average( TrueRange, PeriodAtr );
//Calculation the Average as Trailing Stop
trailValue = XAverage( Close, PeriodTrail );
```

DEFINING TRADING CONDITIONS AND PROGRAMMING ORDER GENERATION

In this part, the conditions for trading signals are defined and the orders are generated. Two modes are defined:

→ The mode **outsideIn** is designed so that the RSI has to cut the Bollinger Bands from outside in for signal generation. This mode is preferable for correction movements.

→ The mode **insideOut** is designed so that the RSI has to cut the Bollinger Bands from inside out, i.e. in trend direction. This mode is optimal for strong trends.

```
//Setting the trading conditions
//Signals are generated when the RSI crosses the bands from outside in
If TradeMode = 0 Then
    Begin
        //Sale when the RSI crosses the lower band from outside in.
        If rsiValue crosses over lowerBand Then
            Begin
                Buy("LongIn") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close - ( FactorAtr * atrValue );
            End;

        //Short sale when the RSI crosses the upper band from outside in.
        If rsiValue crosses under upperBand Then
            Begin
                Short("ShortIn") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close + ( FactorAtr * atrValue );
            End;
    End
Else
    //Signals are generated when the RSI crosses the bands from inside out
    Begin
        //Sale when the RSI crosses the lower band from inside out.
        If rsiValue crosses over upperBand Then
            Begin
                Buy("LongOut") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close - ( FactorAtr * atrValue );
```

```
                End;
        //Short sale when the RSI crosses the upper band from inside out.
        If rsiValue crosses under lowerBand Then
            Begin
                Short("ShortOut") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close + ( FactorAtr * atrValue );
            End;
    End;
```

HANDLING OF THE STOP LOSS PRICES

For the Stop Loss, the Average True Range (ATR) is calculated. The value for the initial stop results from the ATR multiplied with a factor. As Trailing Stop, the Exponential Moving Average based on the instrument is calculated. If the price cuts this average inverse to the trade, the trade is closed. The program uses both stop values and compares which one is better positioned and more protective of the trade. That value is finally output as a stop order for the next trading period.

```
/* Here the handling of stop values is done: For long positions: The stop
loss is valid as long as the trailing stop is below it. For short positions:
The stop loss is valid as long as the trailing stop is above it. */

//Recognizing long positions
If MarketPosition = MarketPositionLong Then
    Begin
        //If the stop loss is better positioned than the trailing stop
        //the stop loss is set
        If ( stopValue > trailValue ) Then
            Sell("Stop Loss") Next Bar at stopValue Stop;
        //If the trailing stop is better positioned than the stop loss
        //the trailing stop is set
        If ( trailValue > stopValue ) And ( trailValue < Close ) Then
            Sell("Trail") Next Bar at trailValue Stop;
    End;

//Recognizing short positions
If MarketPosition = MarketPositionShort Then
    Begin
        //If the stop loss is better positioned than the trailing stop
        //the stop loss is set
        If ( stopValue < trailValue ) Then
            Cover("Stop Loss") Next Bar at stopValue Stop;
        //If the trailing stop is better positioned than the stop loss
        //the trailing stop is set
        If ( trailValue < stopValue ) And ( trailValue > Close ) Then
            Cover("Trail") Next Bar at trailValue Stop;
    End;
```

DISPLAYING THE INDICATORS IN SUBCHARTS

This is the easiest part. Only the indicators that are used for signal generation are displayed here.

```
//Graphic display of indicators
DrawLine( rsiValue, "RSI", StyleSolid, 1, blue );
DrawLIne( upperBand, "Upper Band", StyleSolid, 1, darkGreen );
DrawLIne( lowerBand, "Lower Band", StyleSolid, 1, red );
```

APPLYING THE STRATEGY

Compile the code either by pressing **F7** or by clicking on the button **Compile Script** in the Equilla Editor group. The code is checked for errors, saved and then available in the list of strategies in the toolbox by the name "Bollinger-RSI-Bands".

You can now apply it to a chart it as described in "Using Strategies" on page 381, for example with drag and drop.

THE COMPLETE CODE

```
//Creating a subchart
Meta:
    SubChart( true );

//Defining the input parameters for the indicators
Inputs:
    PeriodAvg( 20 , 1 ),
    PeriodStd( 10 , 1 ),
    FactorStd( 2.0 , 0.0 ),
    PeriodRSI( 14 , 1 ),
    PeriodATR( 10, 1 ),
    FactorAtr( 1.5, 0.0 ),
    PeriodTrail( 20 , 1 ),
    TradeMode( outsideIn, insideOut );

//Declaring the variables that we need for storing calculation results
Variables:
    avgValue, upperBand, lowerBand, rsiValue, stdValue, atrValue,
    stopValue, trailValue, activeStop;

//Calculating the RSI
rsiValue = RSI( Close, PeriodRSI );
//Calculating the Bollinger Bands constituents (based on the RSI)
avgValue = Average( rsiValue, PeriodAvg );
stdValue = StdDeviation( rsiValue, PeriodStd );
//The upper band is calculated with the average and the added standard
deviation
upperBand = avgValue + ( FactorStd * stdValue );
//The lower band is calculated with the average and the subtracted standard
```

```
deviation
lowerBand = avgValue - ( FactorStd * stdValue );


//Calculating the Average True Range for the Stop Loss
atrValue = Average( TrueRange, PeriodAtr );
//Calculation the Average as Trailing Stop
trailValue = XAverage( Close, PeriodTrail );


//Setting the trading conditions
//Signals are generated when RSI crosses the bands from outside in
If TradeMode = 0 Then
    Begin
        //Sale when the RSI crosses the lower band from outside in.
        If rsiValue crosses over lowerBand Then
            Begin
                Buy("LongIn") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close - ( FactorAtr * atrValue );
            End;

        //Short sale when the RSI crosses the upper band from outside in.
        If rsiValue crosses under upperBand Then
            Begin
                Short("ShortIn") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close + ( FactorAtr * atrValue );
            End;
    End
Else
    //Signals are generated when RSI crosses the bands from inside out
Begin
        //Sale when the RSI crosses the upper band from inside out.
        If rsiValue crosses over upperBand Then
            Begin
                Buy("LongOut") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close - ( FactorAtr * atrValue );
            End;
        //Short sale when the RSI crosses the lower band from inside out.
        If rsiValue crosses under lowerBand Then
            Begin
                Short("ShortOut") Next Bar at Market;
                //Calculating the price for the Stop Loss
                stopValue = Close + ( FactorAtr * atrValue );
            End;
    End;


/* Here the handling of stop values is done: For long positions: The stop
loss is valid as long as the trailing stop is below it. For short positions:
The stop loss is valid as long as the trailing stop is above it. */


//Recognizing long positions
If MarketPosition = MarketPositionLong Then
    Begin
```

```
        //If the stop loss is better positioned than the trailing stop
        //the stop loss is set
        If ( stopValue > trailValue ) Then
            Sell("Stop Loss") Next Bar at stopValue Stop;
        //If the trailing stop is better positioned than the stop loss
        //the trailing stop is set
        If ( trailValue > stopValue ) And ( trailValue < Close ) Then
            Sell("Trail") Next Bar at trailValue Stop;
    End;

//Recognizing short positions
If MarketPosition = MarketPositionShort Then
    Begin
        //If the stop loss is better positioned than the trailing stop
        //the stop loss is set
        If ( stopValue < trailValue ) Then
            Cover("Stop Loss") Next Bar at stopValue Stop;
        //If the trailing stop is better positioned than the stop loss
        //the trailing stop is set
        If ( trailValue < stopValue ) And ( trailValue > Close ) Then
            Cover("Trail") Next Bar at trailValue Stop;
    End;

//Graphic display of indicators
DrawLine( rsiValue, "RSI", StyleSolid, 1, blue );
DrawLIne( upperBand, "Upper Band", StyleSolid, 1, darkGreen );
DrawLIne( lowerBand, "Lower Band", StyleSolid, 1, red );
```

WORKING WITH EQUILLA

EQUILLA BASICS

With the programming language Equilla, Tradesignal offers you an easy to learn but powerful programming language. With its help, you can easily perform even complex tasks.

Equilla resembles programming languages like Pascal or Visual Basic. All functions, indicators and strategies in Tradesignal are written in Equilla. (For the relationship between these three, see the chapter "Introduction to Functions, Indicators and Strategies" on page 369).

The special benefits of Equilla are the extensions for the trading business. They allow you to translate your ideas about finance and analyses into executable routines. This way, you can write your own strategies, indicators or other applications for the various software components of Tradesignal. Equilla helps you to solve your individual problems, to test new trading ideas and to work outside the box of externally defined, inflexible procedures.

To quickly get accustomed to Equilla, we recommend familiarity with a programming language. However, you can also learn to tap the potential of Equilla by analyzing and editing available Equilla code (e.g. customizing an indicator).

Equilla scripts are edited in the Equilla Editor, which supports you with color-coding of the Equilla source code. In the editor, you can also retrieve detailed information for Equilla functions via the context menu.

The Equilla chapters in this help are intended to be more of an introduction to the various topics. For an extensive documentation of all features, please refer to Tradesignal help under the menu entry **Equilla Formula Language**.

SEQUENCE OF EVENTS WHEN COMPILING EQUILLA CODE

When compiling Equilla code into an executable Equilla program, it is important to remember that all Equilla scripts are saved in packages. The compilation sequence partly depends on the sequence of these packages, which you can change in the "Package and File Management" on page 334.

CALLING UP FUNCTIONS FROM INDICATORS/STRATEGIES

For indicators and strategies, functions are called up by their name (without information about their package). Tradesignal searches for the function in the following sequence:

01. in the same package as the indicator/strategy

02. in all packages, in the sequence given in the "Package and File Management" on page 334

As soon as a function with the correct name is found, the search ends and this function is used.

Therefore, if you move indicators/strategies to another package, it may give different results if another function is used due to the changed package sequence.

Exporting packages can also lead to problems, if packages exchanged with other users use functions from another package. If the user has no function with the same name, the script will not compile; if the user has another or older version, the results for the users may differ.

CALLING UP INDICATORS/STRATEGIES FROM SAVED DOCUMENTS

When saving a chart, scanner, watchlist or portfolio, not only all settings but also all applied indicators and strategies (including their respective package names) are saved.

When the documents are opened again, Tradesignal checks whether a newer version of the indicator/strategy is available, and will use that one if possible. Tradesignal searches in the following sequence:

01. in the packages as given in the saved document

02. in all packages, in the sequence given in the "Package Management in the Tradesignal Options" on page 337

If no newer version is to be found, the indicator/strategy as saved in the document is used.

EQUILLA EDITOR

For writing and editing scripts written in the Equilla language (which is in-built in Tradesignal), an Equilla editor is available. It supports programming by highlighting code areas and comments in different colors.

↑ EQUILLA EDITOR

OPENING THE EQUILLA EDITOR

You can open the Equilla editor in two ways:
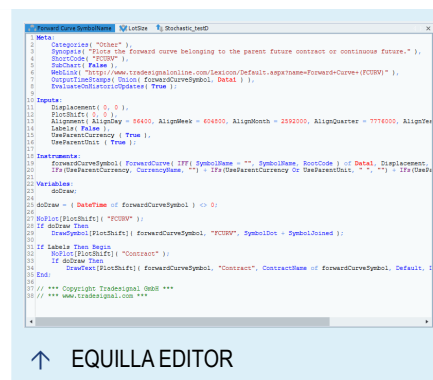
→ The editor opens when you edit a function, indicator or strategy. To do so, open the respective list (functions, indicators or strategies) in the toolbox. Then call up an entry for editing by either double-clicking on it or by selecting **Edit Equilla Source Code** from the context menu. The Equilla editor opens with the source code of the script.

→ To open an empty editor, you have to start a new script. To do so, select **New Indicator / New Strategy / New Function** in the *Related Task* area in the toolbox (available entry depends on the currently opened area). A window opens. Enter a name and select a location for saving. Finish with **OK**. *An empty editor opens.*

COLOR CODING IN THE EDITOR

The source code is color-coded. The following colors are possible:

Blue Signal words in the code (begin, end), declaration areas (meta, variables...), input types, commands (if then...), formatting (StyleSolid...), drawing commands (DrawText...).

Red Content of synopsis, numeric values (e.g. close or true numbers like 1, 10, 30), true/false.

For blue and bold red Equilla expressions, you can find additional information in Tradesignal. To display it, right-click on the operator in question in the Equilla Editor, e.g. Begin, and choose **Lookup Keyword** from the context menu. A browser window opens with information on the operators and links to related functions.

Lilac Names of other functions.

You can open these functions in the Equilla Editor. To do so, right-click on the function and choose **Open** from the context menu. The source code is opened in the Equilla Editor.

Green Comments

Black Anything else, like text, declared variables etc.

EDITING THE EQUILLA CODE

When the Equilla editor is open, the Editor tab appears in the toolbar, with the following buttons:

↑ TEXT EDITOR GROUP
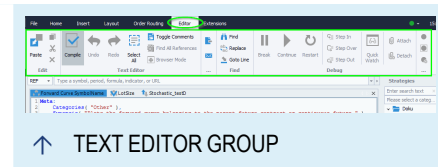
Compile (F7) Use this to compile the script. Only compiled scripts can be used. Uncompiled scripts are grayed out in the toolbox. In case of script errors, error descriptions will be given in the lower area of the workspace. For delivered scripts, compiling may lead to error messages if the scripts are protected against overwriting.

Undo (Ctrl+Z) Undo the last action (multiple undoes possible, but none after compiling). This way, you can undo an unintended deletion, for example.

Redo (Ctrl+Shift+Z) Repeat the last action (multiple repeats possible, but none after compiling). This way, you can insert a copied text multiple times, for example.

Select All (Ctrl+A) Selects all code. You can use the standard Windows key commands to copy the code with "Ctrl+C" and then paste with "Ctrl+V", e.g. into a text editor.

Toggle Comments Toggle the selected line(s) between being a comment (leading //) or not. The button is only active for scripts that can be edited (i.e. not for delivered scripts).

Find All References Find all other uses of a user function in all Equilla scripts know to the application. For this button to be active, place the mouse on a user function in the Equilla editor or debugger, e.g. "Momentum" in the Momentum indicator, and then click the button. A list of all findings will be displayed in the output window. In case of "Momentum", this amounts to "182 use(s)", while a function like "ADO" has only 6 findings. Double-click on a finding to open the referenced script. The action searches all of the script, code as well as comments, so there can be more than one finding for a script.

Tip: To open only the function itself, right-click on the function and choose **Open in New Editor** from the context menu.

Browser Mode Toggle between HTML edit mode and the browser mode.

SEARCH AND REPLACE

To edit the code, the Find group in the toolbar is available.

→ Click on **Find** to enter a search term in the search pane.

→ With **Replace** you can replace one or all appearances of a code text with another text. The button is only active for scripts that can be edited.

→ For long scripts, you can use **Goto Line** to jump to a code line.

ADDING SYMBOLS

Symbols can added into the Equilla script via drag-and-drop from the symbol list or via typing in the symbol name.

APPLYING YOUR EQUILLA SCRIPT

Scripts can only be applied once they have been compiled. After that, the new script can be used like any delivered function, indicator or strategy. You can find more information in the chapter "Introduction to Functions, Indicators and Strategies" on page 369.

EQUILLA DEBUGGER

The Equilla debugger can be used to find and resolve problems in your Equilla scripts. It allows you to stop execution of your scripts, step through your source code and examine the state of variables used in your code.

↑ DEBUGGER

CREATING A DEBUGGER DOCUMENT

To create a new debugger document, select the Insert group on the Toolbar and click on the Debugger button.After clicking on the Debugger debugger, a dialog will be displayed

asking you which document you would like to debug. The dialog shows a list of all open desktops, workspaces and documents and presents the following options:

Skip Do not attach to a document yet. This is typically used if the document you want to debug isn't open yet. You may execute the debuggers Attach command from the ribbon as soon as the document you want to debug is ready to be used.

Attach Attaches the new debugger to the selected document.

Cancel Abort the operation and do no create a new debugger document.

> **Note:** A debugger can only debug one document at a time and only one debugger can be attached to a specific document. You may create multiple debuggers simultaneously and attached each of them to a separate document.

> **Note:** In order to be able to debug an indicator or strategy it has to be compiled using Tradesignal 7.0 or higher. Equilla scripts that have been compiled with earlier versions of Tradesignal will not show up in the debugger document.

> **Note:** Only chart documents can be debugged.

THE DEBUGGER DOCUMENT

The debugger document enables you to debug your Equilla scripts. It consists of the following components:

Scripts The debugger loads all scripts that are referenced in the debugged document.

Watch windows A set of watch windows that help you inspect the state of your indicator or strategy. There are three predefined windows, showing common information and one window where you can enter debug expressions on your own.

Call Stack Shows the nesting level of your scripts while debugging.

Breakpoints Shows a list of all breakpoints that have been set up.

Objects Provides a list of all Equilla indicators and strategies that are contained in the debugged document. You may enable or disable the debugging of specific objects as you need.

SCRIPTS

Every script referenced in the debugged document will be loaded automatically. Here you can inspect the source code, add or manipulate breakpoints or examine the state of variables as you need.

The debugger editor has all the same functionality as the normal "Equilla Editor" on page 399.

To add a breakpoint, click on the left margin of the editor, select the Toggle Breakpoint command from the ribbon or use the corresponding context menu entry.

While the execution is paused, you can examine the state of variables or evaluate Equilla expression by hovering over the corresponding text with your mouse. To evaluate an Equilla expression containing space characters, you have to select the whole expression in the editor before hovering over it.

> **Note:** If a script has been changed since the indicator or strategy has been compiled, the scripts tab will show a corresponding image. Please be aware that breakpoints and variables may behave unexpected in such a case.

If the evaluation is paused, the source code line that is about to be evaluated will be highlighted in the source code editor. Additionally the margin will show an arrow icon on the corresponding line.

WATCH WINDOWS

The Equilla debugger provides a quick way to check the state of the document as a whole or of specific elements in it.

Virtual Machine This is a predefined view and cannot be modified. It shows information of all elements within the virtual machine. This includes all the indicator and strategies that have been created as well as the instruments that are used to evaluate your scripts.

This This is a predefined view and cannot be modified. It provides access to the state of the currently debugged indicator or strategy. This includes general properties as well as the referenced parents and generated output data. You may also get access to child objects that have been applied to this indicator or strategy.

Locals This is a predefined view and cannot be modified. This view provides access to all variables that are used in the currently debugged indicator, strategy or Equilla function. While stepping through your code, this view will be updated

automatically to show only the variables that are relevant for the script that is about to be evaluated.

Watch Use this view to track specific variables or Equilla expressions. The list of expressions will not change automatically while stepping through your code. To add an expression, simply type it into the list or use drag-and-drop to copy an expression from the source code editor or another watch window. The Quick Watch is an alternative to this view when the information for the inspected object or variable does not fit into the available space.

CALL STACK

The call stack shows the currently evaluated script and line number. The currently evaluated script is displayed on the top and the indicator or strategy script is displayed at the bottom.

For Equilla functions, the passed parameters will be displayed as well. Please be aware that the same limitations as for the evaluation of debug expression apply. Therefore the list of parameters might not be complete.

To navigate through the call stack, simple double click on an entry in the list.

BREAKPOINTS

This view shows a list of all the breakpoints that have been set up for a debugger. The displayed information includes the script file and line number, the breakpoint belongs to, as well as information about the state, conditions and the action that should be taken when the breakpoint is hit.

State

The breakpoint is valid and enabled.

The breakpoint is valid, but currently disabled.

The breakpoint cannot be mapped to any executable code.

To modify an existing breakpoint, either enable or disable it using the check box at the front of the entry or right click on an entry to show up a context menu.The context menu provides access to the following commands:

Enable/Disable breakpoint - Enable or disable the selected breakpoint

Remove Breakpoint - Delete the selected breakpoint

Goto - Go to the source code line the breakpoint is attached to.

Properties - Modify the breakpoint condition and action.

BREAKPOINT PROPERTIES

Every breakpoint supports a range of properties to control its behavior. To examine or modify these properties, right click on a breakpoint and select **Properties** from the context menu.

Breakpoints can be configured to only pause evaluation under a certain condition. To make a breakpoint conditional, check the **Active the breakpoint based on the following condition** option. Type the condition as Equilla code in the corresponding editor and specify how to interpret the condition.

Beside conditions, you can also specify what to do when the break point is hit. The default behavior is to pause evaluation, but you can also specify that the debugger should simply print a message to the output window. Available options are:

Break Pauses the evaluation when the breakpoint is hit. This is the default behavior.

Print a message on historic bars Prints the specified message when the breakpoint is hit while evaluating historic bars.

Print a message on real-time bars Prints the specified message when the breakpoint is hit while evaluating real-time bars.

Print a message on every bar Always prints the specified message when the breakpoint is hit.

Continue execution Specifies if the debugger should continue execution when the breakpoint is hit or if the evaluation should be paused as it is done for standard breakpoints.

BREAKING ON RUNTIME ERRORS

By default, if a runtime error occurs, the debugger will automatically break on the instruction that caused the error. This allows the developer to identify exactly what went wrong, without having to manually set breakpoints to stop just before the error.

This feature may be enabled or disabled in the property inspector, using the *Break on Runtime Error* property.

In the case that runtime errors are disabled in a Equilla Script, the break point will still be triggered, although the execution can then be resumed afterwards.

OBJECTS

The objects view shows what objects are available for debugging. It also enables you to filter what items should be debugged.

To enable or disable debugging for an object, simply set or clear the check box in front of it.

Use the context menu to toggle between these two modes.

DEBUGGER COMMANDS

The debugger document supports the following commands:

DEBUG GROUP

Break Pauses the execution when the next evaluation starts. Please be aware that some new data has to arrive in order to trigger an evaluation. If the market is closed, the debugger will pause with the next tick that arrives.

Continue Continues evaluation when the evaluation is paused.

Restart Restarts the evaluation of the complete chart. All scripts will be reevaluated starting with bar 1.

Step In Steps into an Equilla script function, entering the next level in the call stack. If the next instruction is not an Equilla script function, this command acts like the Step Over command.

Step Over Steps over the next line.

Step Out Steps out of the current Equilla script, going back one level in the call stack.

Quick Watch Shows the quick watch dialog that can be used to evaluate Equilla expressions or inspect the state of variables and objects.

Attach Attaches the debugger to a document.

Detach Detaches the debugger from the currently debugged document.

BREAKPOINTS GROUP

Toggle Breakpoint Adds a new or removes an existing breakpoint.

Enable/Disable Enables or disables an existing breakpoint.

Remove Breakpoint Removes an existing breakpoint.

PROPERTIES

The general properties are available via "Settings" on page 157 in the home tab.

Trace Order State Changes (Historic) Enables or disables the tracing of order state changes while evaluating historic data. The default value is false.

Trace Order State Changes (Real-time) Enables or disables the tracing of order state changes while evaluating real-time bars. The default value is false.

Break on Runtime Error Enables or disables if the execution of the Equilla script should be paused automatically if a runtime error occurs.

QUICK WATCH

The Quick Watch can be used to inspect the state of variables and object and to evaluate Equilla expressions.

While providing the same functionality as the Watch view it allows the resizing of the output area without affecting the general layout of the debugger document. Therefor it can be used to quickly inspect the state of a variable or object even if the information does not fit into the space available for the Watch view.

DEBUG EXPRESSIONS

The Equilla debugger supports a wide range of debug expressions that can be evaluated in the **Watch** view or the *Quick Watch* dialog. This includes some predefined expressions that provide information about the debugged document or the currently debugged object.

PREDEFINED EXPRESSIONS

VM This expression provides access to the state of the debugged document. This includes settings, references to all instruments used in the document as well as all elements in the chart, like instruments, indicators, strategies and tools. When debugging strategies it also provides information about positions, orders and statistics.

This This expression provides access to the state of the currently debugged object. This includes parent objects and input instruments, as well as, error information, generated output data and trading related data.

EQUILLA EXPRESSIONS

In addition to the predefined debug expressions, you can evaluate standard Equilla code and evaluate it in the debugger. While you can use all build-in Equilla functions, you cannot use any Equilla script function.

Valid examples, using only build-in functions or standard operators:

```
Sum(close, 10) / 10

(Close[1] + Close) / 2
```

Invalid example, using a script function rather than a build in function:

```
Average(Close, 10)
```

Please be aware that some variable might not be available in the debugger. This is caused by code optimizations that are applied to the source code when compiling it. This may result in variables being removed or replaced in order to save resources and increase the evaluation speed. Additionally the compiler may reorder the instructions in its optimization phase, leading to unexpected jumps while stepping through the code.

CHART

When attaching a debugger to a chart document, the chart will display a corresponding hint below the standard legend.

↑ DEBUGGED CHART

EQUILLA PROGRAM STRUCTURE AND SYNTAX

META TAGS

The so-called meta properties define the global functions of your indicator, for example if the indicator should be displayed in a window of its own or within another chart. You can also add information about how the indicator is calculated (Synopsis) and define a ShortCode. The meta information area can usually be found in the beginning of the source code. You should adhere to this convention. The area has to be introduced with the tag

```
Meta:
```

The three most important pieces of meta information are:

```
Meta:

    //Description for the code
    Synopsis( " Text " ),
    //Define whether the indicator will be displayed in a separate sub-chart
or not
    Subchart(True/False),
    //Define a ShortCode. By entering it in the command linethe indicator is
called up.
    ShortCode("MyIndicator");
```

INPUT DECLARATION

When applying an indicator to a chart, one or more parameters are available in the indicator properties. These parameters can be calculation periods, multiplications or lists. User-specific parameters have to be declared in the input area of the source code. The area has to be introduced with the tag

```
Inputs:
```

AVAILABLE INPUT TYPES

```
Inputs:
    //Switch for true/false /yes/no) choice.
    Visuals (true, false),

    //Input field for integers, followed by lower and upper
    //end of range.
    Period(10, 1, 100),

    //Input field for decimal value; note that the
    //decimal point of the defining criterion.
    FactorOffSet( 1.25, 1.0, 5.0 ),

    //Input field for string; note that
    //the quotation marks are the defining criterion.
    UserName( "John Smith" ),

    //Input field for colors; the dialog is system-dependent.
    //The dialog generation also works for colors entered as
    //RGB values ( redValue, greenValue, blueValue ).
    //The values for redValue, greenValue und blueValue have to be between
    //0 and 255.
    PreferredColor( red ),

    //Generates a selection list for time lines. The list automatically
    //includes all time lines for the basic symbol. Usually, these are the
    //Open, High, Low, Close and Volume data.
    PriceValue( Close ),
```

```
    //Generates a selection list for the given words or strings.
    //The list is zero-based.
    Weekdays( Monday, Tuesday, Wednesday, Thursday, Friday, Saturday, Sunday
);
```

Examples for Using the Input Types

```
//Example for querying a true/false (yes/no) boolean switch
//When the switch is set to true (yes), a line is drawn:
If Visuals = True Then
    DrawLine ( (High+Low)/2);

//Example for using an integer input
//The parameter 'Period' is declared as input, the given
//value 10 for the period is passed to the average function.
avgValue = Average( Close, Period );
Drawline( avgValue );

//Example for using a decimal number
//The drawing function draws a continuous line which
//corresponds to the value 'close * 1.25'.
DrawLine( FactorOffSet * Close );

//Example for using a string input
//In the output window, 'John Smith' is displayed.
Print( "UserName" );

//Example for using a color value as input
//A red, solid line is drawn.
DrawLine( Close, "Close Line", StyleSolid, 2, PreferredColor );

//Example for using a time line input
//A line is drawn on the level of the close prices.
DrawLine( PriceValue );

//Example for querying the selected entry in a list
//In the output window, 'Monday' appears when selected.
If Weekdays = "Monday" Then
    Print( "Monday" );

//In lists, index numbers are assigned to the entries.
//As already mentioned, lists are zero-based, so Monday is "0" and Sunday is
"6".
//Instead of querying the string, the index number can be used instead.
If Weekdays = 0 Then
    Print( "Monday" );
```

VARIABLE DECLARATION

WHAT ARE VARIABLES?

Variables are data containers. To be able to use values like numbers, calculation results, user entries or prices, the values have to be saved temporarily in variables. This way, each value has its own storage space and can be called up by the variable name. Imagine variable to be like containers on a cargo ship. Each container has its own unique ID, with which to find the contents. When the booker needs to know the information in a container, he enters the unique ID into a computer, which returns the wanted information.

VALIDITY OF VARIABLES

Variables are only valid within the script in a chart. It is not possible to use the value of variable "Period1" of the indicator "Indicator1" in "Indicator2", since the second script has no access to the variable - not even when both indicators are used in the same chart.

The only exceptions to the rule are global variables.

INITIALIZATION OF VARIABLES, AND FOR HOW LONG DO THEY KEEP THEIR VALUE?

Each Equilla script, e.g. an indicator, is processed once for each trading period. If the indicator is used in a daily chart, the indicator is calculated once for each day in the chart. The variable is initialized at the first trading day in the chart.

If in the days following that, no new value is set for the variable, the value is kept until the last trading day in the chart. If a new value is set for the variable in between, it is kept until a new value is assigned or until the last trading day.

GENERATING VARIABLES

Variables are generated by being declared, i.e. given a name. Variables can only be defined within a certain code area. It has to be introduced with the tag

```
Variables:
```

You have the following possible methods to declare a variable:

```
//Declare a variable by assigning a name
Variables:
    myFirstVariable, mySecondVariable;

//Declare a variable by assigning a name and value
Variables:
```

```
    myFirstVariable( 10 ), mySecondVariable( myFirstVariable / 2 );

//Declare a variable by entering a string
Variables:
    myFirstString ( "" ), mySecondString( "String test" );

//Declare a variable with color values
Variables:
    myFirstColor( red ), mySecondColor( RGB (10, 20, 30) );
```

GLOBAL (SCRIPT-INDEPENDENT) VARIABLES

As opposed to the statement above, you can use global variables under special circumstances. The limitation is that the scripts have to be in the same chart or portfolio. A sub chart, for example an indicator chart, does not count as a full chart. Therefore, you can pass data between main and sub charts and between several Equilla scripts that are used within the same main/sub charts.

To do so, global variables are available. A global variable consists of a "Namespace", which can be seen as the name of the cargo ship, and a variable name, which can be seen as the container ID. Since global variables are valid across several scripts, they do not have to be defined in the "Variables:" area. It is enough to name the global variable in one script and assign a value this way.

```
//This is the way to set up a global variable
//The global variable with the Namespace 'global' and the name
//'myFirstGlobalVar' is generated by assigning a value.
//From this moment on, the value can be used in all
//scripts in the same chart.
global::myFirstGlobalVar = 100;

//This is the way to read the value of a global variable.
//In the output window, '100' is displayed.
Variables:
    myNewVar;

myNewVar = global::myFirstGlobalVar ;
Print( myNewVar );
```

DECLARATION DETAIL FOR VARIABLES AND INPUTS

For variables as well as inputs, you can either enter several declarations in one line or each declaration in its own line. The declarations have to be separated by commas. After the last declaration, a semi-colon has to be entered.

```
//Declare inputs in one line
Inputs:
    MyName( "Caspar David" ), YourName( "Peter King" ), HerName ( "Barbara
```

```
Myers" );

//Declare inputs in several lines
Inputs:
    MyName( "Caspar David" ),
    YourName( "Peter King" ),
    HerName ( "Barbara Myers" );
```

STRUCTURING SOURCE CODE

For a better readability and overview in the Equilla code, the source code should be well-structured. This also makes it easier to find errors in the coding. For structuring, make use of indentions, comments and empty lines. Declare the variables and inputs in separate lines instead of one line.

INDENTING SOURCE CODE

It is a standard programming technique to indent certain parts of the code by using the **Tab** key. This way it is much easier to understand the relations between code parts. This is especially useful in cases of loops or conditions.

```
//Indenting the code that is only run if the condition is met
If Bronto = "Saurus" Then
    DrawText( Close, "Run away!" );

//Cascading indenting of code to keep a better overview
If condition = "met" Then
    Begin
        myFirstVar = 100;
        mySecondVar = 7;
        DrawLine( myFirstVar + mySecondVar );
    End;

//Each consecutive condition should also be indented
If condition = "met" Then
    Begin
        myFirstVar = 100;
        mySecondVar = 7;
        //additional condition
        if Visuals = True Then
            DrawLine( myFirstVar + mySecondVar );
    End;
```

BRACKETING EXPRESSIONS

It is also recommended that you use bracketing for conditional queries or loops. This way, you avoid overly complicated code and malfunctioning which may result from logical errors.

```
//Expressions in queries should be bracketed for two reasons
//a) For better overview
If ( myFirstVar = 100 ) and ( mySecondVar = 100 ) Then
    Begin
        //Here follow...
        //...expressions
    End;

//b) For program logic
If (myFirstVar = 100) AND ((mySecondVar = 100) OR (myThirdVar = 0)) Then
    Begin
        //This block is only executed if
        //myFirstVar and mySecondVar both have the value 100
        //or if myFirstVar has the value 100 and if myThirdVar has the value
0
    End;
```

Take a closer look at the second example. If the two brackets around the expressions linked by OR were not there, another meaning would result. The condition would be met if "myFirstVar = 100 and mySecondVar = 100" OR "myThirdVar = 0". In this case, the code would only be executed if "myFirstVar" were 100 and "mySecondVar" were 100 OR "myThirdVar" were 0, which was not meant to be according to the definition given in the comments.

In addition to the examples above, it may also be useful to set brackets around mathematical operators.

```
//Are you sure what's meant here?
myFirstVar = 100 * ( x + y * ( 10 / z ) );

//This way it is easier to read.
myFirstVar = 100 * ( x + ( y * ( 10 / z ) ) );
```

INSERTING COMMENTS

As already seen, you can enter comments in the code. This is especially useful for two reasons

- → Even in case of longer source code and more complex structures, good readability and comprehensibility are given. This way, you can correct or edit the code even after years.

- → Outsiders are able to understand the code much faster.

EQUILLA FUNCTIONS

WHAT IS A FUNCTION?

In programming languages, functions are subordinate portions of the code in which regularly used calculations and subroutines are sourced out. For example, instead of writing the calculation of standard deviation again and again, the calculation is put into a function. By calling up the function by its name - and passing the relevant parameter(s) for calculation - the user receives the return value as result.

The call may look as follows:

```
/* With the following function you receive the standard deviation over a 10
day range. 'StandardDev' is the Equilla function that contains the actual
calculation. */

myStdAbw = StandardDev( Close, 10 , 0 );
```

This is the source code of the Equilla StandardDev:

```
Meta:
    Synopsis( "[Standard Deviation 1] Returns the Standard Deviation value
for the current bar." );

Inputs:
    Price( NumericSeries ),
    Period( NumericSimple ),
    DataType( NumericSimple );

Variables:
    divisor, sumSquare, avg, i;

StandardDev = 0;

If DataType = 1 Then
    divisor = Period
Else
    divisor = Period - 1;

If divisor > 0 Then Begin
    avg = AverageFC( Price, Period );
    sumSquare = 0;
    For i = 0 To Period - 1 Do
        sumSquare = sumSquare + Sqr( Price[i] - avg );
    If sumSquare > 0 Then
        StandardDev = Sqrt( sumSquare / divisor );
End
```

Another big advantage of functions is that you can call up the same functions from indicators and strategies. In fact, all indicators are based on functions - just as strategies are based on indicators.

You can find the functions that came with the program by clicking on the button **Functions** in the toolbox. To see the code of the function, right-click on it to open the context and select **Edit**.

FUNCTION STRUCTURE

For the programming of Equilla functions, the same conditions apply as for all Equilla scripts, see the chapter Equilla Program Structure and Syntax. Minor divergences are given in the following paragraphs.

FUNCTION NAME

The function name is necessary to a) save the function in the file system and b) call up the function from within an Equilla script. When choosing the name, take care that the name

- → is short and concise
- → relates to the contents
- → is not yet in use for another function (this might cause problems)

```
//The function Momentum gives the indicator of the same name as result
myFirstVar = Momentum( PriceSerie, CalculationPeriod );
```

PASSING PARAMETERS UPON FUNCTION CALL

For the calculation of indicators, statistics and other values, certain information has to be given:

- → which data is to be used for calculation
- → which time range is to be used for calculation

When calling up the function, these parameters (separated by commas) have to be passed in brackets.

```
/* The function 'Momentum' gives the indicator of the same name as result As
parameter the function demands the data to be used for the Momentum and the
time range over which to calculate. */

myFirstVar = Momentum( Close, 20 );
```

INPUT DECLARATION IN FUNCTIONS

In the source code of the function, any inputs from outside have to be declared. As opposed to the definition of indicators, the type of the input parameters has to be declared in functions.

```
Inputs:
    //A data series, e.g. prices, has to be declared as NumericSeries
    PriceValue( NumericSeries ),

    //Simple numeric values are declared as NumericSimple
    PeriodFast( NumericSimple ),

    //Booleans as true/false (yes/no) value are declared TrueFalseSimple
    DrawVisuals( TrueFalseSimple ),

    //Strings like words or symbols are declared as StringSimple
    UserName( StringSimple ),

    //If you want to pass data that will be modified within the function and
the
    //resulting modified value is to be used outside of the function, you
have
    //to declare this as NumericRef
    AdjustedPeriod( NumericRef ),

    //Arrays can have multiple dimensions in Equilla, each dimension also
    //declares an additional input for the function, in this example the
    //function expects a 2-dimensional array as input which will be
accessible
    //with the name Array2D and the numeric inputs Rows and Columns which
are
    //initialized to contain the lenght of the array in this dimension.
    Array2D [ Rows, Columns ] ( NumericArray ),

    //If you want to pass an extension object to a function, you have to
declare
    //the input as ObjectSimple (available in Tradesignal 6.3 and above).
    ExtensionObject ( ObjectSimple );
```

Make sure to use the parameters in the same sequence as they are declared in the function. The names of parameters used inside of functions are independent of parameter names that are passed. Therefore you can use the parameter 'Period', which is passed when calling the function, under another name within the function. You only have to take care that the sequence of values passed is the same as in the declaration.

VARIABLE DECLARATION IN FUNCTIONS

The same conventions apply as described in Equilla Basics. You can also use variable names that are already in use in the main program, as there is no danger

of collision.

RETURNING VALUES

Values that were calculated in the function usually should be available for further processing. To do so, the values have to be "returned". The actual way of returning depends on which kind of value has to be returned.

RETURNING A SINGLE VALUE

If only a single value has to be returned, this is usually done with the name of the function. In the calling script, the function is assigned to a declared variable. The variable takes up the calculation result and makes it available for further operations.

```
// In the calling script, the result of the Momentum calculation
// is assigned to the variable myFirstVar

myFirstVar = Momentum( Close, 20 );
```

In the source code of the function, the calculation result has to be assigned to the name of the function.

```
Meta:
    Synopsis( "[Momentum] Returns the momentum of a series over a specified
period." );

Inputs:
    Price( NumericSeries ),
    Period( NumericSimple );

//Assignment, i.e. returning the value

Momentum = Price - Price[ Period ];
```

RETURNING SEVERAL VALUES

When you want to return more than one result from a function, you must use so called reference parameters. These parameters will be passed into your function, modified within the function and then can be used. The following function shows two such reference parameters that are set to the result of two different moving averages:

```
//Function: TwoSmoothMA
Inputs:
    FastMA(NumericRef), // Notice how we declare the type of the inputs as
numeric references
    SlowMA(NumericRef); // instead of numericseries or numericsimple.
```

```
Variables:
    smoothMA;

smoothMA = Average(Close, 5);
FastMA = Average(smoothMA, 10);
SlowMA = Average(smoothMA, 50);
TwoSmoothMA = 1; // A dummy return value that will not be used in this case.
```

We can now use our new function in the following way:

```
//Indicator: Two Smooth Averages
Meta:
    SubChart(False);
Variables:
    slowMA, fastMA;

TwoSmoothMA(slowMA, fastMA); // The values for slowMA and fastMA are set in
the function

DrawLine(slowMA, "Slow");
DrawLine(fastMA, "Fast");
```

The advantage of using multiple output functions is that related operations can be nicely encapsulated, but more importantly that if the result of each output rely on a shared calculated value, it is more efficient to do the shared part once rather than twice in two functions that return single values.

RETRIEVING PAST VALUES WITH DISPLACEMENTS

By using displacements, for example "Price[i]", you can retrieve older function results. A good example for this would be the search for a breakout within the last 20 days' high or low. Please note that with the displacement attribute, past values are retrieved. Therefore "[1]" gives the value for yesterday, [2] the value of two days ago etc.

> **Caution:** Trying to retrieve values of functions that are not calculated continuously may result in wrong indicator results. This would be the case, for example, when the function call is in a subroutine that is not executed for each bar.

ADDITIONAL INFORMATION FOR FUNCTIONS

For all Equilla functions, you can find additional information in Tradesignal. To display it, open the source code in the Equilla Editor. Then right-click on the function in question, e.g. *DateTime*, and choose **Lookup Equilla Function** from the context menu. A window opens with information on the command and links to related functions.

EQUILLA OPERATORS

An important part of the scripts is the calculation of values. Often only basic arithmetic is necessary for these calculations, but sometimes the tasks are more complex. Equilla places many operators for calculating and comparing values at your disposal.

CALCULATIONS

BASIC ARITHMETICS

For calculating values, the four basic arithmetic operations are available. These are used most often.

```
Variables:
    myFirstVar, mySecondVar, myThirdVar;

//Adding two values
myFirstVar = mySecondVar + myThirdVar;

//Subtracting two values
myFirstVar = mySecondVar - myThirdVar;

//Multiplying two values
myFirstVar = mySecondVar * myThirdVar;

/* When dividing two values, care has to be taken that no division by zero
occurs (which may happen if price series are faulty and include a zero). In
this case, Tradesignal instantly reports an error and stops the calculation.
After a simple example for a division, two examples are given that are
designed to prevent a division by zero. */

//Simple Division
myFirstVar = mySecondVar / myThirdVar;

//Query if Divisor = NULL
If myThirdVar <> 0 Then
    myFirstVar = mySecondVar / myThirdVar

//If myThirdVar is zero, the result of the
//preceding trading period is used.
//The alternative block starting with 'Else'
//may be left out
Else
    myFirstVar = myFirstVar [ 1 ];

//The Equilla function ''Divide' is available for this task
```

```
//The two operands have to be passed in brackets
myFirstVar = Divide( mySecondVar , myThirdVar );
```

MATHEMATICAL FUNCTIONS FOR COMPLEX CALCULATIONS

With some effort, every calculation can be performed. However, you can reduce the programming load by using functions already provided for special tasks. You can find a list of all functions by clicking the **Function** button in the toolbox. To see the code, double-click the function or select **Edit** from the context menu.

In the following, excerpts of some important functions and their use are given.

```
//No subchart
Meta:
    Subchart( false );

//Declare period for calculation and variables
Inputs:
    Period( 10 );

Variables:
    myFirstVar, mySecondVar, myThirdVar;


/* This way you can find the highest value in a series. Please note:
Parameter 1: The used data has to be given as a continuous series, either a
price series or a value that is calculated or existent at each bar.
Parameter 2: The calculation span gives the number of values from the past
that are used in the calculation. In the example, period is set to '10'. */

//Example 1: finding the highest close
myFirstVar = HHV( Close, Period );

//Example 2: finding the highest price span
mySecondVar = High - Low;
myFirstVar = HHV( mySecondVar, Period );
/* There is a similar function you can use for finding the lowest price in a
series. Besides the different function name, all statements from above
apply. */

//Example 1: finding the lowest close price
myFirstVar = LLV( Close, Period );

//Example 2: finding the lowest price span
mySecondVar = High - Low;
myFirstVar = LLV( mySecondVar, Period );
```

```
/* When working with data, you often do not know during the programming
which values are less or greater than others. However, it is often important
to pursue calculations with the greater or lesser of two values. For this
task, the two functions MaxItems and MinItems are available. In both cases,
```

```
two or more comma-separated values have to be passed in brackets. The
functions then give the greatest or smallest value from a list of values. */

//Calculating the height of a candlestick body
//without knowing if the close is below or above the open

myFirstVar = MaxItems( Open, Close ) - MinItems( Open, Close );

//Extracting the decimal places of a value
If isLastBar Then
    Begin
        myFirstVar = Frac( 5.5 );
        Print( myFirstVar ); //0,5 is output
    End;

//Finding the biggest integer that is smaller than the given value
If isLastBar Then
    Begin
        myFirstVar = Floor( 5.5 );
        Print( myFirstVar ); //5 is output
    End;

//Finding the smallest integer that is greater than the given value
If isLastBar Then
    Begin
        myFirstVar = Ceiling( 5.5 );
        Print( myFirstVar ); //6 is output
    End;

//Calculating the cosine of a value
If isLastBar Then
    Begin
        myFirstVar = Cos( 5.5 );
        Print( myFirstVar ); //0,7086697742913 is output
    End;
```

COMPARISONS

When calculating an indicator, it is often necessary to compare values and then execute certain functions. For value comparison, several operators are available.

SIMPLE COMPARISONS BETWEEN TWO VALUES

```
//No subchart
Meta:
    Subchart( false );

//Declare variables
Variables:
    myFirstVar, mySecondVar, myThirdVar;

//Query if two values are identical
```

```
If isLastBar Then
    Begin
        If myFirstVar = mySecondVar Then
            Print( "Hello World" ); //Data is output if values are identical
    End;

//Query if two values are unequal
If isLastBar Then
    Begin
        If myFirstVar <> mySecondVar Then
            Print( "Hello World" ); // Data is output if values are unequal
    End;

//Query if the first value is greater or equal to the second
If isLastBar Then
    Begin
        If myFirstVar >= mySecondVar Then
            Print( "Hello World" ); // Data is output if the value is
                            // greater or equal to the
                            // second value
    End;

//Query if the first value is smaller or equal to the second
If isLastBar Then
    Begin
        If myFirstVar <= mySecondVar Then
            Print( "Hello World" ); // Data is output if the value is
                            // smaller or equal to the
                            // second value
    End;
```

COMPARISONS BETWEEN SEVERAL VALUES THROUGH COMBINATION

```
//No subchart
Meta:
    Subchart( false );

//Declare variables
Variables:
    myFirstVar, mySecondVar, myThirdVar;

//Combining two comparisons with the AND operator
If isLastBar Then
    Begin
        If ( myFirstVar = mySecondVar ) AND ( myFirstVar = myThirdVar ) Then
            Print( "Hello World" ); //Data is output if both comparisons are
true
    End;

//Combining two comparisons with the OR operator
If isLastBar Then
    Begin
```

```
        If ( myFirstVar = mySecondVar ) OR ( myFirstVar = myThirdVar ) Then
            Print( "Hello World" ); //Data is output if one comparison or
both
                        //are true
    End;


//Combining two comparisons with the XOR operator
If isLastBar Then
    Begin
        If ( myFirstVar = mySecondVar ) XOR ( myFirstVar = myThirdVar ) Then
            Print( "Hello World" ); //Data is output if one comparison is
true
                        //but not both
    End;
```

FINDING CROSSING TIME SERIES

One of the most important problems in indicators and strategies is the search for intersections between prices and averages, indicators and alert lines etc. Tradesignal offers several functions for this task.

```
//No subchart
Meta:
    Subchart( false );

//Set periods for calculation
Inputs:
    PeriodFast( 10 , 1 ),
    PeriodSlow( 20 , 1 );

//Declare variables
Variables:
    fastAvg, slowAvg;

//Calculating a short average of close prices
fastAvg = Average( Close, PeriodFast );
//Calculating a longer average of close prices
slowAvg = Average( Close, PeriodSlow );

If isLastbar then
    Begin
        //Query if the faster average crosses over slower
        If fastAvg Crosses Over slowAvg Then
            Alert( "Average moves upwards" );
        //Query if the faster average crosses under slower
        If fastAvg Crosses Under slowAvg Then
            Alert( "Average moves downwards" );
    End;
```

EQUILLA LOOPS

Loops serve to call functions multiple times without having to enter the function code again and again. This is especially useful in cases in which the number of necessary runs for the loop is calculated during program execution.

In this chapter, all loop types available in Equilla are described.

For all Equilla operators, you can find additional information in Tradesignal. To display it, open the source code in the Equilla Editor. Then right-click on the operator in question, e.g. Begin, and choose **Lookup Equilla Function** from the context menu. A window opens with information on the operators and links to related functions.

LOOPS WITH A DEFINITE NUMBER OF CYCLES (FOR...TO...DO)

For this type of loop, start and end values are given. The number of cycles is given by their difference.

```
//This loop repeats the command 10 times
For counter = 0 to 9 Do
    command;

//This loop repeats the block of commands 10 times
For counter = 0 to 9 Do
    Begin
        command1;
        command2;
        ...
        commandX;
    End;
```

You also have the option to rule with which steps the loop have to run. The standard for the step is 1.

```
//This loop repeats the command 5 times
For counter = 0 to 9 Step 2 Do
    command;

//This loop repeats the command 10 times with a negative incrementation
For counter = 9 to 0 Step -1 Do
    Print(Counter);
```

You also have the option to give the start and end value of the loop as variables. This way, the loop is more flexible and results of partial calculations or functions can be used as counters.

```
//This loop repeats the command 13 times
Variables:
    startCount( 0 ), endCount( 12 );

For counter = startCount to endCount Do
    command;

//This loop repeats the block of commands 13 times
For counter = startCount to endCount Do
    Begin
        command1;
        command2;
        ...
        commandX;
    End;
```

CONDITION-CONTROLLED LOOPS

The above presented type of loop uses a fixed value as a counter for the number of cycles. The values can be set by variables, but these variables cannot be changed from within the loop. However, this is necessary in cases, for example, in which the number of cycles depends on the result of a calculation within the loop itself.

For these cases, other types of loops exist. These loops run until a certain result or value in the cycle meets a certain condition. There are two different subtypes of these loops:

LOOP WITH THE CONDITION BEFORE THE EXECUTION (WHILE...DO)

The condition for the loop is checked before the loop is executed.

```
//This loop runs 10 times ( 0-9 )
Variables:
    counter(10), sumCounter(0);

While ( counter < sumCounter ) Do
    sumCounter = sumCounter + 1;
```

```
//You can also run several commands as a block.
Variables:
    counter(10), sumCounter(0);

While ( counter < sumCounter ) Do
    Begin
        sumCounter = sumCounter + 1;
        Print( sumCounter );
    End;
```

LOOPS WITH THE CONDITION AFTER THE EXECUTION (REPEAT...UNTIL)

The condition for the loop is checked after each cycle run, i.e. after the calculation.

```
//This loop runs 10 times ( 0-9 )
Variables:
    counter(10), sumCounter(0);

Repeat
    sumCounter = sumCounter + 1;
Until ( sumCounter < counter );
```

```
//You can also run several commands as a block.
Variables:
    counter(10), sumCounter(0);

Repeat
    Begin
        sumCounter = sumCounter + 1;
        Print( sumCounter );
    End;
Until ( sumCounter < counter );
```

EQUILLA CONDITIONS

One of the most important aspects of programming indicators, strategies or other routines is the reaction to certain events, like calculation results or user inputs. Without the control, activation or deactivation of program parts depending on those events, no complex programming would be possible.

For all Equilla conditions, you can find additional information in TradeSignal. To display it, open the source code in the Equilla Editor. Then right-click on the operator in question, e.g. Else, and choose Lookup Equilla Function from the context menu. A window opens with information on the operators and links to related functions.

SIMPLE CONDITION (IF ... THEN)

You can use the key words **If...Then** to encapsulate one or more conditions. Depending on the results, different actions are performed. The conditions can be combined by using the three operators And, Or and Xor (see the chapter "Equilla Operators" on page 420).

```
//No subchart
Meta:
    Subchart( false );

//A list with two input parameters is declared

Inputs:
    commodities( Silver, Gold );

//Query if the first list entry is selected
If Commodities = 0 Then
    Print( "Silver price rises." )
Else //If not selected, the alternative is processed
    Print( "Gold price rises." );
```

CONDITIONS WITH BRANCHING (IF...THEN...ELSE)

By entering an alternative command, your script can react to met and not met conditions likewise. When testing several cases at once, it is sensible to process them within the same context.

```
//No subchart
Meta:
    Subchart( false );

//A list with three input parameters is declared

Inputs:
    commodities( Silver, Gold, Platin );

//Query if the first list entry is selected
If Commodities = 0 Then
    Print( "Silver price rises." )
Else //If not selected, the alternative is processed
    Print( "Gold price rises." );

//Query if the first list entry is selected
If Commodities = 0 Then
    Print( "Silver price rises." )
Else If Commodities = 1 Then //If not selected, the second alternative is
checked
    Print( "Gold price rises." )
Else //Is it not selected, only the last possibility is left.
    Print( "Platin price rises." );
```

Note: The line before the Else statement must not end with a semi-colon.

NESTED CONDITIONS

You can put several statements into a block and nest queries. The following example shows how to write begin-end blocks and nested conditions.

```
//Important, this is not a working program. Do not attempt
//to compile it in the editor.
//We check the cucumber and want to buy a really fresh one only
If cucumber = green Then
    Begin
        //The color meets our first condition, but is it also fresh?
        If ( cucumber = fresh ) Then
            Begin
                //The cucumber is fresh, we use it
                "Cut in slices";
                "Add tomato slices";
                "Add dressing";
                //If it's Friday, add garlic
                If Today = Friday Then
                    "Put lots of garlic in the dressing"
                Else //If it's not Friday, do not use garlic
                    "Skip garlic";
            End
        Else //The cucumber was too soft and squashy, we try to buy another
one.
            "Drive to another store";
    End;
```

EQUILLA QUOTATIONS AND TIME PERIODS

This entry is about quotations that are delivered by the provider and that you need as input values for the calculation of functions, indicators and strategies. It also offers information on working with date and time date. In the end, you can find information and examples on how to find distinct bars in a chart.

For all Equilla functions, you can find additional information in Tradesignal. To call it up, open the source code in the "Equilla Editor" on page 399. Then right-click on the function in question, e.g. *Accelerator*, and choose **Lookup Equilla Function** from the context menu. A window opens with information on the function and links to related functions.

DATA IN QUOTATION SERIES

The most important data needed for indicators are the quotations. These are delivered by the data provider and can be displayed in a chart. In addition, you can use external quotations from locally saved files in Tradesignal. From most providers, you will receive the following data:

Open Opening price for each trading period

High High price for each trading period

Low Low price for each trading period

Close Closing price for each trading period

Volume Trading volume for each trading period

Open Interest Open interest in the case of futures

PARTICULARITIES OF VOLUME DATA

Two different definitions of trading volume are in existence, which are often confused.

→ The more meaningful definition is that the trading volume is given by the number of traded stocks multiplied with its traded price. This way, the volume represents the amount of capital that was traded in the period.

→ Differing from this, sometimes the trading volume is only given as turnover in traded pieces. This means only the number of traded stocks is taken as volume, without information on the traded prices. The problem is that in this case, 100 stocks at 0.20 cents would yield the same volume as 100 stocks traded at $164.40. The number of pieces does not represent the capital used for the trades.

Make sure to ask your data provider which kind of volume data is delivered. Depending on the volume interpretation, indicator data and statistics have to be adapted or put into perspective.

EXAMPLE: USING QUOTATIONS SERIES WITHOUT VOLUME

```
/*      The following example demonstrates the usage of quotations series without
volume. Four variables are declared which will be used for each of the
quotation series. Following this, an average is calculated for each series,
saved in the variables and displayed as a candlestick chart in a new window.
Remember that Equilla scripts are processed once for each trading period. */

Meta:
    Subchart ( true );

//The trading period for the average calculation is declared as input.
//You can later edit the value in the properties of the indicator.

Inputs:
```

```
    Period( 10, 1 );

//Variables are declared

Variables:
    myOpenValue, myCloseValue, myLowValue, myHighValue,
    avgOpen, avgClose, avgLow, avgHigh;

//Day for day is processed. For each trading day, the price is assigned to
//the variables.
myOpenValue = Open;
myCloseValue = Close;
myLowValue = Low;
myHighValue = High;


/* Now the average calculation follows, which is done once per trading day.
The passing of the quotations to the calculation functions is especially
complicated to demonstrate the underlying principle. Alternatively, you can
pass the quotations to the functions directly. avgOpen = Average ( Open,
Period ); avgClose = Average ( Close, Period ); avgLow = Average ( Low,
Period ); avgHigh = Average ( High, Period ); */

avgOpen = Average ( myOpenValue , Period );
avgClose = Average ( myCloseValue, Period );
avgLow = Average ( myLowValue, Period );
avgHigh = Average ( myHighValue, Period );

//With the result of the average calculations
//candlesticks are drawn
DrawCandleStick( avgOpen, avgHigh, avgLow, avgClose, Yellow, Red, DarkBlue
);
```

INLINE INSTRUMENTS AND DATA INPUTS

Indicators can be used for more than just the quotations of a single basic symbol in the chart. Many indicators use the quotation series of more than one stock. The same applies to strategies, many of which are based on several symbols or different quotation series. For these calculations, the tools Inline Instruments and Data Inputs are available.

↑　INLINE INSTRUMENTS

INLINE INSTRUMENTS

An inline instrument is a reference to the stock data which is used directly in the source code. You have to give the symbol and the relevant quotation series. The following example calculates the difference between the quotations of Puma and Adidas Salomon. The result is displayed in a candlestick chart. It does not matter to which chart you apply this indicator - it always uses the given quotations of

those two companies. Therefore, inline instruments can be used for calculation with quotations that are not a part of the current chart or portfolio.

```
//Generate a subchart
Meta:
    Subchart( true );

//Declare variables
Variables:
    openValue, highValue, lowValue, closeValue;

/* Subtract the time series. By giving the symbol in the series, quotations
can be used that are not part of the current chart. */
openValue = Open of 'pum ger' - Open of 'ads ger';
highValue = High of 'pum ger' - High of 'ads ger';
lowValue = Low of 'pum ger' - Low of 'ads ger';
closeValue = Close of 'pum ger' - Close of 'ads ger';

//Display result as candlesticks
DrawCandleStick( openValue, highValue, lowValue, closeValue, White, Red,
Black );
```

DYNAMIC INLINE INSTRUMENTS

Tradesignal 6 offers you the ability to create inline instruments based on runtime information, e.g. the string inputs of an indicator or strategy may be used instead of a constant string expression.

See the **Equilla Formula Language** reference entry **Instruments** in Tradesignal for more details on importing symbols.

```
//Import a single instrument and reference it in the script by using
DrawLine on its variable
Input:
    Symbol( "" );

Instruments:
    mySymbol( Symbol );

DrawLine( mySymbol );
```

You can also create a list of inline instruments and reference any of the symbols in the list via its index which starts at zero.

```
//Import a list of instruments and calculate the average price
Input:
    ListSymbol( "" );

Instruments:
    myInstruments( List( ListSymbol ) );
```

```
Variables:
    prices( 0 ), i( 0 );

prices = 0;

For i = 0 to Len( myInstruments ) - 1 Begin
    prices = prices + Close of myInstruments( i );
End;

If Len( myInstruments ) != 0 Then
    DrawLine( prices / Len( myInstruments ), "Average" );
```

DATA INPUTS

With data inputs, you can access different quotation series or other data in the chart or portfolio. The only condition is that those series are available in the same chart or portfolio during runtime. For example, you can write an indicator displaying the spread between two time series without defining beforehand to which symbols the series belong. You simply start a chart with two symbols and then apply the indicator.

↑ USING DATA INPUTS IN A CHART

To recreate the indicator from above with data inputs instead of input instruments, create a chart with Puma AG and Adidas Salomon AG. Now enter a new indicator. The quotations are used as data inputs. The first quotation series is referred to as "Data1", the second as "Data2" etc. Since up to twelve symbols can be displayed in a chart, you can enter up to 12 data inputs.

```
//Generate subchart
Meta:
    Subchart(true);

//Using the data input parameters for the spread
DrawCandleStick( Open of Data1 - Open of Data2,
High of Data1 - High of Data2,
Low of Data1 - Low of Data2,
Close of Data1 - Close of Data2,
white, red, black);
```

DATE AND TIME FOR QUOTATION SERIES

The information is delivered with the price data, online or in files. For correct display of quotations, date and time are necessary. This information is also often

necessary for other functions, e.g. to recognize day change-overs or certain days of time.

HOW A CHART IS DRAWN

The quotations are displayed linearly, from the first period (in the past) to the last. Usually, this is the current day or hour, depending on the time base of the chart. Within an Equilla script, the navigation is done with the consecutive number of the period (not the date or time). Therefore, if you want to use the close price of three days ago in your indicator, you need to write the script so that is goes three periods back in time.

The date cannot be used for this kind of navigation. You cannot retrieve data such as price or volume with a date. However, you can read the date and time of each period for other uses, for example the output of date and time of certain price levels in a chart.

WHICH DATA IS OFFERED BY TRADESIGNAL?

Date The date for the current period as numeric value: 1060609 (this is the 09.06.2006)

Time The time of the current period as numeric value: 1645 (this is 16:45)

DateTime A combined expression that is already formatted: 2006/07/05 17:25:00.000 (this is the 05.07.2006 1725)

Extracting the data with code:

```
//Date of the current trading day in a daily chart
Variables:
    myDate;

myDate = Date

//In the output window, the date for each trading day in the chart
//is displayed continuously.
Print( myDate );
```

```
//Time of the current period in an intraday chart
Variables:
    myTime;

myTime= Time;

//In the output window, the time for each trading period in the chart
//is displayed continuously.
Print( myTime);
```

FUNCTIONS FOR FORMATTING AND WORKING WITH DATE AND TIME

Above, the three basic time series for date and time are given. These data can be read for every period and be used further. In the example above, the date and time were read and printed in the output window. However, it is often necessary to find out single components of the date, for example the day of week, the calendar month or the current year. You may also want to use the given date and time values in another format than the one offered by the system.

FUNCTIONS FOR SPLITTING DATE AND TIME

The following functions are not a complete list of all available functions. Only the most important ones are listed.

For returning date components, you can use the simple functions *Year(date), Month (date)* etc. When entering "now" for the date, the current date is used.

Instead of day, the function *DayOfMonth* can be used.

```
//Example: Write the components of the current date and time to the output
window:
If IsLastBar Then
    Begin
        ClearDebug();
        Print( "Year=" + CStr( Year( Now ) ) );
        Print( "Month=" + CStr(Month( Now ) ) );
        Print( "Day=" + CStr( Day( Now ) ) );
        Print( "Hour=" + CStr( Hour( Now ) ) );
        Print( "Minute=" + CStr( Minute( Now ) ) );
        Print( "Second=" + CStr( Second( Now ) ) );
        Print( "MilliSecond=" + CStr( MilliSecond( Now ) ) );
    End;
```

To return parts of the *DateTime*, the function *DatePart* has to be used, defined as *DatePart(DateInterval, DateTime)*. For the definition of DateTime, see above.

The *DateInterval* is a numeric constant representing a certain part of the *DateTime*. It is always constructed with a leading Interval followed by a date or time expression.

Interval	Time
Interval_Year	Year
Interval_Month	Month of Year (1-12)
Interval_Day	Day of Month (1-31)
Interval_DayOfMonth	Day of Month (1-31)
Interval_DayOfWeek	Day of Week (0-6)

Interval	Time
Interval_DayOfYear	Day of Year (1-365)
Interval_Hour	Hours
Interval_Minute	Minutes
Interval_Seconds	Seconds

```
//Example: Write a date or time part to the output window:

Input:
    Interval( iYear, iMonth, iDay, iHour, iMinute, iSecond );

Variables:
    name, part;

If Interval = iYear Then Begin
    name = "Year";
    part = Interval_Year;
End Else If Interval = iMonth Then Begin
    name = "Month";
    part = Interval_Month;
End Else If Interval = iDay Then Begin
    name = "Day";
    part = Interval_Day;
End Else If Interval = iHour Then Begin
    name = "Hour";
    part = Interval_Hour;
End Else If Interval = iMinute Then Begin
    name = "Minute";
    part = Interval_Minute;
End Else If Interval = iSecond Then Begin
    name = "Second";
    part = Interval_Second;
End;

Print( name + "=" + CStr( DatePart( part, DateTime ) ) );
```

FUNCTIONS FOR FORMATTING DATE AND TIME DATA

The basic date and time entries are dry figures. The DateTime component is also not formatted according to European standard. To allow you to generate various date and time formats, complex formatting functions are available. Two important ones are described here.

```
/* With the following function, you can format a date so that it includes
the full name of the month. The function has the DateTime parameter as
input. The formatting possibilities are quite unlimited. */

//No subchart; output in the main chart
Meta:
    Subchart ( false );
```

```
//Declaring variables for date and day
Variables:
    myDate, myDay;

//Reformatting the date, for example to
myDate = FormatDate ( DateTime, "dd/mm/yyyy");

//Here the day is read
myDay = DayOfWeek ( Date );

//Check if it is Monday - if yes, the text is
//output in the chart
if myDay = 1 Then
    DrawText ( High + Range(), "Monday", "Monday," + mydate, 10, blue );
```

```
/* The following function is similar to the FormatDate function. It serves
for formatting the time data in user-defined formats. It is recommended to
take a look at the Equilla help for further information. */

//No subchart; output in the main chart
Meta:
    Subchart( false) ;

//Declaring the variables for time and the formatted time
Variables:
    myTime, myFormatTime;

//Here the time is read
myTime = Time;

//Here the time is reformatted with a separator
myFormatTime = FormatTime( DateTime, "hh:mm");

//At five past nine, a message is displayed in the chart
If Time = 0905 Then
    DrawText ( High + Range(); "Good morning!", "It is " +myFormatTime,
10, blue);

//At one o'clock, it's time for the lunch break
If Time = 1300 Then
    DrawText ( High + Range(); "Lunch time!", "Go and have something to eat,
it is " +myFormatTime, 10, blue);

//At half past five, it's time for knocking off
If Time = 1730 Then
    DrawText ( High + Range(); "Bye!", "Call it a day, it is "
+myFormatTime,
10, blue);
```

INFORMATION ABOUT SPECIFIC PERIODS AND BARS

In Equilla Graphs, Outputs and Alerts you can find information on how the navigation in a chart can be controlled by an Equilla script. Reference values are used that can also be interpreted as step sizes. Much as in a game, where a figure makes 6 steps forwards or backwards, the program navigates through the time series.

```
//Reading the date of three days ago
myPrevDate = Date[ 3 ];

//Reading the close price of five days ago
myPrevClose = Close[ 5 ];
```

From each period in a chart, you have access to all other data and prices in the chart by going back or forward in the data. To do so, some useful functions are available in Tradesignal, which can be used with Equilla.

```
/* The parameter 'CurrentBar' gives the reference number of the current
period The number is listed consecutively, as can be seen in the chart. */

//Output to be done in the main chart
Meta:
    Subchart( false );

Variables:
    myBarNum;

//The numeric value CurrentBar is converted into a string
myBarNum = CStr( CurrentBar );

DrawText( High + Range(), "Bar numbers", myBarNum, 10, blue);
```

For many applications it is important to execute a specific action at the very beginning or ending of a chart. For example, variables are often set at the first bar. Two important functions are offered by Tradesignal for this purpose.

- → With the first function, you can read out how many bars (periods, candlesticks) are loaded in the chart.

- → With the second function, a flag is set which is "true" when the last bar is reached.

```
//We set two variables at the first bar
Variables:
    myEntryCondition, myExitCondition, myBarNums;

//We look for the first bar
If CurrentBar = 1 Then
```

```
    Begin
        myEntryCondition = false;
        myExitCondition = false;
    End;
/* We look for the last bar. This time we use the number of total bars in
the chart which we get with the variable 'LastBar'. */

If CurrentBar = LastBar Then
    Begin
        myBarNums = LastBar;
        Print ( myBarNums );
    End;

//To find the last bar, you can also use the
//function 'IsLastBar' which is a boolean.

If isLastBar = True Then
    Begin
        myBarNums = LastBar;
        Print ( myBarNums );
    End;
```

Last not least it is often important to know the current time base of the indicator. For this, the constant "TimeBase" is available. With it you get the number of seconds spanned by each bar. With some mathematics, we can quickly find out if the indicator is in a day chart or one with a five minute span.

```
Variables:
    outputString("");

If CurrentBar = 1 Then
    Begin
        //Checking for a day chart
        if TimeBase = 86400 Then
            outputString="d";
        //Checking for a one hour time base
        if TimeBase = 3600 Then
            outputString="1h";
        //Checking for a five minute time base
        if TimeBase = 300 Then
            outputString="5m";
        //Checking for a one minute time base
        if TimeBase = 60 Then
            outputString="1m";
    End;

//At the last bar, the output is written
//into the output window
If isLastBar Then
    Print ( outputString );
```

EQUILLA GRAPHS, OUTPUTS AND ALERTS

There are several ways to offer data, calculation results, symbols and reports to the users. One of the most important functions is the graphic display of indicators and other information. Tradesignal offers output functions for text and reports and an alert function.

For all Equilla operators, you can find additional information in Tradesignal. To display it, open the source code in the Equilla Editor. Then right-click on the operator in question, e.g. Begin, and choose **Lookup Equilla Function** from the context menu. A window opens with information on the operators and links to related functions.

DRAWING LINES, AREAS, SYMBOLS OR TEXT IN A CHART

With the drawing statements, usually indicators and graphs related to them are generated. An indicator usually consists of a line or histogram. Some indicators also use filled areas or symbols or offer information as text.

In this chapter, you can find general information on using colors, line width, symbols and their most important applications. When you enter a drawing statement in the editor, you can find all parameters and their sequence in the tooltip. Parameters that are not mandatory are labeled with "optional".

BASICS OF DRAWING STATEMENTS

Here you can find information on using drawing statements, why they should have captions and how the displacement function can be used to move the graphic display in the timeline. The most important parameters are given.

CAPTIONS

A caption should be entered for each statement. This is especially useful when several drawing statements are used in the same chart. The captions have two important functions:

The drawing statements are more easily identified in the property inspector.

In the tooltips and the target cursor mode in the chart, values are displayed for all graphic objects under the cursor. The value interpretation is easier when the drawing statements are named.

If no caption is given, each drawing statement is labeled with "Plot" and a consecutive number.

DISPLACEMENT

Equilla scripts are executed once per bar. By using so-called displacements, for example "Price[i]", you can retrieve older function results. In a similar way, drawing statements can be displaced. For this, the Displacement parameter has to be added directly after the statement. Enter a positive value in square brackets [ ] to move it into the past, and a negative value to move it into the future.

↑ DISPLACEMENT EXAMPLE

Example for a displacement:

```
// Generate no subchart
Meta:
    Subchart( false );

//Execute at last bar
If isLastBar Then
    Begin
        DrawSymbol[3] (Low[3], "Past", SymbolSquare, 30, black, blue );
        DrawSymbol[-3] (Low, "Future", SymbolSquare, 30, black, blue );
    End;
```

PARAMETERS

For all drawing statements, optional parameters can be specified. These are caption, line width, symbol size, colors etc. These parameters can be given by variables which can be changed at runtime (see some of the examples below). Feel free to experiment with the options.

Especially interesting is using dynamic color values. Each component of the color values of RGB and HSV modes can be changed. The opacity can also be set.

Design parameters like line or symbols styles can also be entered numerically. However, while this saves space, the full parameter names are easier to read and remember.

DRAWING STATEMENTS AND SYNTAX

Below, the most commonly used drawing statements and their syntax are listed. In the thumbnails, screenshots with graphs and source code are given.

DRAWLINE ( )

With this statement, a line is drawn. Style, size and color can be specified. Constant values or definable parameters (e.g. results or calculations) can be used.

↑ LINE EXAMPLE

```
DrawLine[ Displacement ]( Value, "caption", Style, LineWidth, Color );
```

Example for a sine curve:

```
// Generate subchart
Meta:
    Subchart( true );

//Declare variables
Variables:
    mySinValue, counter;

//Assign a value to the variable
mySinValue = Sin(counter);
counter = counter + 1;

//Draw the values as a solid red 2 pixel line
DrawLine( mySinValue, "Sinus", StyleSolid,2, Red );
```

DRAWFOREST ( )

With this statement, a line is drawn. Style, size and color can be specified. Constant values or definable parameters (e.g. results or calculations) can be used.

```
DrawForest[ Displacement ]( StartValue, EndValue, "caption1", "caption2",
NeedleSize, NeedleColor, LinkForest True/False );
```

Example for an indicator displayed as forest:

```
// Generate no subchart
Meta:
    Subchart( false );
```

```
Inputs:
    Period( 20, 1 );

//Declare variables
Variables:
    myOwnIndicator;

//Create the indicator
myOwnIndicator = RSI ( Momentum (Close, Period), 5 );

//Display indicator as forest
DrawForest( 0, myOwnIndicator, "Basis", "MEI", thick, blue, false );
```

DRAWAREA ( )

With this statement, an area is drawn between two values of the scale. Colors and opacity can be set.

```
DrawArea[ Displacement ]( Value1, Value2, "caption1", "caption2", FillColor,
LineColor1, LineColor2 );
```

Example for drawing an area with color gradient:

```
// Generate a subchart
Meta:
    Subchart( true );

//Declare variables
Variables:
    counter, colorValue;

//Change the counter in a loop
if counter <= 254 then
    counter = counter + 1;

//Reset the counter at 255
Else
    counter = 0;

//Set the RGB color value with a dynamic value.

colorValue = RGB( counter, 150, 150 );

//Set opacity.

colorValue = TransparentColor ( colorValue, counter );

//Draw the area between the positive and negative values of
//'counter', with black border lines.

DrawArea( counter, Neg( counter ), "Up", "Down", colorValue, Black, Black);
```

DRAWSYMBOL ( )

Symbols example

With this statement, symbol charts with circles, start, dots, triangles etc. can be drawn. The size and colors can be controlled dynamically.

```
DrawSymbol[ Displacement ]( Value, "caption", SymbolStyle, SymbolSize,
SymbolBorderColor, SymbolFillColor );
```

Example for drawing triangles (pointing up or down, depending on the curves):

```
// Generate no subchart
Meta:
    Subchart( false );

//Declare input
Inputs:
    Period( 20, 1 );

//Declare variables
Variables:
    avgValue;

//Calculate the average close price
avgValue = XAverage ( Close, Period );

//Display an triangle pointing upward, if
//the price crosses above the average.
If Close Crosses over avgValue Then
    DrawSymbol( High, "CrossUp", SymbolTriangleUp, 20, black, darkgreen);

//Display an triangle pointing downward, if
//the price crosses below the average.
If Close Crosses under avgValue Then
    DrawSymbol( Low, "CrossUp", SymbolTriangleDown, 20, black, darkgreen);

//The average itself is displayed as line.
DrawLine( avgValue, "Average", StyleSolid, 2, black );
```

DRAWTEXT ( )

Output text example

With this statement, text is output. Variables like font size, color, style etc. can be specified.

```
DrawText[ Displacement ]( Value, "caption", textoutput, FontSize, FontColor,
FontStyle, URL );
```

Example for text output:

```
//Generate no subchart
Meta:
    Subchart( false );

//Declare input
Inputs:
    Period( 10, 1 );

//Declare variables
Variables:
    avgValue;

//Calculate the average close price
avgValue = WAverage ( Close, Period );

//When the average turns up, text is added to the
//Low of the last day.
If TurnsUp( avgValue, 2, 1 ) Then
    DrawText[1]( Low[1], "Up", "Bottom", 10, Darkgreen);

//When the average turns down, text is added to the
//High of the last day.
If TurnsDown( avgValue, 2, 1 ) Then
    DrawText[1]( High[1], "Down", "Top", 10, Red );
```

DRAWBAR ( )

With this statement, a bar chart is drawn. Each of the four values - open, high, low, close - can be chosen freely. This way, indicators can also be drawn as bars.

In this statement no caption needs to be specified, as it can only be used once in each script.

```
DrawBar[ Displacement ]( Open, High, Low, Close, BullishColor, BearishColor
)
```

Example for modified OHLC values as bars (Heikin Ashi method):

```
//Generate a subchart
Meta:
    Subchart( true );

//Declare input
Inputs:
    Period( 14, 1 );

//Declare variables
Variables:
    avgOpen, avgHigh, avgLow, avgClose;

//Calculate the average for all quotes.
```

```
avgOpen = XAverage( Open, Period );
avgHigh = XAverage( High, Period );
avgLow = XAverage( Low, Period );
avgClose = XAverage( Close, Period );

//Display bars.
DrawBar ( avgOpen, avgHigh, avgLow, avgClose, DarkGreen, Red );
```
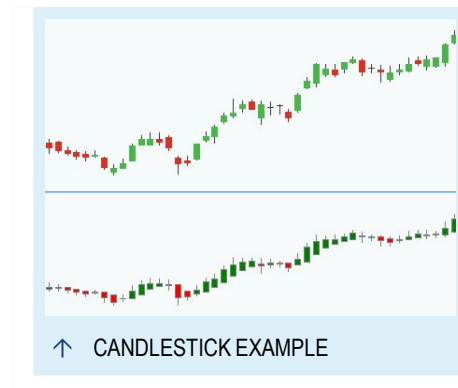
DRAWCANDLESTICK ( )

With this statement, a candlestick chart is drawn. Each of the four values - open, high, low, close - can be set freely. This way, indicators can also be drawn as candlesticks.

In this statement no caption needs to be specified, as it can only be used once in each script.

↑ CANDLESTICK EXAMPLE

```
DrawCandleStick[ Displacement ]( Open, High, Low, Close, BullishColor,
BearishColor,
BorderColor )
```

Example for modified OHLC display as candlesticks (Heikin Ashi method):

```
//Generate a subchart
Meta:
    Subchart( true );

//Declare input
Inputs:
    Period( 14, 1 );

//Declare variables
Variables:
    haOpen, haHigh, haLow, haClose;

//Calculate the Heikin Ashi values
If ( CurrentBar = 1 ) Then
    Begin
        haOpen = Open;
        haClose = Close;
    End
Else
    Begin
        haOpen = (haOpen[1] + haClose[1]) / 2;
```

```
        haClose = (open + high + low + close) / 4);
    End;

haHigh = MaxItems( high, haOpen, haClose );
haLow = MinItems( low, haOpen, haClose );

//Draw the Heikin Ashi values as candlesticks.
DrawCandlestick ( haOpen, haHigh, haLow, haClose, DarkGreen, Red, DarkGray
);
```

DRAWPRICEMARKER ( )

This draws a horizontal marker at the given price next to the price scale or aligned to the last bar. Price markers will only be drawn on the last bar of a chart. Additionally, price markers are only valid for one evaluation run. When an update occurs, all existing price markers will be deleted. Price markers are always drawn behind any other chart.

```
DrawPriceMarker( Price1, Price2, Width, FillColor, BorderColor,
BorderThickness, Alignment, Label, LabelSize, LabelColor, LabelOptions )
```

In contrast to drawing functions like DrawLine(), DrawPriceMarker () does not procure series data. Therefore the output from this function cannot be used from client scripts.Example for markers for all stop and limit order active on the current bar:

```
Meta:
SubChart( False );

Variables:
order, price, type, extent( 10 );

If IsLastBar Then Begin
For order = 1 To GetActiveOrderCount Begin
price = GetActiveOrderPrice( order );
type = GetActiveOrderType( order );
If type = OrderTypeLimit Then
DrawPriceMarker( price, price, extent, Blue, Blue )
Else If type = OrderTypeStop Then
DrawPriceMarker( price, price, extent, Red, Red );
End;
End;
```

DRAWING TOOLS WITH SPECIAL FUNCTIONS

For the two drawing tools DrawTrendLine() and DrawRectangle(), special functions are available in Equilla to draw with and manipulate these tools.

These special functions are passed as (tool) flags. They allow actions, for example expanding a rectangle into the "past" with "ToolLeftExtend".

In contrast to drawing functions like Drawline(), the output generated by the tool functions is valid for display in a chart only.

You can find more information on DrawTrendLine(), DrawRectangle() and the flags in Tradesignal help under Equilla Formula Language, menu entry Tools.

DRAWTRENDLINE ( )

This draws a trendline into a chart.

```
DrawTrendline( StartDate, StartTime, StartPrice, EndDate, EndTime, EndPrice,
Style, Width, Color, Flags )
```

The flags are special functions like ToolExtendLeft, ToolExtendTop etc.

Example for a trendline drawn at the highest high of the last bars:

```
Input:
Price( High ),
Period( 10, 1 );

Variables:
highVal;

If IsLastBar Then
Begin
// Remove any trendline from the previous bars
While ( ToolGetFirst() <> -2 )
ToolDelete( ToolGetFirst() );

    // calculate the highest high
highVal = HHV( Price, Period );

    // draw the trendline
DrawTrendline( DateTime[10], highVal, DateTime, highVal );
End;
```

DRAWRECTANGLE ( )

This draws a rectangle into the chart.

```
DrawRectangle( StartDate, StartTime, StartPrice, EndDate, EndTime, EndPrice,
BorderColor, FillColor, Flags )
```

The flags are special functions like ToolExtendLeft, ToolExtendTop etc.

```
Input:
LongColor( ColorGreen ),
FlatColor( Transparent ),
ShortColor( ColorRed );

Variables:
color,
flags( ToolDrawInBackground + ToolExtendBottom + ToolExtendLeft +
ToolExtendRight + ToolExtendTop );

// Select the background color
If MarketPosition = MarketPositionLong Then
farbe = LongColor
Else If MarketPosition = MarketPositionFlat Then
farbe = FlatColor
Else If MarketPosition = MarketPositionShort Then
farbe = ShortColor;

// Remove all previously drawn rectangles
While ( ToolGetFirst() <> -2 )
ToolDelete( ToolGetFirst() );

// Draw a rectangle in the background
DrawRectangle( Date, Time, Close, Date, Time, Close, color, color, flags );
```

CHANGE THE CHART TYPE OF AN INDICATOR/STRATEGY

You can change the output of an indicator or strategy in a chart (which is using one of the drawing functions described above) without changing or recompiling the script. For this, select the indicator or strategy and open the "Chart" on page 96 button menu in the Chart group in the toolbar. Then select the new chart type from the list.

SMALL EXCURSION IN CHROMATICS

In Equilla, there are several ways to enter colors. A number of color definitions can be entered as names. The usual ones are the standard colors like red, darkgreen, blue, black, magenta etc. The list of predefined colors offers many more colors.

Beyond that, the two color models HSV and RGB are available. When you define a color, for example in the color dialog in the mini toolbar, the RGB and HSV values are given below the color areas. With these values, every possible color can be entered.

THE TWO COLOR MODELS

```
//Ouput in a subchart
Meta:
```

```
    Subchart( true );

//Color values can be saved in variables
Variables:
    myFirstRGBColor, myFirstHSVColor;

//Color as RGB value
myFirstRGBColor = RGB( 100, 30, 250 );

//Color as HSV value
myFirstHSVColor = HSV( 100, 230, 250 );

//Lines in RGB color
DrawLine( 100, "RGB color", StyleSolid, 5, myFirstRGBColor );

//Lines in HSV color
DrawLine( -100, "HSV color", StyleSolid, 5, myFirstHSVColor );
```

USING OPACITY (TRANSPARENCY)

For every color, you can define an opacity value. This works for all colors, the standard colors as well as colors given by RGB or HSV values. Once again, color values can be given by variables which can be combined with opacity.

```
//Open a subchart
Meta:
    Subchart( true );

//Change this input value to see the opacity
//effect in the chart
Inputs:
    Transparency( 200, 1 );

//Color settings can be given as variables
Variables:
    myFirstRGBColor, MyFirstTransparentColor;

//Compose an RGB value
myFirstRGBColor = RGB( 100, 30, 250 );

//Add Opacity
myFirstTransparentColor = TransparentColor( myFirstRGBColor, Transparency );

//Draw an area with a transparent fill color
DrawArea( 100, -100, "Up", "Down", myFirstTransparentColor, black, black );
```

OUTPUT OF DATA IN THE OUTPUT WINDOW

The output window is used for the output of data or text with the Print statement. For example, you can output your own statistical or temporary results.

As a developer, it is often necessary to have detailed information about the program flow. With the Print function, a parameter output can be generated (emulating a debug mode) that helps finding eventual errors.

```
//Let the program communicate
Variables:
    myDate, myFutureDate;

myDate = FormatDate( DateTime, "dd.mm.yyyy");
myFutureDate = FormatDate( DateTime, "dd.mm.yyyy")[-1];

Print( "I'm just editing the: " + myDate + ", after that, " +
myFutureDate + " will be next.");

/* In the output window, the following appears: I'm just editing the:
2007/06/12, after that, 2007/06/14 will be next. */
```

DATA OUTPUT VIA FILE INTERFACE

Tradesignal offers the option to write data directly into a file. You can find the setting for the target folder of the PrintToFile function in the Tradesignal Options, tab Equilla. In the statement, only the file name can be specified.

```
Variables:
    fileName("UserStat.txt");

if isLastBar Then
    PrintToFile( fileName, "Indicator was last used at: " +
FormatDate( DateTime, "yyyy/mm/dd"));
/* A file is created with the entry: 'Indicator was last used at 2006/04/30'
*/
```

As long as you do not change or delete the file, Tradesignal appends each new line to the end of the file. This way, a history of entries results. If you want to ensure by way of a script that an existing file is used, you can delete that file.

```
Variables:
    fileName("UserStat.txt");

if isLastBar Then
    Begin
        //RemoveFile deletes the file
        RemoveFile( fileName );
        PrintToFile( fileName, "Indicator was last used at: " +
FormatDate( DateTime, "yyyy/mm/dd"));
    End;
/* A file is created with the entry: 'Indicator was last used at 2006/04/30'
At each start of the indicator, the existing file is deleted first. */
```

ALERT OUTPUT

General information on how to set up and use the alert function can be found in "Alerts" on page 329. You also have the option to output alerts via Equilla. Please note that an alert is only output if generated at the last bar of the chart. Therefore it does not matter at which

↑ ALERT WINDOW

position in the script the alert function is placed, since it is only executed when the last bar is reached.
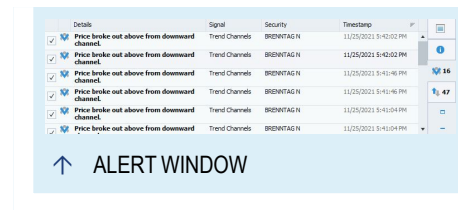
```
Variables:
    myAlertText("");

If isLastBar Then
    Begin
        myAlertText = "The prices break down!"
        alert( myAlertText );
    End;
```

EQUILLA ARRAYS

The following article offers an introduction to arrays in Equilla.

Arrays in Equilla are similar to those in other programming languages. They are data fields designed to contain large quantities of data. Each piece of data can be retrieved via the unique position (index) in the array. With the help of additional functions delivered with Tradesignal, a wide range of applications can be covered with arrays.

Arrays are set to replace the "Equilla Vectors" on page 459 of earlier Tradesignal versions. Any current script with vectors can easily be modified to use arrays instead.

WHAT IS AN ARRAY?

In the basic Equilla article, variables were introduced as being "containers with an identification number". Via the name of the variable, existing contents can be called up or new contents can be assigned to the variable.

While you can only save one value per variable, arrays are a lot more flexible - an infinite number of values can be put into an array. To expand the container comparison: arrays are containers that include an unlimited number of storage spaces, like boxes in a container. Each box can be retrieved by its index (unique position in the array).

By taking this container analogy one step further to a stack of containers, we get to multidimensional arrays, most commonly described as arrays of arrays.

ARRAY DECLARATION

An array is treated similar to a variable. They are declared in a special declaration block starting with the keyword Arrays. The name of the array variable has to be followed by a pair of square brackets.

```
Arrays:
    myVeryFirstArray[];
```

This array is initally empty and can later be resized to hold as many items as you wish to store in it.

If you know in advance how many items you want to store in your array and don't want to be able to resize it at a later time, you can declare it in this way.

```
Arrays:
    myFixedSizeArray[10];
```

This creates an array with a maximum valid index of 10, but since indices start at 0, you can store 11 items in this array. Builtin functions ignore index 0, so you should not use this place if you plan to use the builtin functions.

The declaration of a multidimensional array looks like this:

```
Arrays:
    my2DArray[3,4];
```

This array can be interpreted as a spreadsheet having rows and columns.

[0,0] [0,1] [0,2] [0,3] [0,4]

[1,0] [1,1] [1,2] [1,3] [1,4]

[2,0] [2,1] [2,2] [2,3] [2,4]

[3,0] [3,1] [3,2] [3,3] [3,4]

A built-in function would ignore any index containing a 0, but you are free to use these items to store e.g. sums per row and column.

As with variables, you can create a global array. This way it is possible to call up the array from several scripts. Global array are defined just like global variables by adding a namespace for your global variables and :: in front of the array name.

```
Arrays:
    myGlobals::myGlobalArray[];
```

ACCESSING ITEMS IN AN ARRAY

The storage places inside an array are adressed using the array name followed by the unique index in square brackets.

```
Arrays:
    myArray[10];
// assigns 23 to the storage place with index 1
myArray[1] = 23;
// prints the value contained in storage place with index 1, i.e. 23
Print( myArray[1] );
```

Arrays can include all data types available in Equilla.

OUTPUT CATENATED DATA

If you want to output the complete content of a array in a quick and easy way, you can use several builtin functions. You can just use the print command and all items stored in the array will be printed.

```
Arrays:
    myArray[];
// fill the array with some values
FillArray( myArray, 12, 4, 2, 23 );
// output all values using the print command
Print( myArray );
// Print( myArray ) does the same as
// Print( myArray[1], myArray[2], myArray[3], myArray[4] )
```

In the output window appears

```
12      4      2      23
```

Or you can use Join() and have all items printed on a separate line using the string constant NewLine.

```
Arrays:
    myArray[];
// fill the array with some values
FillArray( myArray, 12, 4, 2, 23 );
// output all values separated by a newline
Print( Join( NewLine, myArray ) );
```

Output window shows

```
12
4
2
23
```

READING THE ARRAY PROPERTIES

Some useful functions are available for reading the array properties. For example, by using the ArrayLength( ) function, you receive the array size, i.e. the number of items in it.

With other functions you gain information about the highest or lowest value in an array (and their unique index in the array).

ArrayLength(ArrayName) Returns the size of the array.

HighestArray(ArrayName) Returns the highest value in the array.

IndexOfHighestArray(ArrayName) Returns the index of the highest value in the array.

LowestArray(ArrayName) Returns the lowest value in the array.

IndexOfLowestArray(ArrayName) Returns the index of the lowest value in the array.

With the following little routine you can test the functions listed above. When you change the content of the *FillArray( )* function, different values will be output.

```
Variables:
    OutputText;
Arrays:
    myArray[];
If isLastBar Then
    Begin
        //Fill the array with values
        FillArray( myArray, 2, 4, 6, 8, 10, 2, 3, 5 );
        //Output array contents
        Print( "Array Contents: " + Join( ", ", myArray ) );
        //Read the number of elements
        OutputText = "Number of Elements: " + ArrayLength( myArray);
```

```
        //Output in the output window
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestArray( myArray);
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestArray( myArray);
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestArray( myArray);
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestArray( myArray);
        //Output in the output window
        Print( OutputText);
    End;
```

In the output window, the following appears:

```
Array contents: 2, 4, 6, 8, 10, 2, 3, 5
Number of elements: 8
Highest value: 10 - at position No.: 5
Lowest value: 2 - at position No.: 1
```

OVERVIEW OF ALL ARRAY FUNCTIONS

In the following you can find a list of all array functions in Equilla. More information and examples for each function you can find in the Tradesignal help under **Equilla Formula Language**, menu entry **Arrays**.

To open the Tradesignal help, click on the button with the yellow question mark in the toolbox or in the header bar. In the Equilla editor, you can also right-click on an Equilla function and select **Lookup Equilla Function**.

Function	Description
AppendArray	Apppends an array or a single variable to another array.
ArrayLength	Returns the length (and maximum index) of an array.
Array_Copy	Copies some elements from one array to another.
Array_GetType	Returns the type of the array elements.
Array_Sort	Sorts a range of elements in an array.

Array_Sum	Returns the sum of all elements or the number of true values in case of booleans.
AverageArray	Returns the (mean) average of all or some elements of the array.
AvgDeviationArray	Returns the average deviation of all or some elements of the array.
BinarySearchArray	Returns the position of a given value using a binary search.
ClearArray	Clears an array and resets it to its initial state.
CompareArray	Compares one array to another.
CopyArray	Copy all or some elements from one array to another.
CreateSortedIndexArray	Creates a sorted index into another array.
FillArray	Fills an array with the given values.
GetArrayDimensions	Returns the number of dimensions of an array.
HarmonicMeanArray	Returns the harmonic mean of all or some elements of the array.
HighestArray	Returns the highest value in the array.
IndexOfHighestArray	Returns the index of the highest value in the array.
IndexOfLowestArray	Returns the lowest value in the array.
InsertAtArray	Inserts a value into an array at a given index.
InsertSortedArray	Inserts a value into an array keeping it sorted.
KurtosisArray	Returns the Kurtosis value of all or some elements of the array.
LowestArray	Returns the lowest value in the array.

MedianArray	Returns the median of all or some elements of the array.
RemoveAtArray	Removes an element at a given index from the array.
SearchArray	Returns the position of a given value.
SetArrayLength	Shrinks or grows a dynamic array.
SetValRangeArray	Sets a range of elements to a given value.
SkewnessArray	Returns the skewness of all or some elements of the array.
Sort2DArray	Sorts a 2-dimensional array by columns.
SortArray	Sorts some or all elements of an array.
StdDeviationArray	Returns the standard deviation of all or some elements of the array.
StdErrorArray	Returns the standard error of all or some elements of the array.
SummationArray	Returns the sum of all or some elements of the array.
SummationRecArray	Returns the sum of reciprocals of all or some elements of the array.
SummationSqrArray	Returns the sum of squares of all or some elements of the array.
VarianceArray	Returns the variance of all or some elements of the array.

EQUILLA VECTORS

The following article offers an introduction to vectors in Equilla. Vectors are deprecated in Tradesignal and are superseded by arrays.

Vectors in Equilla are the same kind of construction as those called arrays in other programming languages. They are data fields designed to contain large quantities of data. Each piece of data can be retrieved via the unique position (index) in the vector. With the help of additional functions delivered with Tradesignal, a wide range of applications can be covered with vectors.

WHAT IS A VECTOR?

In the "Equilla Basics" on page 397 article, variables were introduced as being "containers with an identification number". Via the name of the variable, existing contents can be called up or new contents can be assigned to the variable.

While you can only save one value per variable, vectors are a lot more flexible - an infinite number of values can be put into a vector. To expand the container comparison: vectors are containers that include an unlimited number of storage spaces, like boxes in a container. Each box can be retrieved by its index (unique position in the vector).

VECTOR DECLARATION

A vector is treated similar to a variable. In the variable declaration, the vector has to be defined and named. The keyword Vector has to be added in brackets.

```
Variables:
    myVeryFirstVector( Vector );
```

When you forget the keyword Vector, a variable of this name is available but without the vector properties.

As with variables, you can create a global vector. This way it is possible to call up the vector from several scripts. Global vectors are defined as follows:

```
Variables:
    myVeryFirstGlobalVector( GlobalVector );
```

READ AND WRITE DATA

Vectors offer the two basic features ReadVector() and WriteVector(). Both functions need the name and the unique index to address the right storage place. When writing a vector, you also need to pass the content to be written.

Vectors can include all data types available in Equilla.

WRITE DATA

Data is written into the vector with the WriteVector ( ) function. As parameters, the vector name and the value to be written have to be passed. The size of the vector is automatically adapted to the highest used index. Therefore, the possible length of the future vector is irrelevant for the calculation.

```
Variables:
    myVeryFirstVector( Vector );

If isLastBar Then
    Begin
        //The string 'Hello' is written at the position with ID 0
        WriteVector( myVeryFirstVector, 0, "Hello");
        //The string 'Rene' is written at the position with ID 1
        WriteVector( myVeryFirstVector, 1, " Rene");
    End;
```

OUTPUT CATENATED DATA

If you want to output the complete content of a vector in a quick and easy way, you can use the function FormatVector. It is part of the delivered functions and catenates all elements of a vector to one string. This can then be output with the print command. The function is especially useful if you want to keep track of the values while programming.

We expand the source code given above:

```
Variables:
    myVeryFirstVector( Vector );

If isLastBar Then
    Begin
        //The string 'Hello' is written at the position with ID 0
```

```
        WriteVector( myVeryFirstVector, 0, "Hello");
        //The string 'Rene' is written at the position with ID 1
        WriteVector( myVeryFirstVector, 1, " Rene");
        Print( FormatVector( myVeryFirstVector ));
    End;
```

In the output window, the line "Hello Rene" appears.

READ DATA

Vector data can be read with the ReadVector ( ) function. As parameters, the vector name and the index have to be passed.

Make sure that the program does not try to read from non-existing positions. When this happens, Tradesignal aborts the execution with an error message in the chart legend.

```
Variables:
    myVeryFirstVector( Vector ), OutputText;

If isLastBar Then
    Begin
        //The string 'Hello' is written at the position with ID 0
        WriteVector( myVeryFirstVector, 0, "Hello");
        //The string 'Rene' is written at the position with ID 1
        WriteVector( myVeryFirstVector, 1, " Rene");
        OutputText = ReadVector( myVeryFirstVector, 0 );
        OutputText = OutputText + ReadVector( myVeryFirstVector, 1 );
        Print( OutputText );
    End;
```

In the output window, the line "Hello Rene" appears.

READING THE VECTOR PROPERTIES

Some useful functions are available for reading the vector properties. For example, by using the VectorLength( ) function, you receive the vector size, i.e. the number of included elements.

With other functions you gain information about the highest or lowest value in a vector (and their unique IDs in the vector). Please note that a vector indexing always starts at zero. The first index is zero, the second is one and so on.

VectorLength(VectorName) Offers the number of elements.

HighestVector(VectorName) Offers the highest value in the vector as result.

IndexOfHighestVector(VectorName) Offers the unique ID of the highest value in the vector.

LowestVector(VectorName) Offers the lowest value in the vector as result.

IndexOfLowestVector(VectorName) Offers the unique ID of the lowest value in the vector.

With the following little routine you can test the functions listed above. When you change the content of the FillVector( ) function, different values will be output.

```
Variables:
    myVeryFirstVector ( Vector ), OutputText;

If isLastBar Then
    Begin
        //Fill the vector with values
        FillVector( myVeryFirstVector , 2,4,6,8,10,2,3,5 );
        //Output vector contents
        Print( "Vector Contents: " + FormatVector( myVeryFirstVector ));
        //Read the number of elements
        OutputText = "Number of Elements: " + VectorLength(
myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestVector( myVeryFirstVector );
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestVector( myVeryFirstVector );
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
    End;
```

In the output window, the following appears:

```
Vector contents: '2', '4', '6', '8', '10', '2', '3', '5'

Number of elements: 8

Highest value: 10 - at position No.: 4

Lowest value: 2 - at position No.: 0
```

FILL VECTORS WITH CONTENT AND DELETE CONTENT

To write a defined number of values into a vector, use the function *FillVector(VectorName, Value1, Value2, ..)*. This function was already used in the example above.

To delete the content of a vector, use the function *ClearVector(VectorName)*. This function deletes all elements in a vector and resets its size to zero. Use this function when you reuse vectors in your program, except in cases when you want to use old vector data.

Let us expand the source code of the example above by adding the delete function:

```
Variables:
    myVeryFirstVector ( Vector ), OutputText;

If isLastBar Then
    Begin
        //Fill the vector with values
        FillVector( myVeryFirstVector , 2,4,6,8,10,2,3,5 );
        //Output vector contents
        Print( "Vector Contents: " + FormatVector( myVeryFirstVector ));
        //Read the number of elements
        OutputText = "Number of Elements: " + VectorLength(
myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestVector( myVeryFirstVector );
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestVector( myVeryFirstVector );
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);

        Print( "Vector deleted!" );
        ClearVector( myVeryFirstVector );

        Print( "Vector contents: " + FormatVector( myVeryFirstVector ));

        //Repeat all analysis:
        OutputText = "Number of Elements: " + VectorLength(
myVeryFirstVector );
        //Output in the output window
```

```
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestVector( myVeryFirstVector );
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestVector( myVeryFirstVector );
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestVector( myVeryFirstVector );
        //Output in the output window
    End;
```

In the output window, the following appears:

```
Vector contents: '2', '4', '6', '8', '10', '2', '3', '5'

Number of elements: 8

Highest value: 10 - at position No.: 4

Highest value: 2 - at position No.: 0

Vector deleted!

Vector contents:

Number of elements: 0

Highest value: 0 - at position No.: -1

Highest value: 0 - at position No.: -1
```

As you can see, the vector is empty after the deletion. Due to this, some functions output an error with the result "-1".

FINDING AND SORTING DATA

Some useful functions are available to navigate in a vector.

To find data in a vector, use the function *SearchVector(VectorName, SearchedValue)*.

To sort data, use the function *SortVector(VectorName, SortAscending)*.

To demonstrate the sorting, we modify the indicator of the deletion example. We simply exchange the *ClearVector(VectorName)* function with the sorting function

SortVector(VectorName, SortAscending). You can change the sorting direction with true/false. Enter true for ascending and false for descending order.

```
Variables:
    myVeryFirstVector ( Vector ), OutputText;


If isLastBar Then
    Begin
        //Fill the vector with values
        FillVector( myVeryFirstVector , 2,4,6,8,10,2,3,5 );
        //Output vector contents
        Print( "Vector Contents: " + FormatVector( myVeryFirstVector ));
        //Read the number of elements
        OutputText = "Number of Elements: " + VectorLength(
myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestVector( myVeryFirstVector );
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestVector( myVeryFirstVector );
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);

        SortVector( myVeryFirstVector , true );

        //Repeat the analysis:
        Print( "Vector contents: " + FormatVector( myVeryFirstVector ));
        //Fill the vector with values
        FillVector( myVeryFirstVector , 2,4,6,8,10,2,3,5 );
        //Output vector contents
        Print( "Vector Contents: " + FormatVector( myVeryFirstVector ));
        //Read the number of elements
        OutputText = "Number of Elements: " + VectorLength(
myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the highest value
        OutputText = "Highest Value: " + HighestVector( myVeryFirstVector );
        //Retrieve unique ID / position of highest value
        OutputText = OutputText + " - at position No.: " +
IndexOfHighestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
        //Retrieve the lowest value
        OutputText = "Lowest Value: " + LowestVector( myVeryFirstVector );
```

```
        //Retrieve unique ID / position of lowest value
        OutputText = OutputText + " - at position No.: " +
IndexOfLowestVector( myVeryFirstVector );
        //Output in the output window
        Print( OutputText);
    End;
```

In the output window, the following appears:

```
Vector content: '2', '4', '6', '8', '10', '2', '3', '5'

The wanted value 10 is at position No.: 4
```

OVERVIEW OF ALL VECTOR FUNCTIONS

In the following you can find a list of all vector functions in Equilla. More information and examples for each vector you can find in the Tradesignal help under **Equilla Formula Language**, menu entry **Vectors**.

To open the Tradesignal help, click on the button with the yellow question mark in the toolbox or in the header bar. In the Equilla editor, you can also right-click on an Equilla function and select **Lookup Equilla Function**.

Vector	Function
AppendVector()	Appends the contects of one vector onto the end of another vector.
AverageVector()	Returns the average value (mean) of the elements in a vector.
AvgDeviationVector()	Returns the average deviation of the elements in a vector.
BinarySearchVector()	Returns the position of an element with a specific value in a vector using a binary search.
ClearVector()	Clears the contents of a vector and sets its size to zero (0).
CompareVector()	Compares the elements in one vector to those in another vector.
CopyVector()	Copies some or all of the elements from one vector to another.
CreateSortedIndexVector()	Creates a sorted index to a vector. The

	vector containing the actual data will remain unchanged.
FillVector()	Fills a vector with the specified elements.
GlobalVector()	Returns a newly created vector that can be shared between scripts.
HarmonicMeanVector()	Returns the harmonic mean of the values in a vector.
HighestVector()	Returns the highest element in a vector.
IndexOfHighestVector()	Returns the zero based index of the first occurrence of the highest element in a vector.
IndexOfLowestVector()	Returns the zero based index of the first occurrence of the lowest element in a vector.
KurtosisVector()	Returns the Kurtosis value of the elements in a vector.
LowestVector()	Returns the lowest element in a vector.
MedianVector()	Returns the median of the elements in a vector.
ReadVector()	Returns the value stored at a specific index within a vector.
ReadVectorIndirect()	Returns the value stored at a certain index within the data vector.
SearchVector()	Returns the position of an element with a specific value in a vector.
SetMaxIndexVector()	Sets the largest index value for this vector.
SetValRangeVector()	Sets a range of elements in a vector to a specified value.
SkewnessVector()	Returns the skewness (the degree of asymmetry) of the elements in a vector.

SortVector()	Sorts the contents of the vector.
StdDeviationVector()	Returns the standard deviation of the elements in a vector.
StdErrorVector()	Returns the standard error of the elements in a vector.
SummationRecVector()	Returns the sum of reciprocals of each element in a vector.
SummationSqrVector()	Returns the sum of squares of each element in a vector.
SummationVector()	Returns the sum of all, or a range of elements in the vector.
VarianceVector()	Returns the variance of the elements in a vector.
Vector()	Returns a newly created vector.
VectorLength()	Returns the number of elements stored in a vector..
WriteVector()	Writes a value to a specific index within a vector.
WriteVectorIndirect()	Writes a value to a specific index within a vector. The index into the data vector will be looked up via the index vector.

EXTENDING EQUILLA

Tradesignal offers two ways of extending the equilla programming language.

C-API EXTENSIONS

C-API extensions are supported for backwards compatibility. They work by exporting functions from dlls that are placed in a special folder. These functions can be referenced from equilla using the Import statement. For a detailed documentation read the article "C-API Extensions" on page 472.

COM-API EXTENSIONS

These Extensions have been introduced with Tradesignal 6.3 and are the preferred way of extending equilla. You can implement these extensions using programming languages like C#, C++ or any other language that can output COM compatible dlls. COM Extensions allow an Object style syntax to access the implemented methods. For a detailed documentation read the article "COM-API Extensions" on page 482.

EQUILLA TEXTFILEREADER

The TextFileReader object is an "COM-API Extensions" on page 482 that is included as part of the standard Tradesignal installation. The TextFileReader object presents an Application Programmers Interface (API) for reading text files from the local workstation or network.

The full Visual Studio project and source code for the TextFileReader object are included in the Tradesignal install directory under the *Samples* folder. The sample project demonstrates how to create an Equilla COM-based extension using unmanaged C++.

The TextFileReader will try to determine the encoding of the text file (ASCII, UTF-8, UTF-16, etc.).

USAGE EXAMPLE

This example indicator will read a text file (identified by filename input) and output the file line by line to the Tradesignal output window with line numbering:

```
Input:
    Filename( "C:\MyTextFile.txt" ); // Replace this with a path to an
existing text file.

Object:
    textFileReader( "EquillaExt.TextFileReader" );

Variables:
    currentLine( "" ), lineNumber( 0 );

If CurrentBar = 1 Then Begin
    If textFileReader.OpenTextFile( Filename ) Then Begin
        While textFileReader.IsEOF() = False Begin
            currentLine = textFileReader.ReadLine();
            lineNumber = lineNumber + 1;

            // Do something with the line, e.g.:
            Print( lineNumber, currentLine );
```

```
        End;

        textFileReader.CloseFile();
    End;
End;
```

Note: Before you can compile the above sample, you may need to enable Equilla extensions using the option under *File > Tradesignal Options > Equilla*.

TEXTFILEREADER INTERFACE

```
[ProgId("EquillaExt.TextFileReader")]
interface ITextFileReader
{
    // Tries to open a text file with the specified name, returns true if
file is opened
    bool OpenTextFile(string Filename);

    // Ensures any previously opened file is closed, returns true if file is
closed
    bool CloseFile();

    // Tries to read a line of text from the currently open text file. The
resulting text
    // does not contain line end markers.
    string ReadLine();

    // Tries to read a specific number of characters from the currently open
file. The resulting
    // text may contain line end markers.
    string ReadChars(int NumberOfChars);

    // Returns the creation date and time of the currently open text file.
    DateTime GetCreateDate();

    // Returns the last write date and time of the currently open text file.
    DateTime GetModifyDate();

    // Returns the length in bytes of the currently open text file.
    int GetFileLength();

    // Returns the current read position for the currently open text file.
    int GetFilePosition();

    // Moves the read position for the currently open text file to the
specified value,
    // returns true if successful
    bool SetFilePosition(int Position);

    // Returns true if the read position for the currently open text file
has reached
```

```
    // the end of the file.
    bool IsEOF();

    // Returns if the text file is currently open.
    bool IsOpen();

    // Returns the name and path of the currently open text file.
    string GetFilename();
}
```

EXTENDING EQUILLA

C-API EXTENSIONS

Equilla, the formula language of Tradesignal, is a powerful way to describe your trading strategies. There are cases when you may need additional functionality which is not directly available in Equilla. To address this issue the language can be extended via Dynamic Link Libraries (DLLs) using the Equilla Extension Application Programmer's Interface (API).

WHAT IS AN EQUILLA EXTENSION

Equilla Extension libraries are DLLs containing one or more functions. These functions must have a specific signature in order to be compliant with Equilla.

HOW TO ACCESS AN EQUILLA EXTENSION FROM EQUILLA

To use an extension function from a script you have to first make sure the DLL is in the correct place on your system, and then you must add a reference to the function at the start of your Equilla script.

WHERE TO PUT THE EQUILLA EXTENSION

All Equilla Extension libraries have to be placed in the directory where Tradesignal is installed.

You can specify a different directory for Extension DLLs in the options under File > Options > Folders > Equilla Paths.

HOW TO USE EXTENSION FUNCTIONS

Assuming you have an Equilla Extension DLL called MyEquillaExtension.dll containing a function called MyMovingAverage that takes price and period parameters, you would first import the function using the following Equilla command:

```
Import( "MyMovingAverage", "MyEquillaExtension.dll" );
```

You can then use the function as you would use a normal Equilla function.

```
DrawLine( MyMovingAverage( Close, 10 ), "Avg" );
```

Note: Each function from the DLL must have it's own import statement.

HOW TO IMPORT A FUNCTION THAT HAS THE SAME NAME AS AN EXISTING EQUILLA FUNCTION

You can easily import a function and give it an alternate name as a third parameter to the Import command.

```
Import( "MyMovingAverage", "MyEquillaExtension.dll", "RenamedMovingAverage"
);

DrawLine( RenamedMovingAverage( Close, 10 ), "Avg" );
```

HOW TO WRITE AN EQUILLA EXTENSION IN MICROSOFT VISUAL C++ 2005

The Equilla Extension API is described in the EquillaApi.h file, which is located in the Include sub-directory of your Tradesignal installation. In order to create Equilla Extension libraries you have to add the directory to the Include files directory of Visual Studio under *Tools > Options > Projects and Solutions > VC++ Directories*.

Follow these steps to create a sample project:

→ Create a new Visual C++ DLL project

01. *File > New > Project... > Visual C++ > Win32 Console Application*

02. Type a name for the new project for example *MyEquillaExtension*.

03. Press **OK**

04. Select the **Application Settings** and set the application type to *DLL*

05. Press **Finish**

→ Include the Equilla interface description and dependencies by adding the following lines to the top of the MyEquillaExtension.cpp file, below the #include "stdafx.h" line:

```
#include <wtypes.h>
#include <oleauto.h>
#include <EquillaApi.h>
```

→ Add the following function to the bottom of the
   MyEquillaExtension.cpp file:

Note: All Equilla Extension functions must be declared with the following function prototype.

```cpp
EQUILLA_API int MyMovingAverage( DWORD scriptID, int argc, EqVariable*
variables[],
                                 VARIANT* result )
{
    // check that the number of parameters passed to this function is two
(Price and Period)
    if (argc != 2)
        return EQUILLA_ARGUMENT_ERROR;

    // extract the period value from the second parameter
    VARIANT vPeriod;
    VariantInit(&vPeriod);
    variables[1]->GetValue(&vPeriod); // read the latest value from the
variable

    // ensure the period parameter is valid
    if (V_I4(&vPeriod) < 1)
        return EQUILLA_ARGUMENT_ERROR;

    // calculate the sum of all prices for the given period
    double sum = 0.0;
    VARIANT vPrice;
    VariantInit(&vPrice);
    for (int index = 0; index < V_I4(&vPeriod); ++index)
    {
        variables[0]->GetValue(index, &vPrice); // read a historic value
from the variable
        sum += V_R8(&vPrice);
        VariantClear(&vPrice); // release any allocated memory
    }

    // write the equilla result and set the type to a 8-byte floating point
value
    V_VT(result) = VT_R8;
    V_R8(result) = sum / V_I4(&vPeriod);

    // clean up and return successfully
    VariantClear(&vPeriod);

    return EQUILLA_SUCCESS;
}
```

→ Compile the project and copy the DLL to the Equilla Extension
   DLLs directory

Note: Ensure you are compiling a 32-bit DLL otherwise it can not be used from Equilla!

You can now access this function from Equilla as described above.

EXTENSION FUNCTION ARGUMENTS AND RETURN VALUE

All Equilla Extension functions have the same prototype as shown above. The parameters are:

Parameter	Description
DWORD scriptID	A value that uniquely identifies the instance of an Equilla script calling this function
int argc	The number of parameters being passed into this function from the Equilla script
EqVariable* variables[]	An array of the parameters passed into this function from the Equilla script
VARIANT* result	A pointer to a variable receiving the result of the function that will be passed to the Equilla script

The return value is an integer that must be one of the following constants:

Return value	Description
EQUILLA_SUCCESS	The function has completed successfully
EQUILLA_ ARGUMENT_ERROR	The is a problem with one or more of the parameters passed into the function
EQUILLA_GENERAL_ ERROR	Any other error has occurred

WORKING WITH EQUILLA VARIABLES

The EqVariable object represents a variable that has been passed to this function from an Equilla script. You can use the object to access the latest value of the variable or a historic value (from a previous bar). All values accessed via the EqVariable object will be returned as VARIANTs.

Note: A VARIANT is generic variable that can hold data of various different types; for an overview of working with VARIANTs see below.

→ To access the latest value of the variable:

```
VARIANT vValue;
VariantInit(&vValue);
variables[0]->GetValue(&vValue);

// convert the value into a string
VariantChangeType(&vValue, &vValue, VT_BSTR);

// include windows.h to use the MessageBoxW function
MessageBoxW(NULL, V_BSTR(&vValue), L"The value is", MB_OK);

VariantClear(&vValue);
```

→ To access the value of the variable from the previous bar (assuming this is a series variable):

```
VARIANT vPreviousValue;
VariantInit(&vPreviousValue);
variables[0]->GetValue(1, &vPreviousValue);

// do something with the variable here

VariantClear(&vPreviousValue);
```

HOW TO DEBUG AN EQUILLA EXTENSION IN MICROSOFT VISUAL STUDIO 2005

Caution: Before you start the debugger, ensure that Visual Studio is in native debugger mode. This can be enabled as followed:

01. Right-Click on the project in the *Solution Explorer* and select **Properties**

02. Click on the *Configuration Properties > Debugging* in the tree view on the left

03. Locate the *Debugger Type* property and change it's value to *Native Only*

04. Click **OK** to close the dialog.

→ To start debugging your DLL:

01. Start Tradesignal and change the property *File > Tradesignal Options > Equilla > File Locations > Equilla Extension DLLs* to the build directory of your project (this will normally be in the sub folder called Debug).

02. Click **OK**. Then shut down Tradesignal.

03. In Visual Studio ensure that this is the Debug build configuration and select *Debug > Start Debugging* from the menu.

04. A dialog will open asking you for the executable to run. Enter the location of the *tse.exe* file from the Tradesignal installation directory on your system and click **OK**.
The application will now start, you should use your extension function in a new script as described above.

05. Set breakpoints in visual studio and then apply your Equilla script to a Chart, Watchlist or Scanner. Execution will be automatically interrupted when one of your breakpoints is hit.

ADVANCED TOPICS

HOW DO I INITIALIZE AND CLEANUP GLOBAL DATA IN MY EQUILLA EXTENSION

If you want to write a library of functions that maintain some global state from call to call you will need to use global variables in your DLL. This can cause problems in determining when to initialize and free these global variables. To solve this problem, there are two optional functions that you can add to your extension DLL that will be called once when a script containing functions from your DLL is added to a chart, and once when it is removed from a chart. The following example illustrates how these functions are used:

Note: The prototypes and names of the DllAttachScript() and DllDetachScript() functions must be exactly the same as in the example.

```
#include "stdafx.h"
#include <wtypes.h>
#include <oleauto.h>
#include "EquillaApi.h"
#include <map>

BOOL APIENTRY DllMain(HMODULE hModule, DWORD dwReason, LPVOID lpReserved)
{
    return TRUE;
```

```
}

class CGlobalCounter
{
public:
    static CGlobalCounter& Instance()
    {
        // This is not thread-safe, included only for the brevity of the
example
        static CGlobalCounter singleton;
        return singleton;
    }

    void Add(DWORD nScriptId)
    {
        EnterCriticalSection(&m_hCS);
        m_barCounts[nScriptId] = 0;
        LeaveCriticalSection(&m_hCS);
    }

    void Remove(DWORD nScriptId)
    {
        EnterCriticalSection(&m_hCS);
        m_barCounts.erase(nScriptID);
        LeaveCriticalSection(&m_hCS);
    }

    int Increment(DWORD nScriptId)
    {
        EnterCriticalSection(&m_hCS);
        int nResult = ++m_barCounts[nScriptId];
        LeaveCriticalSection(&m_hCS);
        return nResult;
    }
private:
    CGlobalCounter()
    {
        InitializeCriticalSection(&m_hCS);
    }

    CGlobalCounter(const CGlobalCounter&);
    CGlobalCounter& operator=(const CGlobalCounter&);

    std::map<DWORD, int> m_barCounts;
    CRITICAL_SECTION m_hCS;
};

EQUILLA_API void DllAttachScript(DWORD nScriptId)
{
    CGlobalCounter::Instance().Add(nScriptId);
}

EQUILLA_API void DllDetachScript(DWORD nScriptId)
{
```

```
    CGlobalCounter::Instance().Remove(nScriptID);
}


//call this function once on each bar to get the current bar count
EQUILLA_API int BarCount(DWORD nScriptID, int argc, EqVariable* variables[],
VARIANT* result)
{
    V_VT(result) = VT_I4;
    V_I4(result) = CGlobalCounter::Instance().Increment(nScriptId);
    return EQUILLA_SUCCESS;
}
```

Note: Because this DLL can be used by multiple scripts instances at the same time it is important to separate the global data of each script in some way. In the example above we use a map that stores the bar count against a given scriptID. We recommend you use a similar approach in your own DLLs changing the int data type to whichever data you need to store.

WORKING WITH THE VARIANT DATA TYPE

A VARIANT is a variable that can hold any type of data, it maps quite closely to the types of variables that are used in Equilla. The trick to using variants in your Extension DLL is in correct initialization/de-initialization and in accessing the correctly typed data.

DECLARING AND RELEASING VARIANTS

Whenever you declare a variant in your code you should always initialize it in the following way:

```
VARIANT vPrice;
VariantInit(&vPrice);
```

Whenever you have finished with the variant (even in an error case) you should clear the variant in the following way:

```
VariantClear(&vPrice);
```

READING AND WRITING DATA

The following example demonstrates the important variant functions to use to read and write various data types from and to a variant:

```
// initialize the variant
VARIANT vValue;
VariantInit(&vValue);
```

```
// Write and read a double value (like a price) to a variant
double nPrice = 12.1;
V_VT(&vValue) = VT_R8; // set the underlying type of the variant
V_R8(&vValue) = nPrice;
double nNewPrice = V_R8(&vValue);
VariantClear(&vValue);

// Write and read an integer value (like a period) to a variant
int nPeriod = 14;
V_VT(&vValue) = VT_I4; // set the underlying type of the variant
V_I4(&vValue) = nPeriod;
int nNewPeriod = V_I4(&vValue);
VariantClear(&vValue);

// Write and read a Boolean value (a true/false value) to a variant
bool bValue = true;
V_VT(&vValue) = VT_BOOL; // set the underlying type of the variant
V_BOOL(&vValue) = bValue ? VARIANT_TRUE : VARIANT_FALSE;
bool bNewValue = V_BOOL(&vValue) != VARIANT_FALSE;
VariantClear(&vValue);

// Write and read a string value to a variant
LPCWSTR sValue = L"Text";
V_VT(&vValue) = VT_BSTR; // set the underlying type of the variant
V_BSTR(&vValue) = SysAllocString(sValue); // you have to create a BSTR from
the input string
BSTR sNewValue = SysAllocString(V_BSTR(&vValue)); //SysFreeString needs to
be called once sNewValue is not required anymore
VariantClear(&vValue);

// Write and read a date/time (OLE Datetime) to a variant
SYSTEMTIME stLocal = {0};
DATE dtOle = 0;
GetLocalTime(&stLocal);
SystemTimeToVariantTime(stLocal, &dtOle);
V_VT(&vValue) = VT_DATE;
V_DATE(&vValue) = dtOle;
DATE dtNewOle = V_DATE(&vValue);
VariantClear(&vValue);
```

CHECKING FUNCTION PARAMETERS ARE THE CORRECT TYPE

Due to the data types used by the Equilla engine, you should always check if the
type of a given parameter is what you expect. If the type differs from what you
expect you can use the VariantChangeType function to perform the conversion
as the following sample demonstrates (this is the same moving average example
as shown above but with this checking added):

```
EQUILLA_API int MyMovingAverage( DWORD scriptID, int argc, EqVariable*
variables[],
                                VARIANT* result )
{
```

```
    // check that the number of parameters passed to this function is two
(Price and Period)
    if (argc != 2)
        return EQUILLA_ARGUMENT_ERROR;

    // extract the period value from the second parameter
    VARIANT vPeriod;
    VariantInit(&vPeriod);
    variables[1]->GetValue(&vPeriod); // read the latest value from the
variable

    // ensure the period parameter is an integer
    if (V_VT(&vPeriod) != VT_I4 && FAILED(VariantChangeType(&vPeriod,
&vPeriod, VT_I4)))
    {
        VariantClear(&vPeriod);
        return EQUILLA_ARGUMENT_ERROR;
    }

    // ensure the period parameter is valid
    if (V_I4(&vPeriod) < 1)
        return EQUILLA_ARGUMENT_ERROR;

    // calculate the sum of all prices for the given period
    double sum = 0.0;
    VARIANT vPrice;
    VariantInit(&vPrice);
    for (int index = 0; index < V_I4(&vPeriod); ++index)
    {
        variables[0]->GetValue(index, &vPrice); // read a historic value
from the variable

        // ensure the price is a double
        if (V_VT(&vPrice) != VT_R8 && FAILED(VariantChangeType(&vPrice,
&vPrice, VT_R8)))
        {
            VariantClear(&vPeriod);
            VariantClear(&vPrice);
            return EQUILLA_ARGUMENT_ERROR;
        }

        sum += V_R8(&vPrice);
        VariantClear(&vPrice); // release any allocated memory
    }

    // write the equilla result and set the type to a 8-byte floating point
value
    V_VT(result) = VT_R8;
    V_R8(result) = sum / V_I4(&vPeriod);

    // clean up and return successfully
    VariantClear(&vPeriod);

    return EQUILLA_SUCCESS;
```

```
    }
```

CONVERTING VARIANTS TO STRINGS

One of the most common conversion tasks is taking a variant (such as a price) and converting it into a string for output, this can be accomplished in the following way:

```
double nPrice = 12.1;

VARIANT vPrice;
VariantInit(&vPrice);
V_VT(&vPrice) = VT_R8;
V_R8(&vPrice) = nPrice;

// convert the value into a string
VariantChangeType(&vPrice, &vPrice, VT_BSTR);

// include windows.h to use the MessageBoxW function
MessageBoxW(NULL, V_BSTR(&vPrice), L"The value is", MB_OK);

VariantClear(&vPrice);
```

COM-API EXTENSIONS

The following article offers an introduction to COM-API Extensions for Equilla (note: available in Tradesignal 6.3 and above)

WHAT ARE COM-EXTENSION OBJECTS

Equilla COM-Extensions are COM-Objects that implement a special set of interfaces. Each COM-Object can provide one or more Extension objects by implementing one or more interfaces derived from the "IEquillaExtension Interface" on page 491. These objects are referenced from equilla by using the Prog-ID or the CLSID and an optional interface name. Extension COM-Objects need to be registered with the system so they can be instantiated via the Windows CoCreateInstance mechanism. For a detailed step-by-step guide to create COM-Extensions read the section "How to write a COM Extension" on page 485 and check out the samples projects installed with Tradesignal.

HOW TO USE COM-EXTENSION OBJECTS

Equilla objects are created similar to Variables, by adding an Objects:-Block to the script and declaring the objects you want to use. For every object within a script one extension object will be instantiated. If you use the same indicator multiple times separate extension objects will be created for every script instance.

```
Objects:
    myObject("ProgID");

myObject.MyMethod();
```

For a detailed description of the Object syntax see the Equilla help.

> **Caution:** COM API Extension modules must be enabled in the options by selecting the setting at File > Options > Advanced > Equilla Extension.

LIFETIME OF AN EXTENSION OBJECT

All extension objects go through a common life cycle.

→ Creation

→ There are multiple reasons why an extension object can be created.

→ By the equilla editor to provide auto completion support.

→ By the compiler to validate that the script is correct.

→ Because the compiled script is loaded (e.g. indicator added to a chart)

→ If the extension object was loaded by the compile or editor no further actions will be performed and the object will be released shortly after. In case it was created by loading script the following actions will occur.

→ Attach Session (optional)

→ After loading a compiled script the virtual machine will first attach a session object. This is an optional step that is only performed if your extension implements the "ISupportSessions Interface" on page 493.

→ Attach Host Object (IEquillaExtension)

→ This call on the "IEquillaExtension Interface" on page 491 is done before the actual script evaluation starts. It supplies the extension object with a thread safe Host-Object that can be used to trigger reevaluation of the script an provides information about the executing context.

→ Script Evaluation Phase

→ While a script is evaluated bar-by-bar, methods will be called and signals will be passed to the extension object.

→ Methods called by script evaluation
Once the script evaluation has started the virtual machine will call methods of your object as instructed by the script. These methods can contain multiple arguments of different type and a return value, as explained in "Extension Supported Parameter Types" on page 500.

→ Signals received (optional)
If your COM-Object implements any one of the Signal-Sink interfaces ("Extension Signals and Sinks" on page 495) signals will be passed to your extension after a bar is evaluated. SymbolStateChanged and interactive script alerts can be received at any time.

→ Detach (IEquillaExtension)

→ After script evaluation has stopped (e.g. indicator was removed from a chart) the Detach() method will be called on the IEquillaExtension Interface. Shortly after this the COM object will be released. All necessary clean up work should be performed at this point.

YOUR EXTENSION INTERFACE

The extension interface has to be derived from IEquillaExtension Interface and it should be the default interface of your COM-Object. If it is not the default interface the user will have to explicitly name it every time he wants to instantiate an equilla object.

Equilla extension interfaces requirements and limitations:

→ Limited set of return and argument types (see "Extension Supported Parameter Types" on page 500)

→ Properties are not supported

→ default values are not supported

→ only 'dual' interfaces are supported

EXAMPLE PROJECTS

A few sample projects are shipped with Tradesignal. They are located in the install folder of Tradesignal.

→ ExcelOrderTracker (C#)

→ Demonstrates direct data transfer to Microsoft-Excel.

→ RSSExtension (C#)

→ Query of RSS 2.0 and Atom 1.0 data feeds, reacting on user interaction and display of custom user interface elements. This Extension is accompanied by the RSS-Indicator that can be found int the standard Tradesignal package.

→ TextFileReader (C++)

→ Reading and processing of text file from an equilla script.

HOW TO WRITE A COM EXTENSION

In this tutorial we will focus on using C# with Visual Studio 2008 (other versions of Visual Studio will work in much the same way). It is also relatively straight-forward to create extension objects in unmanaged C++ using ATL, and is preferable where raw performance is required. The TextFileReader sample project found in the installation directory of Tradesignal demonstrates how this is done.

OBJECTIVE

Create an Equilla extension object that can compute a Simple Moving Average and play a sound from the local hard disk.

CREATING A PROJECT FILE

The first task is to create an appropriate project:

→ Start Visual Studio 2008 (as administrator when running Windows Vista or above)

→ Select File > New > Project... > Visual C# > Class Library

→ Enter a name for the Project (e.g. "SoundAverage") and click **OK**.

→ A project containing a single class called Class1 should have been created

Once the project is created we must add a reference to the EquillaExtension.dll:

→ Select *Project > Add Reference... > COM > Tradesignal EquillaExtension 1.0 Type Library* and click **OK**.

DEFINING THE INTERFACE

The next task is to define what the interface for our new object will be and then to make it visible via COM:

Open the Class1.cs file if it is not already open and inside the namespace *SoundAverage* block add the following:

```
namespace SoundAverage
{
    public interface ISoundAverage
    {
        double SimpleAverage(EquillaExtension.IDoubleSeries prices, int
length);
        void PlaySound(string path);
    }

    public class Class1
    {
    }
}
```

Next we must make the interface visible to COM, this requires us to indicate it is COM visible and to specify a unique class ID (a GUID). Both of these can be set by specifying attributes as follows:

```
using System.Runtime.InteropServices;

namespace SoundAverage
{
    [ComVisible(true)]
    [Guid("E4AF0866-A1DB-462f-A304-4ED46EB7C2E6")]
    public interface ISoundAverage
    {
        double SimpleAverage(EquillaExtension.IDoubleSeries prices, int
length);
        void PlaySound(string path);
    }

    public class Class1
    {
    }
}
```

Caution: All classes and interfaces that we create must have a unique GUID, the tool under Tools > Create GUID is a simple way to create a new GUID.

Caution: Once an interface is created and deployed it must never change, it is one of the ground rules of COM development. If you want to add more methods to a deployed interface you must create new interfaces.

ADDING HELP STRINGS TO THE INTERFACE

Extension objects are supported by the auto suggest and insight help features of the Equilla Editor. In order to display help messages we must adorn our interface and members with Description attributes:

```
using System.Runtime.InteropServices;
using System.ComponentModel;

namespace SoundAverage
{
    [ComVisible(true)]
    [Guid("E4AF0866-A1DB-462f-A304-4ED46EB7C2E6")]
    [Description("Calculates a moving average and plays sounds")]
    public interface ISoundAverage
    {
        [Description("Returns the result of a simple moving average")]
        double SimpleAverage(EquillaExtension.IDoubleSeries prices, int
length);

        [Description("Asynchronously plays the .WAV file specified by the
file name")]
        void PlaySound(string path);
    }

    public class Class1
    {
    }
}
```

IMPLEMENTING THE EXTENSION OBJECT

Now that we have our interface, we can create a class that uses it.

First of all we must implement our interface (we will ignore error handling for the sake of brevity, and because the Equilla compiler and runtime engine will display exceptions in a useful way if they occur):

```
public class Class1 : ISoundAverage
{
    double ISoundAverage.SimpleAverage(EquillaExtension.IDoubleSeries
prices, int length)
    {
        double sum = 0;
```

```
        for (int i = 0; i < length; ++i)
            sum += prices.GetValue(i);
        return sum / length;
    }

    void ISoundAverage.PlaySound(string path)
    {
        System.Media.SoundPlayer player = new System.Media.SoundPlayer
(path);
        player.Play();
    }
}
```

Next we must implement the IEquillaExtension interface, without this interface Tradesignal will not recognize the object:

```
public class Class1 : ISoundAverage, EquillaExtension.IEquillaExtension
{
    double ISoundAverage.SimpleAverage(EquillaExtension.IDoubleSeries
prices, int length)
    {
        double sum = 0;
        for (int i = 0; i < length; ++i)
            sum += prices.GetValue(i);

        return sum / length;
    }

    void ISoundAverage.PlaySound(string path)
    {
        System.Media.SoundPlayer player = new System.Media.SoundPlayer
(path);
        player.Play();
    }

    void EquillaExtension.IEquillaExtension.Attach
(EquillaExtension.IEquillaHost Host)
    {
    }

    void EquillaExtension.IEquillaExtension.Detach()
    {
    }
}
```

We do not need to use the *IEquillaExtension* methods in this case.

We must next make the class visible to COM, indicate the default COM interface, and provide a suitable name (Prog ID) with which we will create the object from Equilla:

```
[ComVisible(true)]
[Guid("516024B3-0D76-4d5b-97AE-65F3A30E0C8A")]
[ComDefaultInterface(typeof(ISoundAverage))]
[ProgId("SoundAverage.Class1")]
public class Class1 : ISoundAverage, EquillaExtension.IEquillaExtension
{
    double ISoundAverage.SimpleAverage(EquillaExtension.IDoubleSeries
prices, int length)
    {
        double sum = 0;
        for (int i = 0; i < length; ++i)
        sum += prices.GetValue(i);

        return sum / length;
    }

    void ISoundAverage.PlaySound(string path)
    {
        System.Media.SoundPlayer player = new System.Media.SoundPlayer
(path);
        player.Play();
    }

    void EquillaExtension.IEquillaExtension.Attach
(EquillaExtension.IEquillaHost Host)
    {
    }

    void EquillaExtension.IEquillaExtension.Detach()
    {
    }
}
```

Our COM-based extension object is almost ready, we just need to build it and register it.

01. First indicate it should be registered automatically after it is built by checking the option: Project > SoundAverage Properties... > Build > Output > Register for COM interop

02. Now, select Build > Build Solution to build the DLL.

Now we have a built and registered COM-based Equilla Extension Object which could now be "How to deploy a COM Extension" on the next page.

USING THE EXTENSION FROM EQUILLA

To use the object from Equilla we must first create a new indicator called LoudSMA after starting Tradesignal.

Next we must create an instance of our object as follows:

```
Object:
    soundAverage( "SoundAverage.Class1" );
```

Notice how we use the same ID string as we declared in the *ProgID* attribute when we created the object.

Finally we can call the functions on the *soundAverage* object to plot a SMA and make an audio alert based on a sound file when a cross over occurs (we assume the file exists at the specified location).

```
Inputs:
    Price( Close ),
    Length( 14, 1 ),
    AlertFile( "C:\alert.wav" );

Object:
    soundAverage( "SoundAverage.Class1" );

Variable:
    lsma;

lsma = soundAverage.SimpleAverage( Price, Length );

DrawLine( lsma, "LSMA" );

If Price Crosses Over lsma Then
    soundAverage.PlaySound( AlertFile );
```

HOW TO DEPLOY A COM EXTENSION

Once a COM Equilla extension has been created, it must be deployed to a target workstation. Deployment is fairly straight-forward, consisting of the following steps:

→ Ensure prerequisites are installed (e.g. Tradesignal and correct version of C or .NET runtimes if Visual Studio 2008 is not used)

→ Copy the Extension DLL

→ Register the Extension DLL (either with regsvr32.exe for C++ DLLs or regasm.exe for .NET DLLs)

→ Copy any indicator package created with Tradesignal

→ Register the indicator package for auto discovery on Tradesignal start

These steps are best combined into a setup for ease of distribution. Packages such as InstallShield can handle all of the registration issues automatically.

DEPLOYING AN EXTENSION WITH A SETUP

The best way to distribute a library of indicators and/or strategies that include one or more Equilla extension DLLs is to use a setup.

First create the package in Tradesignal and copy the extension DLLs into the folder that contains the package contents using Windows Explorer.

Next, add this package folder including indicators, functions, strategies, manifest file and extension DLLs to a setup project (for example InstallShield). Already compiled indicators and strategies make it easier to use the deployed extension.

Mark any Extension DLLs as requiring registration:

→ In InstallShield C++ DLLs should be marked as Extract COM Information at Build

→ In InstallShield .NET DLLs should be marked as Register for .NET COM interop

Now instruct the setup to add a string value to the following registry key, with a unique name (GUID) and a value that contains the folder path on the target machine of the installed package:

HKEY_LOCAL_ MACHINE\Software\Tradesignal\TradeSignalEnterprise\Packages

This will make Tradesignal automatically add the package when it is next started.

Finally, build and test the setup.

IEQUILLAEXTENSION INTERFACE

An extension object must implement the *IEquillaExtension* interface so that Tradesignal will recognize the object as a valid extension.

```
interface IEquillaExtension
{
    void Attach(IEquillaHost Host);
    void Detach();
}
```

When an object is first created the *Attach()* method will be called by Tradesignal with a deployed to other users workstations "IEquillaHost Interface" below object as the only parameter. The majority of initialization should be performed in the *Attach()* method rather than the objects constructor. The Host object is a thread-safe object that allows an extension module to communicate with the hosting chart or list.

When the Equilla script that declares the extension object is removed from a chart or list, the *Detach()* method will be called, allowing the extension object to preform clean-up. The majority of the clean-up of the object should be done in the *Detach ()* method rather than the objects destructor.

IEQUILLAHOST INTERFACE

The interface provides access to methods on the chart or list that is hosting the "COM-API Extensions" on page 482.

```
interface IEquillaHost
{
    void ScheduleEvaluation( bool Incremental );
    string TimeZone { get; }
    int OwnerHandle { get; }
}
```

The *IEquillaHost* interface is implemented by the *Host* object that is passed to each extension module shortly after creation. The *Host* object is thread-safe (neutral threaded) and may be passed between and used from various threads without restriction.

VOID SCHEDULEEVALUATION(BOOL INCREMENTAL)

Call this method to instruct the hosting chart or list to perform a new evaluation of the Equilla script that created the extension object. This method is non-blocking and the evaluation will occur in the near future in much the same way as if a tick had been received.

If *Incremental* is set to true only the current bar will be reevaluated, if *Incremental* is set to *false*, the entire price history and any dependencies will be reevaluated.

> **Note:** Performing frequent non-incremetal evaluations will result in a severe reduction in system performance.

STRING TIMEZONE

Returns the current application timezone in Windows Timezone ID Format. This string can be be used directly by the .NET *System.TimeZoneInfo.FindSystemTimeZoneById()* method.

```
System.TimeZoneInfo equillaTimeZone =
System.TimeZoneInfo.FindSystemTimeZoneById( Host.TimeZone );
```

INT OWNERHANDLE

Returns the windows handle of an object that may be used as the parent of any windows that the extension object wants to show.

```
// Helper object to convert a windows ID to a IWin32Window object.
class WindowWrapper : IWin32Window
{
    public WindowWrapper( int handle )
    {
        Handle = new IntPtr( handle );
    }

    public IntPtr Handle { get; private set; }
}

// Show a message box that is owned by the Tradesignal application
System.Windows.Forms.MessageBox.Show( new WindowWrapper( Host.OwnerHandle ),
"A message from an extension" );
```

ISUPPORTSESSIONS INTERFACE

An extension object may implement the *ISupportSessions* interface in order to share a common "IEquillaExtensionSession Interface" on the next page object between all instances of the extension object used inside a single chart (or portfolio). Sessions provide a mechanism for multiple indicators within a chart to share a common resource, for example a connection to an external server.

```
interface ISupportSessions : IDispatch
{
    IEquillaExtensionSession CreateSessionObject();
    void AttachSession(IEquillaExtensionSession Session);
}
```

The first time an extension object is created that implements this interface, a chart will call the *CreateSessionObject()* factory method, which must return an object that implements the "IEquillaExtension Interface" on page 491. The newly

created session will immediately be passed back to the extension object via a call to *AttachSession()*.

Following the creation of other extension objects of the same type within the same chart, the *AttachSession()* method will also be called with the original session passed as the only parameter.

The example project *RSSExtension* uses a session object to manage a pool of RSS feeds so that the same data does not need to be re-requested by each use of the RSS indicator within a chart.

The example project *ExcelOrderTracker* uses a session object to manage a single Excel workbook that all instruments within a chart will forward strategy data to.

IEQUILLAEXTENSIONSESSION INTERFACE

A session object may be created and shared between all instances of an extension object used within a single chart (or portfolio). Such a session object must implement the *IEquillaExtensionSession* interface.

```
interface IEquillaExtensionSession
{
    void Attach();
    void Detach();
}
```

An extension session object will only ever be created by an extension object that implements the "ISupportSessions Interface" on the previous page interface.

Shortly after the session object is returned from the *ISupportSessions.CreateSessionObject() method*, the *Attach() method* will be called. It is expected that the majority of the construction logic for the session object will be performed in this method instead of the object's constructor.

When the last extension object that uses a session is removed from the chart (or portfolio), the Detach() method will be called, so that the extension session can perform clean-up. It is expected that the majority of the destruction logic for the session object will be performed in this method instead of the object's destructor.

EQUILLACONSTANTS CLASS

The EquillaConstants object provides access to standard values used within Equilla scripts that may be needed within an extension object.

```
interface IEquillaConstants
{
    double InvalidValue { get; }
    DateTime InvalidDate { get; }
}
```

The *InvalidValue* constant can be used to test if a price parameter is set to the Equilla Invalid value.

The *InvalidDate* constant can be used to test if a date/time parameter is set to the Equilla Invalid value.

```
// Test if a price is valid
bool IsValidPrice( double price )
{
    EquillaConstants eqConsts = new EquillaConstantsClass();
    return price != eqConsts.InvalidValue;
}
```

EXTENSION SIGNALS AND SINKS

Extension objects can register interest in certain "Alerts" on page 329and other events that may be generated by a chart (or portfolio) that are not directly related to an Equilla script evaluation. These signals are broken down into four main categories that can be independently hooked by the extension object: Equilla script alerts, tool alerts, strategy events and instrument events.

To register interest in a specific class of signals, the extension object must implements a *Sink* interface of the corresponding type:

```
interface IScriptSignal
{
    void ScriptSignalRaised( IScriptSignal Signal, bool MoreToFollow );
}
```

```
interface IStrategySignalSink
{
    void StrategySignalRaised( IStrategySignal Signal, bool MoreToFollow );
}
```

```
interface IToolSignalSink
{
    void ToolSignalRaised( IToolSignal Signal, bool MoreToFollow );
}
```

In each of the above cases, the implemented method will be called when a signal is raised, containing an interface to an object the contains details of that signal (see below), the *MoreToFollow* flag will indicate if more signals are pending, so that the signals may be queued and processed in a batch when *MoreToFollow* is set to false (this is of special importance with strategy orders).

```
interface ISymbolStateChangedSink
{
    SymbolStateChanged( string Symbol, string DisplayName, bool Active );
}
```

Implementation of the *ISymbolStateChangedSink* allows an extension object to respond when instruments transition from an active to an inactive state (inactive can mean the instrument is stale, or that the data connection has been lost).

ISCRIPTSIGNAL

Contains details about an Equilla alert that has occurred as the result of calling the Equilla *Alert() function*, or clicking on a chart hyperlink generated by *DrawText ()* using the signal protocol.

Please refer to the sample project *RSSExtension* and the corresponding indicator *RSS* for how to hook and generate script alerts.

```
interface IScriptSignal
{
    string SourcePath { get; }        // Unique workspace location of the
event source
    string DisplaySource { get; }     // User visible location of the event
source
    string ScriptName { get; }        // Name of the script that generated
the event
    string SignalName { get; }        // Name of the event
    string AlertText { get; }         // Test specified in the Alert()
function
    string ParentSymbolName { get; }  // Symbol of the script parent
instrument
    DateTime BarTimestamp { get; }    // Chart timestamp of the bar on which
the alert was generated
    double BarPrice { get; }          // Parent instrument price when the
alert was generated
    DateTime TimestampUTC { get; }    // UTC Timestamp of the signal
    string ParentDisplayName { get; } // Display name of the script parent
instrument
}
```

A simple way to generate an alert would be to use the following Equilla code:

```
If IsLastBar Then
    Alert( "It is the last bar: " + CStr( CurrentBar ) );
```

To generate script alerts from a user clicking on a hyperlink in the chart, do the following:

```
If IsLastBar Then
    DrawText( High, "LinkTest", "Click 4 Alert", Default, Default, AlignTop,
        "signal:It is the last bar: " + CStr( CurrentBar ) );
```

ISTRATEGYSIGNAL

Contains details about a strategy event that has occurred. Strategy events are generated when a chart is running Equilla strategies that use the Buy, Sell, Short, Cover and ExitPosition functions to build and backtest a trading system.

Please refer to the sample project *ExcelOrderTracker* and the corresponding indicator *OrderTracker* for how to hook generated strategy alerts.

```
interface IStrategySignal
{
    EStrategySignalType SignalType { get; }      // See below
    string SourcePath { get; }                   // Unique workspace location
of the event source
    string DisplaySource { get; }                // User visible location of
the event source
    string ScriptName { get; }                   // Name of the script that
generated the event
    string SignalName { get; }                   // Name of the event
    string OrderId { get; }                      // Unique ID of the order to
which the event belongs (placed, filled, etc.)
    EStrategySignalOrderType OrderType { get; } // See below
    double OrderPrice { get; }                    // Price of the order (valid
for limit and stop orders)
    double OrderQuantity { get; }                // Size of the order
    string ParentSymbolName { get; }             // Symbol of the traded
security
    DateTime BarTimestamp { get; }               // Chart timestamp on which
the order occurred
    double BarPrice { get; }                      // Chart price at which the
order occurred
    DateTime TimestampUTC { get; }               // UTC timestamp of the
order
    string RelatedOrders { get; }                // XML list of orders that
will be generated if this order is filled
    string ParentDisplayName { get; }            // Display name of the
traded security
}

enum EStrategySignalType
{
```

```
        eqSignalTypeLongEntryPlaced,
        eqSignalTypeLongExitPlaced,
        eqSignalTypeShortEntryPlaced,
        eqSignalTypeShortExitPlaced,
        eqSignalTypeOrderCancelled,
        eqSignalTypeOrderFilled,
        eqSignalTypeOrderModified,
        eqSignalTypeOrderModifiedTrailing,
}

enum EStrategySignalOrderType
{
        eqSignalTypeMarketLongEntry,
        eqSignalTypeMarketLongExit,
        eqSignalTypeMarketShortEntry,
        eqSignalTypeMarketShortExit,
        eqSignalTypeStopLongEntry,
        eqSignalTypeStopLongExit,
        eqSignalTypeStopShortEntry,
        eqSignalTypeStopShortExit,
        eqSignalTypeLimitLongEntry,
        eqSignalTypeLimitLongExit,
        eqSignalTypeLimitShortEntry,
        eqSignalTypeLimitShortExit
}
```

ITOOLSIGNAL

Contains details about a tool alert that has occurred.

```
interface IToolSignal
{
        EToolSignalType SignalType { get; }              // See below
        string SourcePath { get; }                       // Unique workspace
location of the event source
        string DisplaySource { get; }                    // User visible
location of the event source
        string ScriptName { get; }                       // Name of the script
that generated the event
        string SignalName { get; }                       // Signal text
associated with the tool
        string ParentSymbolName { get; }                 // Symbol of the
script parent instrument
        DateTime BarTimestamp { get; }                   // Chart timestamp of
the bar on which the alert was generated
        double BarPrice { get; }                         // Parent instrument
price when the alert was generated
        EToolSignalToolType ToolType { get; }            // See below
        EToolSignalLine Line { get; }                    // See below
        EToolSignalPriceDirection PriceDirection { get; } // See below
        string ToolText { get; }                         // Text associated
with the tool
        DateTime TimestampUTC { get; }                   // UTC Timestamp of
```

```
the signal
    string ParentDisplayName { get; }                     // Display name of the
script parent instrument
}
```
```
enum EToolSignalType
{
    eqSignalTypeCrossed,
    eqSignalTypeBreakIn,
    eqSignalTypeBreakOut,
}

enum EToolSignalLine
{
    eqToolLine,
    eqToolUpperLine,
    eqToolMiddleLine,
    eqToolLowerLine,
    eqToolLineChannel,
    eqToolLineFibo1,
    eqToolLineFibo2,
    eqToolLineFibo3,
    eqToolLineFibo4,
    eqToolLineFibo5,
    eqToolLineFibo6,
    eqToolLineFibo7,
    eqToolLineFibo8,
    eqToolLineFibo9,
    eqToolLineFibo10,
    eqToolLineFibo11,
    eqToolLineFibo12,
    eqToolLineFibo13,
    eqToolLineFibo14,
    eqToolLineFibo15,
    eqToolLineFibo16,
};

enum EToolSignalToolType
{
    eqToolTypeTrendLine,
    eqToolTypeFiboRetracement,
    eqToolTypeStopLine,
    eqToolTypeTrendChannel,
    eqToolTypePitchfork,
    eqToolTypeRegressionChannel,
};

enum EToolSignalPriceDirection
{
    eqDirectionUpwards,
    eqDirectionDownwards,
    eqDirectionSideways,
};
```

EXTENSION SUPPORTED PARAMETER TYPES

Extension objects must declare an interface that may only contain methods (no properties or events). These methods may only accept as parameters the types listed below, and only as input. The methods may only return a value that is one of the simple types with the exception of object. A method may also have a return type of void - to return nothing at all.

SIMPLE TYPES

```
bool (IDL: VARIANT_BOOL)
int (IDL: long)
double (IDL: double)
string (IDL: BSTR)
DateTime (IDL: DATE)
object (IDL: VARIANT)
```

The object type should only be used when a function accepts different types for a specific parameter. The actual type of these parameters may change from call to call and can be of any of the supported types including extension objects (IEquillaExtension). Determining the actual type present is therefore a task for the extension object author. The object type is not the same as a parameter that accepts an extension object which should use the IEquillaExtension type (see below).

EXTENSION OBJECT TYPES

Any object that implements the "IEquillaExtension Interface" on page 491 can be passed to a method that has an IEquillaExtension parameter.

SERIES TYPES

Accepting a series type as input allows the extension object to access historic values of the parameter. There is no length value associated with the series types because the BackBuffer of the Equilla Script will be determined by how much historic data is accessed by the script and any extension objects. So for example if a script only needs 14 bars of data to process, this value should be provided to the extension object to ensure it does not blindly access historic data on a series variable and artificially elongate the BackBuffer (which could lead to severe performance problems).

In each of the below interfaces a single method exists, that when called will return the value at the supplied offset in the series variable. An offset of zero (0) implies the current value, one (1) the prior value and so on.

```
interface IDateTimeSeries
{
    DateTime GetDate( int Offset );
}

interface IDoubleSeries
{
    double GetValue( int Offset );
}

interface IIntegerSeries
{
    int GetValue( int Offset );
}

interface IStringSeries
{
    string GetValue( int Offset );
}

interface IBooleanSeries
{
    bool GetValue( int Offset );
}

interface IVariantSeries
{
    object GetValue( int Offset );
}
```

The IVariantSeries should only be used when a variable can contain a mixture of the other basic types (which is never a good thing to do). Determining the actual type present is therefore a task for the extension object author.

ARRAY TYPES

Array types accept as input Equilla Arrays (declared using the Array: block in an Equilla script). The extension API provides dedicated support for one- and two-dimensional arrays, and a generic version for n-dimensional arrays.

For each basic type supported by an array there is a corresponding series type with the same behavior as described for series types above. Array interfaces have a method to access a value at a given index (and offset in the case of series) and a property for determining the maximum index possible. Arrays are zero-based.

Arrays that hold Variant types should only be used when a variable can contain a mixture of the other basic types (which is never a good thing to do). Determining the actual type present is therefore a task for the extension object author.

ONE-DIMENSIONAL ARRAYS

```
interface IDateTimeArray
{
    DateTime GetDate(int Index);
    int MaxIndex { get; }
}

interface IDateTimeArraySeries
{
    DateTime GetDate(int Offset, int Index);
    int MaxIndex { get; }
}

interface IDoubleArray
{
    double GetValue(int Index);
    int MaxIndex { get; }
}

interface IDoubleArraySeries
{
    double GetValue(int Offset, int Index);
    int MaxIndex { get; }
}

interface IIntegerArray
{
    int GetValue(int Index);
    int MaxIndex { get; }
}

interface IIntegerArraySeries
{
    int GetValue(int Offset, int Index);
    int MaxIndex { get; }
}

interface IStringArray
{
    string GetValue(int Index);
    int MaxIndex { get; }
}

interface IStringArraySeries
{
    string GetValue(int Offset, int Index);
    int MaxIndex { get; }
}

interface IBooleanArray
{
    bool GetValue(int Index);
    int MaxIndex { get; }
```

```
}

interface IBooleanArraySeries
{
    bool GetValue(int Offset, int Index);
    int MaxIndex { get; }
}

interface IVariantArray
{
    object GetValue(int Index);
    int MaxIndex { get; }
}

interface IVariantArraySeries
{
    object GetValue(int Offset, int Index);
    int MaxIndex { get; }
}
```

TWO-DIMENSIONAL ARRAYS

```
interface IDateTimeArray2D
{
    DateTime GetDate(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IDateTimeArray2DSeries
{
    DateTime GetDate(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IDoubleArray2D
{
    double GetValue(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IDoubleArray2DSeries
{
    double GetValue(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IIntegerArray2D
{
    int GetValue(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IIntegerArray2DSeries
```

```
{
    int GetValue(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IStringArray2D
{
    string GetValue(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IStringArray2DSeries
{
    string GetValue(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IBooleanArray2D
{
    bool GetValue(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IBooleanArray2DSeries
{
    bool GetValue(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IVariantArray2D
{
    object GetValue(int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}

interface IVariantArray2DSeries
{
    object GetValue(int Offset, int Row, int Column);
    int GetMaxIndexOfDimension(int Dimension);
}
```

N-DIMENSIONAL ARRAYS

```
interface IDateTimeArrayND
{
    DateTime GetDate(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IDateTimeArrayNDSeries
{
    DateTime GetDate(int Offset, int[] Indices);
```

```
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IDoubleArrayND
{
    double GetValue(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IDoubleArrayNDSeries
{
    double GetValue(int Offset, int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IIntegerArrayND
{
    int GetValue(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IIntegerArrayNDSeries
{
    int GetValue(int Offset, int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IStringArrayND
{
    string GetValue(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IStringArrayNDSeries
{
    string GetValue(int Offset, int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IBooleanArrayND
{
    bool GetValue(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IBooleanArrayNDSeries
```

```
{
    bool GetValue(int Offset, int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IVariantArrayND
{
    object GetValue(int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}

interface IVariantArrayNDSeries
{
    object GetValue(int Offset, int[] Indices);
    int GetMaxIndexOfDimension(int Dimension);
    int Dimensions { get; }
}
```

EXAMPLE: PASSING AN ARRAY TO AN EXTENSION DLL

C# interface and code for the extension DLL (all other series and array types are used in much the same way):

```
public interface ISoundAverage
{
    [Description("Asynchronously plays the .WAV files specified by the array
of file names")]
    void PlaySounds(IStringArray paths);
}

[ProgId("SoundAverage.Class1")]
public class Class1 : ISoundAverage, EquillaExtension.IEquillaExtension
{
    void ISoundAverage.PlaySounds(IStringArray paths)
    {
        for(int i = 1; i < paths.MaxIndex; ++i)
        {
            System.Media.SoundPlayer player = new System.Media.SoundPlayer
(paths.GetValue(i));
            player.Play();
        }
    }

    void EquillaExtension.IEquillaExtension.Attach
(EquillaExtension.IEquillaHost Host)
    {
    }

    void EquillaExtension.IEquillaExtension.Detach()
    {
```

```
    }
}
```

Usage from Equilla:

```
Inputs:
    Price( Close ),
    Length( 14, 1 );

Array:
    pathArray[]();

Object:
    soundAverage( "SoundAverage.Class1" );

If CurrentBar = 1 Then
    FillArray( pathArray, "c:\file1.wav", "c:\file2.wav" );

If Price Crosses Over Average( Price, Length ) Then
    soundAverage.PlaySound( paths );
```

DATA MANAGEMENT

DATA FEEDS

These types of datafeeds are supported:

- → Bloomberg where the Bloomberg Professional Terminal is installed

- → Refinitiv supporting Elektron, TREP/ADS (with RDP or TS1), Eikon, Datastream, Tick History CSV data (TRTH), Workspaces and Cloud

- → Trayport as trading gateway, for direct-broker connections as well as through a local Joule Terminal, Joule Direct and server-based Trading Gateway

- → Morningstar

- → Nasdaq Data Link, former known as Quandl

- → CSV Data generic CSV files in any data quality

- → Teletrader *(not via TECS/TIM)*

- → OpenConnect as middleware for open interoperability

MISSING A DATA PROVIDER?

You would like to see the list of data providers expanded? No problem - contact us at sales@tradesignal.com to discuss the possibility of connecting another data provider to Tradesignal.

SESSIONS, HOLIDAYS AND PROPERTIES

Information on basic data properties, sessions, time zones and holidays are usually offered by the data provider together with the quotations. However, the data may contain errors - for whatever reason - or the data may cause unwanted side effects in your trading system or the chart display. For cases like these, Tradesignal offers you the possibility to add missing information or even overwrite the delivered data. Use the editing for:

- → Adjusting currency data to your working hours

- → Adding the right trading times (sessions) to quotations

→ Adding time zone information for quotations

→ Adding missing holidays or other days without trading

MODIFY SESSIONS AND PROPERTIES WINDOW

The window for editing the sessions, holidays and properties can be called up for an instrument (a symbol). This can be done in a "Chart" on page 96, or from a selected row in the "Scanner" on page 71, "Watchlist" on page 77 or "Portfolio" on page 251. You can open the window in two ways:

↑   SESSIONS

→ Click on the **Sessions** button in the *Home > Data* group on the "Toolbar" on page 42.

→ Alternatively, right-click on the chart legend or the selected row and choose the option **Show Session Manager** in the context menu.
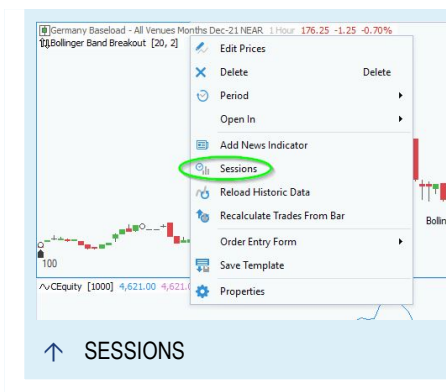
The window opens. The name of the currently edited instrument is displayed in the window header.

DEFINING SESSIONS

On the tab *Sessions* you can set up which times should be used for trading. You have two options:

↑   SESSION MANAGER

Use session information from the data provider Select this option if you want to use the information delivered by the provider. E.g., the trading hours of the NYSE are 9:30 16:00 local time.

Use session information defined below for all charts displaying this instrument Select this option to set up your own trading times for a symbol.

The trading hours are displayed as blue areas in the session display. Move the mouse over the cells to see which time range they represent.

You can select the trading hours as follows (repeating the actions removes the selection again):
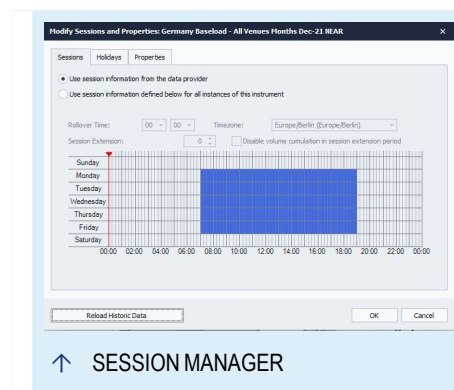
→ Click on the name of each weekday to add (or remove) complete days from the selection.

→ Keep the mouse button pressed and move the mouse over the upper edge of the session display to select a time block, e.g. 08:00 to 15:00.

→ Click on a column header to select a cell column.

→ To define session times to the minute, right-click a cell and select another start time from the list.

→ To select a continuous region, keep the mouse button pressed while moving over the cells in the session display.

You can select a **Time Zone** for which the quotations are displayed. This setting is important when you are using external quotations from distant exchanges and the original data does not include the time information. You can also set the time zone when defining external data sources (see the chapter Data Sources); however, in this case the settings affect all data in the defined folder, even when they do not belong to the same time zone.

When you want to display trading information after the official end of the session without new bars/candles being generated, select the option **Session Extension**. Enter a number of bars or click on the small arrows to enter the numbers. The information for high, close, low and volume are added to the last bar. When you select the additional option **Disable volume cumulation in session extension period**, only the prices, not the volume are added to the last bar.

DEFINE HOLIDAYS

On the tab Holidays you can define which holiday options should be used. There are two options:

Use holiday information from the data provider Select this option to use information delivered by the provider. (Note: not every Dataprovider delivers holiday information)

Use holiday information defined below for all such instruments Select this option to enter holidays. You can define any day as "holiday", i.e. day without trading activity, for example bridging days.

→ To add a new holiday, click on **New**.
A dialog opens. To enter the date, click on the arrow button to open a calendar in which you can select a date. Then enter a name for the holiday.

→ To edit a holiday, select it in the list and click on **Edit**.
A dialog opens in which you can edit the date and/or the name.

→ To delete a holiday, select it in the list and click on **Delete**.

→ To import a holiday defined from another symbol, click **Import**.
A dialog opens which lets import user-defined holidays created for other symbols.

EDIT SECURITY PROPERTIES

On the tab *Properties* you can change four settings for the instrument data. This is especially useful when the external data does not include this information. As default, the *Standard* settings are selected.

Instrument Name Here you can change the name of the symbol as displayed in the chart.

Lot Size The Lot Size is the smallest number of pieces traded, for example 100 pieces for a security. For futures, it is usually 1 piece. To simulate a leverage effect that is caused by multipliers, you can edit the lot size. For the Dax Future that would be 25 Euro, for the Bund Future 1000 Euro.

Tick Size There you can change the smallest possible price movement of a security. For stocks and some indices, it is 0.01 Cent. For some futures it is 0.5 points, for other futures 0.01 ticks or for currencies 0.0001 pips.

Display Unit Here you can change the smallest unit of the value scale.

Slippage/Lot The slippage specific to this security per contract lot (or share).

Contract Weight The Contract Weight is specially important for energy traders. Not every data provider provides this information. If the Contract Weight should not be taken into account for calculation in Equilla, please switch it off here.

CURRENCY AND UNIT CONVERSION

Tradesignal can also convert the currency or the unit of your symbol into another currency or unit. The settings for the currency and unit conversion are visible in the "Mini Toolbar" on page 45 or the full overview of all "Settings" on page 157.

↑ UNIT AND CURRENCY CONVERSION
IN THE PROPERTIES
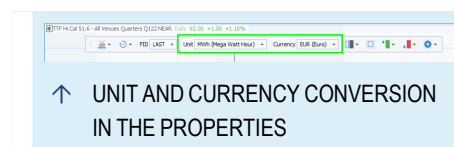
If you are using Tradesignal with Tradesignal DataConnect, you have to specify the datafeed which should be used for the currency conversion in the Tradesignal DataConnect. Tradesignal will use Spot FX prices as default for the currency conversion.

In addition it is possible to define custom currency conversion in Tradesignal for specific currencies. These settings are available in the datafeeds settings.

To easily use the same currency conversion as another user the custom currency conversion settings can be exported and imported (1).

↑   CUSTOM CURRENCY CONVERSION
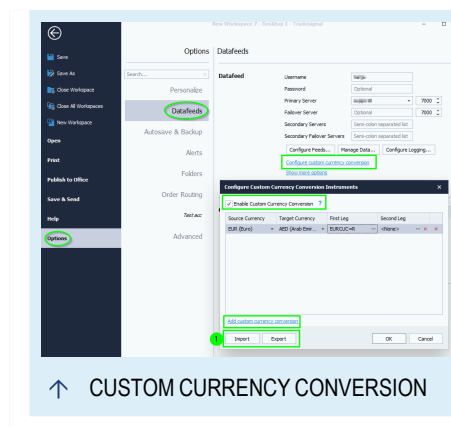
IMPORTING EXTERNAL DATA

Nowadays, all charting software is connected to the internet and thus also to a data provider. This data is called "primary data feed" in Tradesignal. For intraday trading, it is important to have up-to-date and self-refreshing data.

For some trading methods or for developing trading systems and tests, however, it is important to have long histories and a high time resolution. These histories are often expensive and can only be purchased as monthly subscriptions. A less expensive and more individual solution is the inclusion of historic data of files saved on hard drives, removable storage or web servers. For such quotation data, many free and pay sources are available. This allows the users to retrieve and pay only for the histories they need for their analysis.

Offline quotations from external sources can be used for:

→   Extending the price histories of the online data provider

→   Inserting instruments not offered by the online data provider

→   Inserting data other than quotations (business or sentiment indicators, statistics)

External data is treated the same as data from the online provider. You can apply all functions like "Chart" on page 96 Analysis, "Using Indicators" on page 372, "Using Strategies" on page 381, "Portfolio" on page 251and "Scanner" on page 71.

In the following, you can find information about the import of external data and the necessary structure of the file name and the data of such quotation files.

IMPORTING EXTERNAL DATA IN TRADESIGNAL

EDITING THE DATA FEEDS

You can open the settings for the data feed in two ways:

↑ ENTRY DATAFEED IN THE TRADESIGNAL OPTIONS

→ Double-click the connection icon in the top-right corner of the Tradesignal window.

→ Alternatively, open the file menu, select the **Options** entry and click on **Datafeeds**.
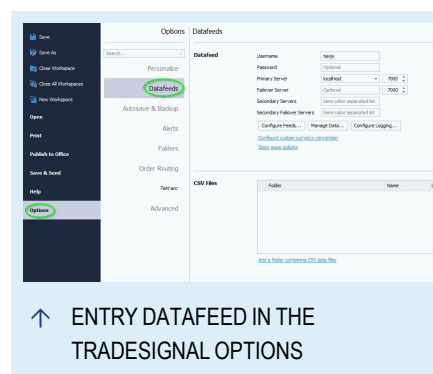
The area for data connection appears in the right side of the window. At the top you can find settings for the data connection to online providers. Below you can find the settings for the "additional data sources" that are available offline.

DATAFEED

Here you setup the connected server with an installed Tradesignal DataConnect and if needed a an additional password.

→ Click on **Configure Feeds...** will guide you through the setup of the feeds, see User Guide for Tradesignal DataConnect.

→ Click on **Manage Data...** opens the Tradesignal DataConnect.

→ Click on **Configure Logging...** opens the Logging Wizard ton enhance the logging.

→ Click on the **Show more options** link to show less critical configuration options.

When you make changes to the data feed, a link will appear offering the chance to reconnect now. Alternatively, clicking on the connection button at the top right above the toolbar will show a menu with a reconnect option.

ADDING AND EDITING ADDITIONAL DATA SOURCES

If you want to use CSV files to obtain additional data in Tradesignal, please use the CSV feed in Tradesignal DataConnect, see User Guide for Tradesignal

DataConnect. If you want to use CSV files to add historical data, please import the data in the Tradesignal DataConnect directly to the symbol.

Top-up data as an additional data source is only used in rare cases.

Set up the type of the additional data source:

Add a folder containing CSV data To configure the folder, click on Browse. Select the folder in which the imported files are located. This may be any folder available on your computer or via intranet. You can also create a new folder for future import. The folder is also called "top-Up service", as it works like a data provider.

> **Note:** External quotation files can only be used when they are located in the configured folder and adhere to both the "File Names for Quotation Data" on page 516 for Files and the "Data Format of External Quotations" on page 518.

Select the **Timezone** from the list (see above).

You can enter a **Text that is added to the legend name of an instrument**. The default string is "top-up". You can enter any other string or delete the entry and leave the field empty. The additional label on the offline data is intended to help you distinguish them from online data. This is especially useful if both data sets have the same shortcut. Additional label won't be visible when extending the price histories of the online data.

Only use data to back-fill missing historic data (default setting) Usually, the online data provider offers all instruments needed. However, the available history is often too short or no intraday data is available. If you want to fill the missing history by data of offline sources, the files have to be saved in the folder configured above and the data shortcut has to be the same as for the instrument of the online provider. Only if both conditions are met, Tradesignal can concatenate the data. The program attempts to fill the history into the past. The additional data is inserted at the point where the history of the online data provider ends.

Always overwrite historic data This setting is only sensible if you have enough offline data for this instrument, so that most or all of the online data is unnecessary. Alternatively, you could also enter a new instrument name so that no collision or concatenation could take place. However, if you want to use a general shortcut for the data without using the online data, this is the right option.

CONDITIONS FOR THE CORRECT DISPLAY OF TRADING PERIODS

For Tradesignal to recognize the time resolution (period) of your data, certain conditions have to be met for the File Names and the Data Format. In cases of

display problems or certain trading periods missing in the chart although the data is available, the error can usually be tracked down to one of these conditions.

EXAMPLE: CONFIGURE AN ADDITIONAL DATA SOURCE IN TRADESIGNAL

STEP 1: OPENING THE CONNECTION SETTINGS IN TRADESIGNAL

01. Open the file menu to the left of the command line.

02. Click on the menu point Options.

03. Click on the tab Datafeeds.

STEP 2: DEFINE A FILE FOLDER AS DATA SOURCE

01. Click on Add a folder containing CSV data to configure a new connection.

02. Click on Browse to open the folder list.

03. Browse to the folder "Tradesignal Files", select it and click on New Folder to create a new folder.

04. Enter the name "Ascii Data" and click on Create.

05. Confirm with OK.

06. As Time Zone, select "Europe/Berlin".

07. Confirm with OK.

STEP 3: IMPORT AND SAVE FILE

Save the file Sample02-1d.txt in the folder described above (right-click the link and "save as target").

If you have read the article about File Names, you can see that the shortcut for the instrument is Sample02 and that the data has a resolution of one day. Keep this instrument name for now. You can always change it later, if desired.

STEP 4: OPEN CHART

01. Enter the shortcut "Sample02" in the command line.

02. Select the option New Chart from the drop-down menu.

The chart with the "Sample02" data is opened.

FILE NAMES FOR QUOTATION DATA

File names have an important function - ideally, they tell the user what kind of data is included and how it is to be displayed. The operating system automatically opens the program assigned to the file extension.

In the case of quotation data like in our case, the file name has another important function. It shows us and the software to which instrument the data belongs, which trading period is used and more. If you have a problem displaying data, this is probably caused by an error either in the file name or in the Data Format.

Please note where the information in a filename is used and if it is mandatory or optional.

FILE NAMES

The file name can/must include the following information:

→ Shortcut (mandatory)

→ Period (mandatory)

→ Field Identifier (optional)

File names can be constructed in the following ways:

→ Shortcut.FileExtension

→ Shortcut-Period.FileExtension

→ Shortcut-FID-Period.FileExtension

As a separator between the parameters, the minus sign is used. If you want to use a shortcut that already includes a minus sign, substitute it with a comma or semicolon. Valid file extensions recognized by Tradesignal are .csv, .asc and .txt.

SHORTCUT

If you want to be able to use the file name in the "Command Line" on page 38 of Tradesignal, e.g. to open a chart with the data, the shortcut has to follow a certain convention. The shortcut is also important if you want to combine data from your online provider with offline data.

> **Note:** If you want to use a shortcut independent of your online provider, you may freely choose the filename. However, if you want to combine data from your online provider with offline data (for example to extend the history or to add intraday data for an instrument), the

shortcut of the offline data has to be identical to the one used by the online provider. Otherwise, the external offline data will not be assigned correctly.

For shortcuts with a leading point (e.g. many indices), a trick has to be used since Windows does not allow filenames with a leading point. Just add a plus sign before the point.

Example for an instrument with leading point: +.gdaxi-5m.csv

PERIOD

The period is optional in a file name. If no period is given, Tradesignal automatically displays the data in daily intervals, even if intraday data is available in the file. The software can display the data correctly only if the period parameter is used. If you receive an error when changing the period settings of your external data in the Chart or Scanner, it is very likely that this error results from a missing or invalid period value.

Period	Shortcode	Example
Tick Data	tick, 0, t, tick, ticks, 1t	aaa-tick.csv
1 Minute	60, 1m, m, min, minute, minutes, minuten	pumg.de-60.csv
5 Minutes	300, 5m, 5min, 5mins, 5minute, 5minuten, 5minutes	adsg.de-5m.csv
30 Minutes	1800, 30m, 30min, 30mins, 30minute, 30minuten, 30minutes	depfa-30min.csv
1 Hour	3600, 1h, h, hour, hourly, 1hour, stunde, stunden	eurusd-hour.csv
1 Day	86400, 1d, d, day, daily, tag	+.rut-1d.txt
1 Week	604800, 1w, w, week, weekly, woche	+.gdaxi-w.csv
1 Month	2592000, month, mothly, monat	dowjones-monthly.csv

FIELD IDENTIFIER

The Field Identifier is only mandatory if instead of the normal quotations (open, high, low and close) the bid, ask, or last prices are given in the file. These prices can only be displayed with the correct identifier. The following identifiers are valid:

→ last

→ bid

→ ask

Example for a file with bid prices: +.gdaxi-bid-5min.csv

Example for a file with ask prices: +.gdaxi-ask-5min.csv

DATA FORMAT OF EXTERNAL QUOTATIONS

In files of quotation data, the data format (i.e. the sequence of elements such as date, time, prices and volume) defines the data display and whether the program can handle it at all. Since there are many possible combinations, import problems may be caused by data in the wrong format. Often, a simple wrong separator or a non-supported date format can cause havoc with the data.

When you need to edit the data format, you can do this with a text editor. For exchanging complete columns, however, usually programs like Excel or Access are necessary.

A file with quotation data has the following components:

→ Header - recommended but optional

→ Data columns separated by separators (by default semicolon or comma)

Tradesignal recognizes the following column types:

→ Date

→ Time - optional

→ Open - optional

→ High - optional

→ Low - optional

→ Close

→ Volume - optional

→ Open Interest - optional

For the display of intraday data, time and date stamps are necessary. Otherwise, the data is filled in beginning with the current trading day, which may not always give correct results. If you want to add information to the history of your online data provider, make sure that your file has the same data elements as the file from your provider.

HEADER

The first segment of the file should be the header. It contains information about the data columns, their order and the used separators. The header is optional; when no header is given, Tradesignal attempts to interpret and display the segments. However, this may cause errors.

In the header, information about the columns is given in the way of identifiers. The identifiers have to be separated by the same separator as the data columns. For each column type, several identifiers are possible, as you can see in the following list:

NOTATION

- → Date - d, date, datetime (when date and time are combined)
- → time - t, time
- → Open - o, op, open
- → High - h, hi, high
- → Low - l, lo, low
- → Close - c, cl, close
- → Volume - v, vo, vol, volume
- → OpenInterest - oi, openint, ointerest, openinterest

Example Header: Date;Time;Open;High;Low;Close;Volume

If no header is given, Tradesignal uses the following masks to analyze the column grouping:

- → d,o,h,l,c
- → d,o,h,l,c,v
- → d,o,h,l,c,v,oi
- → d,c
- → d,c,v
- → d,c,v,oi

Some data sources, for example Internet offers, contain data in additional columns. Since Tradesignal cannot display those, the data has to be skipped. For this, the word "Skip" can be used in the header. In the following header example, the last column is skipped.

EXAMPLE FOR A FILE WITH AN ADDITIONAL COLUMN THAT IS SKIPPED:

```
Date,Open,High,Low,Close,Volume,Adj.
Close*09.11.05,10539.24,10637.78,10466.24,10546.21,22144600,10546.21
```

results in:

```
Date,Open,High,Low,Close,Volume,Skip09.11.05,10539.24,10637.78,10466.24,105
46.21,22144600,10546.21
```

DATA AND TIME FORMATS

For date and time, many different formats exist.

DATE FORMAT

→ European Format - Example: 01.04.2006

→ English (US) Format - Example: 04/01/06

→ Standard ISO Format - Example: 1998-12-22T01:02:03:987

When the European format is recognized, a comma has to be used as decimal separator. In the case of an English format, a decimal point has to be used as decimal separator.

Additional differences may exist in the day, month, year sequence, especially in the case of UK/US formats. See the example below for combinations recognized by Tradesignal.

TIME STAMP

No flexibility is given regarding the time stamp format. The separator has always to be a colon. If necessary, the separators of an external data file have to be exchanged to a colon in a text editor.

COMPONENTS OF THE TIME STAMP

→ hour

→ minute

→ second

one-tenth of a second (for tick data)

For English time zones, "AM" or "PM" can be used if the hours are given in a 12 hour interval.

EXAMPLES FOR VALID DATE AND TIME STAMPS IN TRADESIGNAL

ENGLISH FORMATS

→ 1998/1/11 11:05:00

→ 5/17/1998 11:05:00 AM

→ 5/17/1998 8:05:00 PM

→ 2005/10/25 12:25:11 PM

→ 2005/10/25 11:05:00:124 AM

→ 5-17-1998

→ 1998-12-22

→ 1998-12-22 01:02 PM

→ 98-12-22

EUROPEAN FORMATS

→ 04.12.98

→ 04.12.1998

→ 04.12.1998 12:23

→ 04.12.1998 12:23:12

→ 04.12.1998 12:23:14:122

→ 04.12.1998 12:23:14.122

→ ISO Formats

→ 1998-12-22T01:02:03

→ 1998-12-22T01:02:03:987

ISO FORMATS

→ 1998-12-22T01:02:03

→ 1998-12-22T01:02:03:987

TRADESIGNAL DATA IN EXCEL

Extending Equilla via "COM-API Extensions" on page 482 allows you to get periodically updated data from Tradesignal into your Excel spreadsheets.

In Tradesignal 7, we've added a COM-API extension LiveExport and indicator of the same name to help you accomplish this. The extension enables the indicator to write price data into an Access database file which can be imported into an Excel worksheet. To get periodic updates to the data displayed, you can specify how often Excel updates from the database.

WRITING DATA FROM A CHART TO AN ACCESS DATABASE

↑ EQUILLA EXTENSION OPTIONS

01. Make sure that COM-API extensions are enabled, *File > Options > Advanced > Equilla Extension*.

02. Apply indicator *LiveExport* from the Tradesignal package to an instrument or indicator on a chart.

03. Set path and table name prefix in the properties of the indicator. You can use macros for some commonly used folders on your machine, see source code of the indicator for details.
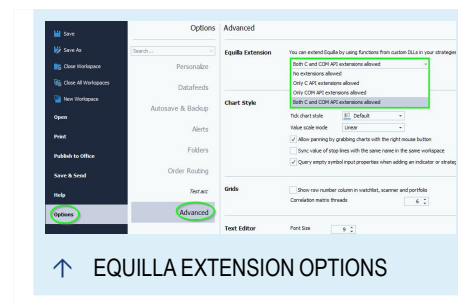
ACCESSING DATABASE FROM EXCEL 2010

01. *Data > From Access* on the ribbon allows you to pick the database file and table.

02. Make sure to pick *DB_MODE_READ* to open the database as read-only, otherwise Tradesignal will not be able to write to this database.

03. In the properties of the connection, you can enable periodic refresh and change the refresh interval.

EXPORTING PRICE DATA

If your data provider allows exporting of price data, you can export data displayed in Tradesignal by

→ dragging the symbol from the chart legend to another application which can handle CSV data input, e.g. most spreadsheet applications

→ or by selecting the *Home > Data > Export Data* found in the "Toolbar" on page 42.

→ The file format for export is CSV which can be parsed by a wide range of applications and is also human readable.

PRICE EDITOR

Price data can be obtained from various sources. On the one hand, data is supplied to the software from the default data provider via the Internet, on the other hand data can be imported via a data interface, as text files or in other data formats.
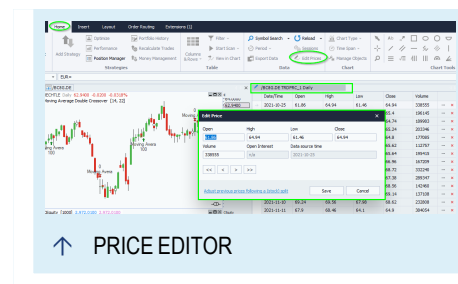
↑   PRICE EDITOR

When receiving data, errors may happen and make it necessary to edit the price data manually. Use the Price Editor to:

→ enter stock splits retroactively

→ rectify faulty ticks and corrupt data records

The Price Editor is available in the Chart, Scanner and Portfolio.

OPEN THE PRICE EDITOR

→ Click on the button **Edit Prices** under Home > Data on the "Toolbar" on page 42.

→ Alternatively, open the context menu of the documents and select **Edit Price**.

The Price Editor opens. The Prices group appears in the toolbar.

EDIT DATA

CHANGE DATA

You can edit the values of a line (single trading period).

→ Double-click the line.

→ Alternatively, right-click the line and select **Edit** from the context menu.

DELETE DATA

You can delete lines (single trading periods) from the price table.

→ Select one or more lines and press the Del key.

→ Alternatively, right-click the selected lines and select **Delete Row(s)** from the context menu.

Depending on file size, the process may take several minutes, as backups are created.

ENTER STOCK SPLITS

You can enter stock splits manually, if the data provider offers no corrected data or if you downloaded data without split correction from the Internet.

01. Select the lines you want to edit.

02. Open the split function by clicking the **Split** button in the symbol bar or selecting the entry **Split** in the context menu.

03. Select a Data Adjustment Mode:

Absolute The value is subtracted from the selected prices.

Relative Here you can enter a multiplier or the split ratio. Many stocks are split in a 1:2 or 1:3 ratio. The preview window displays the effects of the entered split settings on example data.

Click **OK** to save the settings and start the process. The data is changed. This may take a few minutes.

RESET CHANGES

Changed or deleted prices can be reset to their original values at any time (with the exception of DataConnect data). Tradesignal keeps backups of the data.

01. Select one or more lines with changed data. Changed data are underlined in orange in the table.

02. Open the context menu and select **Reset Edited Data**. The program restores the backup and overwrites the changes.

DIFFERENCE BETWEEN LOCAL DATA AND TRADESIGNAL DATACONNECT

Tradesignal DataConnect is a product from Tradesignal that collects and organizes data from many commercial data feeds. It is only relevant to Tradesignal institutional users.

The functions described above are available for local data or data offered from the provider, and also for the price data of DataConnect.

The sole difference is that in the case of DataConnect data, no backup and data restoration is available. If you want to change DataConnect data, save the data as personal backup before editing it.

BLOOMBERG DATA

SYMBOL SYNTAX

Bloomberg Symbol syntax differs from the Reuters syntax. In general, you only have to enter the symbol short code in the command line, for example

- → short code + security type (e.g. SIE EQUITY)

Other short codes are:

- → GOVT for government bonds
- → CORP for corporate bonds
- → CRNCY for currency
- → INDEX for indices
- → CMDTY for futures

Due to the fact that instruments are traded on different exchanges, you have to enter additional commands, otherwise the most profitable exchange will be offered automatically.

- → short code + exchange + security type (e.g. SIE GY EQUITY for xetra)

In addition to those short codes, you can add more commands, e.g. period information.

For example:

→ short code + exchange + security type + period (e.g. SIE GY EQUITY 5m opens Siemens on xetra in 5min. period)

Continuous Future contracts are indicated with "1", e.g. GX1 COMDTY for dax future or RX1 COMDTY for Bund future.

Single contracts are entered as follows:

→ short code + expiry month + expiry year + security type
e.g. for dax future Dec. 2007, it would be GXZ7 COMDTY

You can recall more short codes and infos within the Bloomberg terminal. Enter the commands as follows:

→ DOCS + Go formal documents

→ BLP + Go Bloomberg Launch Pad

→ PDF + Go personal default settings

→ BBXL + Go all about Bloomberg und Excel G + Go

A list of all mayor symbol codes you can find here: Bloomberg Symbollists

DATA HISTORY

All data comes directly from Bloomberg. There will be no local caching or saving.

Generally there will be the following data history be available:

-	Daily	Intraday	Ticks
Stocks	20 - 25 Years	50 Days	5 Days
Futures (adj.)	ca. 15 Years	50 Days	50 Days
Indizes Dt	up to 1960 (Dax)	50 Days	50 Days
Indizes US	up to 1900 (DJI)	50 Days	50 Days
Indizes US	up to 1980 (NDX)	50 Days	50 Days

SYMBOL LISTS

When starting TradeSignal for the very first time, you are asked if you want to receive lists from your data provider. If you confirm this, you will use the Symbol List wizard for the first time. However, you can start the wizard any time to create a new list.

→ In the toolbox, click the Symbol Lists button.

→ In the Related Task area, click on New Symbol List.

The Symbol List wizard opens. Choose **Predefined Symbol List from Your Data Provider**. On the upper left side you will find a search box. Enter the shortcode of the wanted index and hit **Search**. Now the result will be displayed. Make a check into the checkbox next to the result and hit **OK**. Now the new Symbol List will be added to your list.

Use the shortcode, you will use to open the Index as chart.

Please use:

DAX for the Dax 30

MDAX for the M Dax

TDXP for the TecDax

UKX for the FTSE 100 Index

CAC for the CAC 40 Index

BEL20 for the Bell 20 Index

AEX for the AEX Amsterdam Index

IBEX for the Ibex 35 Index

INDU for the Dow Jones Industrial Index

CCMP for the Nasdaq Composite Index

SPX for the S&P 500 Index

SPTSX for the TSX COMPOSITE INDEX

IBOV for the Ibovespa - Bovespa Index

HSI for the Hang Seng Index

NKY for the Nikkei Stock Average 225

SMI for the SMI Index

ATX for the Österreichischen ATX Index

MIB30 for the Italian Mibtel

MADX for the Madrid General Index

OMX for the Stockholm All Share Index

HEX for the Helsinki All Share Index

KFX for the Copenhagen 20 Index

OBX for the Oslo Exchange All-share Index

BUX for the Budapest Stock Exchange Index

SX5P for the DJ Stoxx 50 ETF

SX5E for the DJ Euro Stoxx 50 ETF

AS30 for the Australian All Ordinaries Index

KOSPI for the South Korean KOSPI Index

KLCI for the KLSE Composite Index

SET for the Thai SET Composite Index

JCI for the Jakarta Composite

PCOMP for the Philippine PSE Composite Index

KSE100 for the Karachi SE 100 Index

SHCOMP for the Shanghai Composite Index

TELETRADER DATA

SYMBOL SYNTAX

TeleTrader Symbol syntax differs from the Reuters or Bloomberg syntax. In general, you only have to enter the symbol short code in the command line, for example

→ short code + exchange (e.g. SIE GER)

Other short codes are:

→ GER - Xetra

→ FRA - Frankfurt

→ MUN - München

→ STU - Stuttgart

In addition to those short codes, you can add more commands, e.g. period information.

For example:

→ short code + exchange + period (e.g. SIE GER 5m opens Siemens on xetra in 5min. period)

Continuous Future contracts are not available, but you can create them easily on your own. Please look into help file to learn how to do it: "User-defined continuations" on page 84.

Single contracts are entered as follows:

→ short code + expiry year + expiry month
e.g. for dax future Dec. 2009, it would be FDAX 2009Z

Indices always have a dot before the short code, for example:

→ DAX.de for Dax Index

→ DJX.us for Dow Jones Index

DATA HISTORY

All data comes directly from TeleTrader. There will be no local caching or saving.

Generally there will be the following data history be available:

-	Daily	Intraday	Ticks
Stocks	12 - 14 Years	3 Years	12 Days
Futures (cont.)	8 - 10 Years	3 Years	12 Days
Indices Ger	up to 1950	3 Years	12 Days
Indizes US	up to 1990	3 Years	12 Days

SPECIALS

→ With the TeleTrader Data Provider its possible to create your own "User-defined continuations" on page 84

→ With the TeleTrader Data Provider its possible to create your "Seasonal Chart" on page 155

→ With the TeleTrader Data Provider its possible to create spread charts

SYMBOL LISTS

When starting TradeSignal for the very first time, you are asked if you want to receive lists from your data provider. If you confirm this, you will use the Symbol List wizard for the first time. However, you can start the wizard any time to create a new list.

→ In the toolbox, click the Symbol Lists button.

→ In the Related Task area, click on New Symbol List.

The Symbol List wizard opens. Choose **Predefined Symbol List from Your Data Provider**. Now the result will be displayed. Make a check into the checkbox next to the result and hit OK. Now the new Symbol List will be added to your list.

THOMSON REUTERS DATA

SYMBOL SYNTAX

Reuters Symbol syntax differs from the Bloomberg syntax. In general, you only have to enter the symbol short code in the command line, for example

→ short code + exchange (e.g. Siegn.DE)

The short code behind the colon refers to the exchange, e.g. the following:

→ .DE - Xetra

→ .FRA – Frankfurt

→ .MU - Munich

→ .STU – Stuttgart

In addition to those short codes, you can add more commands, e.g. period information.

For example:Siegn.de 5m (opens Siemens at xetra in 5minute period)

Continuous Future contracts are indicated with "c1", e.g. FDXc1 for dax future or FGBLc1 for Bund future.

Single contracts are entered as follows:

→ short code + expiry month + expiry year
e.g. for dax future dec. 2007, it would be FDXZ7

Indices always have a dot before the short code, for example:

→ .GDAXI for dax index

→ .DJI for dow jones index

→ .GSPC for s&p index

A list of all mayor symbol codes you can find here: Reuters Symbollists

SYMBOL LISTS

When starting TradeSignal for the very first time, you are asked if you want to receive lists from your data provider. If you confirm this, you will use the Symbol List wizard for the first time. However, you can start the wizard any time to create a new list.

→ In the toolbox, click the Symbol Lists button.

→ In the Related Task area, click on New Symbol List.

The Symbol List wizard opens. Choose **Predefined Symbol List from Your Data Provider**. On the upper left side you will find a search box. Enter the RIC of the wanted index and hit Search. Now the result will be displayed. Make a check into the checkbox next to the result and hit OK. Now the new Symbol List will be added to your list.

Use the RIC, you will use to open the Index as chart.

Please use:

→ .GDAXI for the Dax 30

→ .MDAXI for the MDax

→ .TECDAX for the TecDax

→ .FTSE for the FTSE 100 Index

→ .FCHI for the CAC 40 Index

→ .BFX for the Bell 20 Index

→ .AEX for the AEX Amsterdam Index

→ .IBEX for the Ibex 35 Index

→ .DJI for the Dow Jones Industrial Index

→ .IXIC for the Nasdaq Composite Index

→ .SPX for the S&P 500 Index

→ .BVSP for the Ibovespa - Bovespa Index

→ .HSI for the Hang Seng Index

→ .N225 for the Nikkei Stock Average 225

→ .SSMI for the SMI Index

→ .MIBTEL for the Italian Mibtel

→ .SMSI for the Madrid General Index

→ .OMXSPI for the Stockholm All Share Index

→ .OMXHPI for the Helsinki All Share Index

→ .OMXC20 for the Copenhagen 20 Index

→ .OSEAX for the Oslo Exchange All-share Index

- → .BUX for the Budapest Stock Exchange Index
- → .STOXX50 for the DJ Stoxx 50 ETF
- → .STOXX50E for the DJ Euro Stoxx 50 ETF
- → .AORD for the All Ordinaries Index
- → .KS11 for the KOSPI Index
- → .KLSE for the KLSE Composite Index
- → .SETI for the SET Composite Index
- → .JKSE for the Jakarta Composite
- → .PSI for the PSE Composite Index
- → .KSE for the Karachi SE 100 Index
- → .SSEC for the Shanghai Composite Index

INDICATOR AND STRATEGY REFERENCE

ACCUMULATION DISTRIBUTION

Shortcode: ACD

DESCRIPTION

This indicator measures the difference between buying pressure and selling pressure. It is a momentum indicator that gauges supply and demand by determining whether investors are generally accumulating (buying) or distributing (selling) a certain stock. It helps to identify divergences between stock price and volume flow and points out weaknesses in the current price performance.

PARAMETERS

This indicator requires a single parent instrument that has data fields for Open, High, Low, Close available.

CALCULATION

On a daily chart, yesterday's closing is compared to today's closing price. If today's closing price lies above yesterday's closing price (accumulation) the new indicator value is calculated by adding yesterday's indicator value to the difference between closing price and True Low. If today's closing price lies below yesterday's closing price (distribution) the new indicator value is calculated by adding yesterday's indicator value to the difference between closing price and True High.

USAGE

The Accumulation Distribution points out weaknesses in the current price performance by identifying divergences between the indicator and the underlying security. Divergences between indicator and security point to a weakening of the prevailing trend. Keep in mind that a possible trend reversal must be confirmed by the price. A "bullish divergence" occurs when the significant lows of the price lie on a falling line but the significant highs of the indicator on a rising line. A "bearish

divergence" occurs when the significant highs of the price lie on a rising line but those of the indicator are on a falling line. Once a divergence has been identified, separate technical indicators should be used for confirmation. Accumulation Distribution can be generalized to bars of any period.

↑   SLIGHTLY BULLISH DIVERGENCE.

ACCUMULATION DISTRIBUTION LINE

Shortcode: ADL

DESCRIPTION

This indicator measures the cumulative flow of money in and out of a security. The line is a running total of each period's money flow volume. The indicator is designed to illuminate the forces behind price movements by factoring in volume and spot divergences and to confirm the strength and sustainability of a price move.

CALCULATION

The indicator is a cumulative measure of each period's volume flow, or money flow. To calculate the indicator, the Closing Location Value (CLV) (which can take values between -1 and +1) is calculated by subtracting the difference between daily high and closing price from the difference between closing price and daily low, and dividing the result by the difference between daily high and daily low. This value is multiplied by volume and added to the previous day's indicator value to form the Accumulation Distribution Line.

```
CLV = [(Close - Low) - (High - Close)] /(High - Low)
ADL = ADL t-1 + (CLV * Volume)
```

USAGE

The indicator is used to spot divergences between indicator and underlying instrument, i.e. to either reinforce the underlying trend or cast doubts on its sustainability. An uptrend in prices with a downtrend in the Accumulation Distribution Line suggests underlying selling pressure (distribution) that could foreshadow a bearish reversal on the price chart. A downtrend in prices with an uptrend in the Accumulation Distribution Line indicate underlying buying pressure (accumulation) that could foreshadow a bullish reversal in prices.

↑ A BULLISH DIVERGENCE AND THE
SUBSEQUENT TREND REVERSAL.

↑ A BEARISH DIVERGENCE AND THE
SUBSEQUENT TREND REVERSAL.

ACCUMULATION DISTRIBUTION OSCILLATOR

Shortcode: ADO

DESCRIPTION

This indicator measures the buying and selling pressure in a market by analyzing the range of price moves resulting from bullish or bearish market tendencies over the course of the trading period.

CALCULATION

The opening price is subtracted from the daily high, the daily low is subtracted from the closing price. Both results are added together. This result is divided by the double trading range for the period:

```
ADO(t) = ( High(t) - Open(t) ) + ( Close(t) - Low(t) ) / ( 2 * Range(t) )
```

Depending on whether the indicator is calculated for up (bullish) or down (bearish) periods the indicator value will be higher or lower.

USAGE

Higher values indicate increased buying pressure with values over 70 usually indicating the security is overbought. Lower values indicate increased selling pressure with values below 30 usually indicating the security is oversold.

↑ THE INDICATOR IS FAST-MOVING AND SENSITIVE BUT MAY BE USED TO ANTICIPATE TREND REVERSALS.

ADAPTIVE MOVING AVERAGE SIMPLE STRATEGY

DESCRIPTION

This complete strategy is a simple crossover of the price with the "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA). The indicator focused more on trend efficiency then on volatility. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Adaptive Moving Average Simple Portfolio Strategy" on page 538.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period

The number of bars used to calculate

Default: 38

Bullish

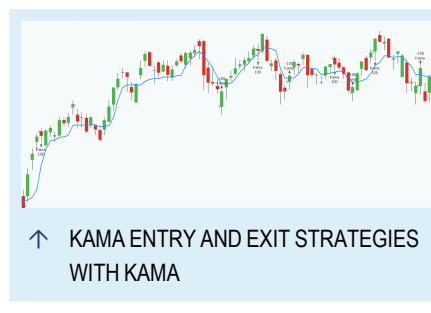Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The indicator uses a Moving Average Exponential with an adaptive weighting factor to calculate the signal line. For the calculation of the indicator itself, see "Moving Average Adaptive" on page 691. A crossover of the price with the KAMA generates trading signals.

↑ KAMA WITHOUT AND WITH A TREND IN THE MARKET

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADAPTIVE MOVING AVERAGE SIMPLE PORTFOLIO STRATEGY

DESCRIPTION

This complete strategy is a simple crossover of the price with the "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA). The indicator focused more on trend efficiency then on volatility. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Period
The number of bars used to calculate

Default: 38

LongEntry
Defines what kind of orders are placed.

Default: True

LongExit
Defines what kind of orders are placed.

Default: True

ShortEntry
Defines what kind of orders are placed.

Default: False

ShortExit
Defines what kind of orders are placed.

Default: False

CALCULATION

The indicator uses a Moving Average Exponential with an adaptive weighting factor to calculate the signal line. For the calculation of the indicator itself, see"Moving Average Adaptive" on page 691. A crossover of the price with the KAMA generates trading signals.

↑ KAMA WITHOUT AND WITH A TREND IN THE MARKET

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADAPTIVE MA CROSS - ENTRY STRATEGY

DESCRIPTION

The strategy uses as tradings signals crossovers between a fast and a slow "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA).

The indicator itself is based on different "Moving Average Exponential" on page 699 and focused more on trend efficiency then on volatility. For Exit signals with the same trigger, please use the "Adaptive MA Cross - Exit Strategy" on the next page.

PARAMETERS

Period1
The number of bars used to calculatefor the fast moving average adaptive

Default: 20

Period2
The number of bars used to calculatefor the slow moving average adaptive

Default: 60

EntryMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The indicator uses two moving average exponential with an adaptive weighting. For the calculation of the indicator itself, see "Moving Average Adaptive" on page 691.

The strategy generates a long entry signal when a fast adaptive moving average crosses a slow adaptive moving average. In contrast, the strategy generates a short entry signal when a fast adaptive moving average crosses under a slow adaptive moving average.

↑ STRATEGY WITH THE TWO MOVING AVERAGE EXPONENTIAL

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADAPTIVE MA CROSS - EXIT STRATEGY

DESCRIPTION

The strategy uses as tradings signals crossovers between a fast and a slow "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA).

The indicator itself is based on different "Moving Average Exponential" on page 699 and focused more on trend efficiency then on volatility. For Entry

signals with the same trigger, please use the"Adaptive MA Cross - Entry Strategy" on page 539.

PARAMETERS

Period1
The number of bars used to calculate for the fast moving average adaptive

Default: 20

Period2
The number of bars used to calculate for the slow moving average adaptive

Default: 60

ExitMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The indicator uses two moving average exponential with an adaptive weighting. For the calculation of the indicator itself, see"Moving Average Adaptive" on page 691.

The strategy generates generates a long exit signal when a fast adaptive moving average crosses under a slow adaptive moving average. In contrast, the strategy generates a short exit signal when a fast adaptive moving average crosses over a slow adaptive moving average.

↑ STRATEGY WITH THE TWO MOVING AVERAGE EXPONENTIAL

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADAPTIVE MA SLOPE - ENTRY STRATEGY

DESCRIPTION

The strategy uses the slope of the "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA). The indicator itself is based on different "Moving Average Exponential" on page 699 and focused more on trend efficiency then on volatility. For Exit signals with the same trigger, please use the "Adaptive MA Slope - Exit Strategy" on the next page.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

LookBack
Defines the lookback period for the slope

Default: 5

EntryMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The indicator uses a Moving Average Exponential with an adaptive weighting factor to calculate the signal line. For the calculation of the indicator itself, see "Moving Average Adaptive" on page 691.

The strategy generates a long entry signal when the slope of the Adaptive Moving Average is positive. In contrast, the strategy generates a short entry signal when the slope of the Adaptive Moving Average is negative.

↑ KAMA WITH RSI

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADAPTIVE MA SLOPE - EXIT STRATEGY

DESCRIPTION

The strategy uses the slope of the "Moving Average Adaptive" on page 691, also known as Kaufman's Adaptive (KAMA). The indicator itself is based on different "Moving Average Exponential" on page 699 and focused more on trend efficiency then on volatility. For Entry signals with the same trigger, please use the"Adaptive MA Slope - Entry Strategy" on the previous page.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

LookBack
Defines the lookback period for the slope

Default: 5

ExitMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The indicator uses a Moving Average Exponential with an adaptive weighting factor to calculate the signal line. For the calculation of the indicator itself, see "Moving Average Adaptive" on page 691.

The strategy generates a long exit signal when the slope of the Adaptive Moving Average is negative. In contrast, the strategy generates a short exit signal when the slope of the Adaptive Moving Average is positive.

↑   KAMA ENTRY AND EXIT STRATEGIES WITH KAMA

USAGE

The strategy shows a lot of signals and whipsaws which can be useful for swing traders. When the market shows no strong trend, the strategy can produce false signals. You could use the strategy along with additional indicators like "Relative Strength Index" on page 753 to identify overbought and oversold levels.

For short and long-term traders different periods are suggested, so you can use the "Optimizer" on page 274 to find a suitable period for your trading system. The advantage of the KAMA is the adaptive weighting factor, which leads to the fact that the strategy does not have to be constantly re-optimised.

ADX MA

Shortcode: ADXMA

DESCRIPTION

This indicator adds a smoothing component to the Average Directional Index to filter non-representative extreme values. The "Average Directional Index" on page 551 evaluates the strength of the current trend. The direction of the trend is not measured.

PARAMETERS

Period
The number of bars used to calculate the smoothed ADX value.

Default: 14

CALCULATION

The calculation of this indicator is largely identical to that of the Directional Movement Index. Its basis are two partial indicators:

→ +DI (Upward Directional Indicator), which is calculated by determining the +DM (Upward Directional Movement). The +DM measures the difference between today's high and yesterday's high and dividing it by the True Range based on the selected period.

→ -DM (Downward Directional Indicator), which is calculated by determining the -DM (Downward Directional Movement). The -DM measures the difference between today's low and yesterday's low and dividing it by the True Range based on the selected period.

The difference between the +DI and -DI is divided by the sum of the +DI and -DI. The result is multiplied by 100 which produces the Directional Movement Index percentage value. To calculate the Average Directional Index value this value is smoothed using a "Moving Average Simple" on page 705.

The Average Directional Index value is then smoothed and transformed into the ADX MA by applying a "Moving Average Simple" on page 705.

USAGE

Like the ADX this indicator is used to measure trend strength. The ADX MA is an oscillator that fluctuates between 0 and 100. Values below 20 indicate that a trend is weak and likely to reverse, values above 40 indicate that a trend is strong and possibly increasing its strength.
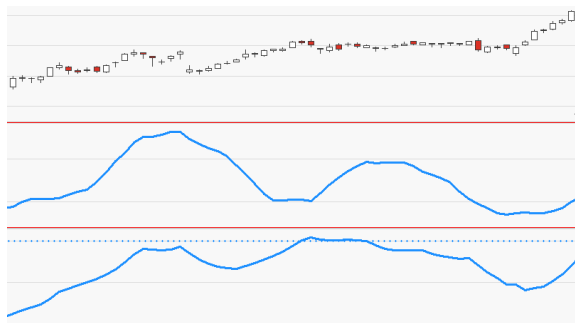
↑ THE ADX MA (CENTER) COMPARED TO THE ADX (BOTTOM).

AROON

Shortcode: ARO

DESCRIPTION

This indicator can be used to determine the beginning of a new trend as well as how strong the trend is. It consists of two separate indicator lines which show the number of periods since price recorded an x-day high or low.

PARAMETERS

Period
The number of bars used to calculate the indicator.

Default: 10

DownLevel
The lower threshold level.

Default: 25

UpLevel
The upper threshold level.

Default: 75

CALCULATION

The two indicator lines, Aroon up and Aroon down, oscillate between 0 and 100. The Aroon up measures the number of bars since an x-day high, the Aroon down measures the number of bars since an x-day low. In other words, the indicator reports the time it is taking for the price to reach, from a starting point, the highest and lowest points over a given time period, each reported as a percentage of total time.

```
Aroon up = 100 * ((Period - n) / Period)
n = Bars since last period high
```

```
Aroon down = 100 * ((Period - n) / Period)
n = Bars since last period low
```

USAGE

→ An up line located above a down line indicates an uptrend; indicator values of 70% or higher indicate that the trend is strong.

→ A down line located above an up line indicates a downtrend; indicator values of 70% or higher indicate that the trend is strong.

→ Crossovers indicate a possible trend reversal; an up line crossing a down line bottom-up is regarded a bullish signal, a down line crossing an up line bottom-up is regarded a bearish signal.

The indicator does not measure price changes but changes related to time periods, therefore its progression is rather straight-lined. The more stable a trend is the more stable the indicator line. Both indicator lines running in their respective extreme zones or moving top-down in parallel indicate a trendless phase. Reoccurring patterns help in the analysis of the indicator, of few of which are:

→ Stable up line at 70% or higher

→ Stable down line a 70% or higher

→ Both lines moving towards 0% in parallel

→ Up line crosses down line bottom-up

→ Down line crosses up line bottom-up
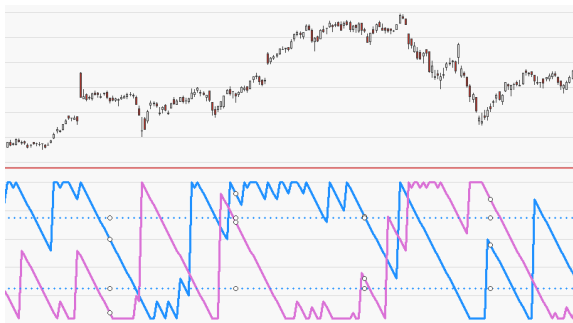
↑ AROON WITH A PERIOD SETTING OF 25.
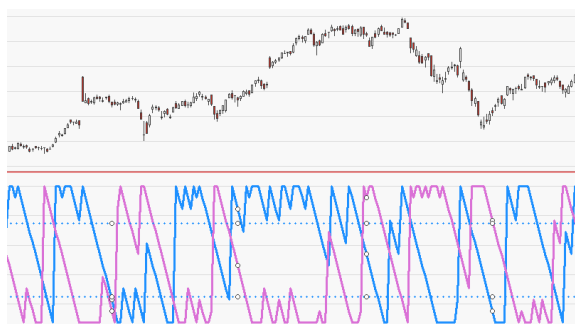
↑ THE SAME CHART, AROON WITH A
PERIOD SETTING OF 13.

AROON OSCILLATOR

Shortcode: AOS

DESCRIPTION

This indicator is directly based on the Aroon
indicator which can be used to determine the
beginning of a new trend as well as how
strong the trend is. The Aroon consists of two
separate indicator lines which show the
number of periods since price recorded an x-

day high or low. The Aroon Oscillator can be used as a trend filter as well as to
measure trend strength.

PARAMETERS

Period
The number of bars used to calculate the indicator.

Default: 10

ShowAlerts
Controls whether alerts are displayed if the threshold values are exceeded.

Default: No

CALCULATION

The indicator requires the calculation of the Aroon up and Aroon down values.
The Aroon up measures the number of bars since an x-day high, the Aroon down
measures the number of bars since an x-day low. In other words, the indicator
reports the time it is taking for the price to reach, from a starting point, the highest

and lowest points over a given time period, each reported as a percentage of total time.

```
Aroon up = 100 * ((Period - n) / Period)
n = Bars since last period high
```

```
Aroon down = 100 * ((Period - n) / Period)
n = Bars since last period low
```

The Aroon Oscillator is calculated by subtracting the Aroon down value from the Aroon up value:

```
AroonOscillator = Aroon up - Aroon down
```

USAGE

→ Like the Aroon indicator, the Aroon Oscillator can be used as a trend-following indicator.

→ When used as a trend filter, an indicator line located above the zero line indicates an upward trend while an indicator line located below the zero line indicated a downward trend.

→ The greater the distance between indicator line and zero line the stronger the current trend (similar to the "Average Directional Index" on page 551).

→ Crossings of indicator line and zero line point to trend reversals.
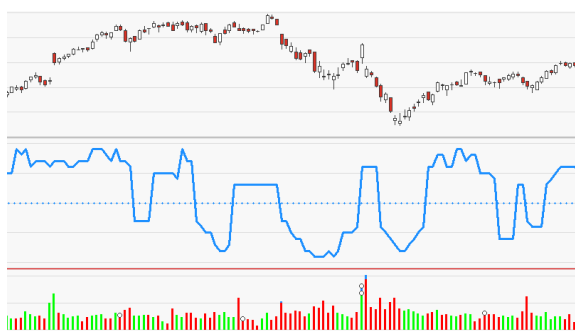
↑ AROON OSCILLATOR COMBINED WITH THE VOLUME FLOW VOLUME INDICATOR.

AVERAGE BALANCE VOLUME

Shortcode: ABV

DESCRIPTION

This indicator calculates a simple average of
the "On Balance Volume" on page 713,
producing a smoothed variant of it. The On
Balance Volume calculates the trading
volume of a security and relates it to the
respective closing price. It calculates a
cumulative sum for each day and displays it as a line on the chart.

PARAMETERS

Period
The number of bars used to calculate this indicator.

Default: 10

CALCULATION

If the current close is higher than the previous period's close the volume is added
to the previous period's indicator value, if it is lower it is subtracted from the
indicator value. The result is a cumulative sum which is displayed as a line on the
chart.

USAGE

The On Balance Volume, on which this indicator is based, is used to analyze
divergences and convergences between security and indicator. The numerical
value of the indicator is irrelevant, only the direction of the line created bears
significance. A strong trend is indicated by an indicator line which confirms the
direction of the underlying security, i.e. by an indicator line that moves in the same
direction as the price of the security (convergence). Divergences indicate a
weakening of the trend or a possible trend reversal. Trend lines applied to the
indicator often generate trading signals even earlier than the security. Those
signals can be used to confirm signals from the security itself.
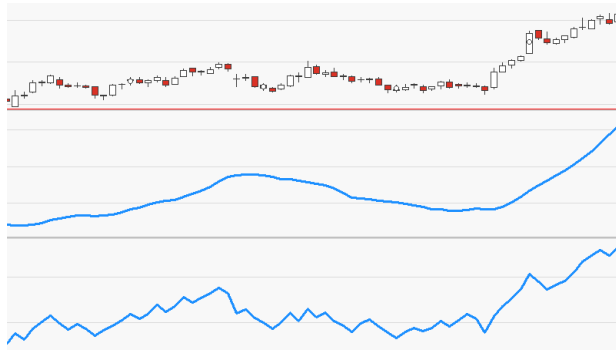
↑ AVERAGE BALANCE VOLUME
(CENTER) AND ON BALANCE VOLUME
(BOTTOM) COMPARED.

↑ THE INDICATOR TREND LINE IS
CROSSED BEFORE THE TREND LINE
IN THE CHART.

AVERAGE DIRECTIONAL INDEX

Shortcode: ADX

DESCRIPTION

This indicator evaluates the strength of the
current trend. It is a smoothed variant of the
"Directional Movement Index" on page 661

PARAMETERS

Period

The number of bars used to calculate the smoothed DMI value, i.e. the ADX
value.

Default: 14

HighLevel
Threshold value indicating an area of strong trend activity.

Default: 30

LowLevel
Threshold value indicating an area of weak trend activity.

Default: 10

CALCULATION

The calculation of this indicator is largely identical to that of the Directional Movement Index. Its basis are two partial indicators:

→ +DI (Upward Directional Indicator), which is calculated by determining the +DM (Upward Directional Movement) which measures the difference between today's high and yesterday's high and dividing it by the True Range based on the selected period.

→ -DM (Downward Directional Indicator), which is calculated by determining the -DM (Downward Directional Movement) which measures the difference between today's low and yesterday's low and dividing it by the True Range based on the selected period.

The difference between the +DI and -DI is divided by the sum of the +DI and -DI. The result is multiplied by 100 which produces the Directional Movement Index percentage value. To calculate the Average Directional Index value this value is smoothed using a "Moving Average Simple" on page 705.

USAGE

The ADX is an oscillator that fluctuates between 0 and 100. Values below 20 indicate that a trend is weak and likely to reverse, values above 40 indicate that a trend is strong and possibly increasing its strength. Threshold values indicating strong and weak trend activity respectively can be added; these values should be based on the underlying security and chosen accordingly.
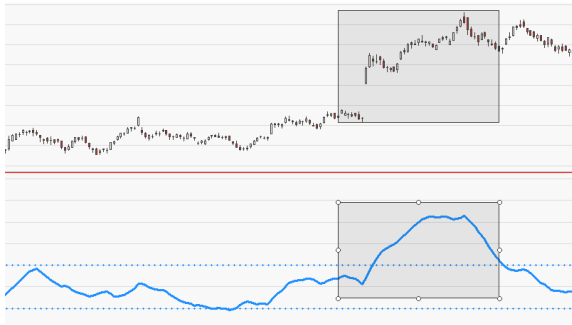
↑ A STRONG TREND, INDICATED BY
HIGH INDICATOR VALUES.

AVERAGE PRICE BREAKOUT - ENTRY STRATEGY

DESCRIPTION

The strategy uses the relation within the current candle and the relation between the average price and the "Moving Average Simple" on page 705 to generate trading signals. For Exit signals with the same trigger, please use the "Average Price Breakout - Exit Strategy" on the next page.

PARAMETERS

Period
The number of bars used to calculate

Default: 5

EntryMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the strategy is a Simple Moving Average with the input Period calculated. This Simple Moving Average, the average price and the current candle are used for trading signals. For the calculation of the indicator itself, see"Moving Average Simple" on page 705

The strategy generates a long entry signal when the average price is higher than a Simple Moving Average and the close higher than the open. The other way round, a short entry signal is generated when the average price is less than a Simple Moving Average and the close is less than the open.

↑ STRATEGY BEFORE AND AFTER OPTIMIZER

USAGE

Strategies which are using an average of historical data like price for trading signals are always depending on delay, noise and trend. The influence of all the three factors can be reduced by choosing the right values for the input. The optimizer in Tradesignal is very useful to find the right settings.

AVERAGE PRICE BREAKOUT - EXIT STRATEGY

DESCRIPTION

The strategy uses the slope of the Average Price to generate trading signals. For Entry signals with the same trigger, please use the"Average Price Breakout - Entry Strategy" on the previous page.

PARAMETERS

LookBack
The number of bars used to calculate

Default: 2

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

The strategy uses the average price within the defined look back period.

The strategy generates a long exit signal when the slope of the average price is negative. The other way round, a short exit signal is generated when the slope of the average price is positive.

↑ STRATEGY BEFORE AND AFTER OPTIMIZER

USAGE

Strategies which are using an average of historical data like price for trading signals are always depending on delay, noise and trend. The influence of all the three factors can be reduced by choosing the right values for the input. The optimizer in Tradesignal is very useful to find the right settings.

AVERAGE TRUE RANGE

Shortcode: ATR

DESCRIPTION

This indicator measures the degree of price movement (volatility) of a security. Low values indicate only minor price changes while high values indicate pronounced price changes. A sustained period of low values might indicate consolidation. The average true range is a smoothed moving average of the true range values over the set period.

PARAMETERS

This indicator requires a single parent instrument that has data fields for Open, High, Low, Close available.

Period
The number of bars used to calculate the smoothing of the true range value.

Default: 14

CALCULATION

The true range values are determined by calculating the largest of

- → the most recent period's high minus the most recent period's low,

- → the absolute value of the most recent period's high minus the previous close and

- → the absolute value of the most recent period's low minus the previous close.

The result is then smoothed using a simple moving average based on the selected period setting.

USAGE

The indicator displays the true trading range of a security and can thus be used to analyze market volatility. Since it takes gaps into consideration it allows for a thorough and realistic analysis of market activity. A large trading range indicates a large amount of movement while a small trading range indicates a small amount of movement. This information can be used to evaluate trends as well as the relationships between trends and trading ranges.

The indicator can also be used to develop stop orders and trailing stops. It prevents the premature closing of positions caused by fluctuations of price.
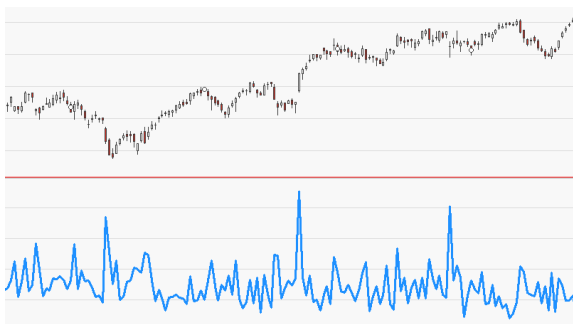
↑ THE AVERAGE TRUE RANGE WITH A PERIOD SETTING OF 1 RESULTS IN A MINIMAL SMOOTHING OF THE TRUE RANGE VALUE.

↑ A PERIOD SETTING OF 14.

AVERAGE VALUE AT TIME

Shortcode: AVAT

DESCRIPTION

This indicator shows deviations in value (typically volume) at a given time of day compared to the mean value over the past few days.

PARAMETERS

This indicator requires an intraday period which is less than a day.

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Days
The number of prior bars over which the average is calculated.

Default: 5

ShowPartialAverages
Controls whether the average should be calculated and shown for bars with an insufficient number of data points.

Default: No

ProjectPriorDays
Projects the average value calculated for the whole of the current day.

Default: Yes

CALCULATION

For each of the past few days the Average Value at Time calculates the mean value for each intraday bar at the same time of day.

USAGE

This indicator enables intraday traders to see how the current volume for a bar is deviating from the average value at this time of day. Differences in volume can easily be identified by combining the indicator with a volume bar indicator (see image above).

This indicator also features a projection which allows intraday traders to anticipate the price route for the day:
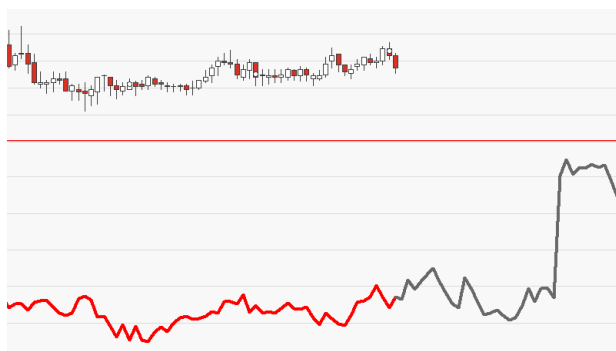
The projection creates a price route for the day.

BACK COLOR DAILY

Shortcode: BACKD

DESCRIPTION

This indicator displays different colors for the background of subcharts based on alternating days.
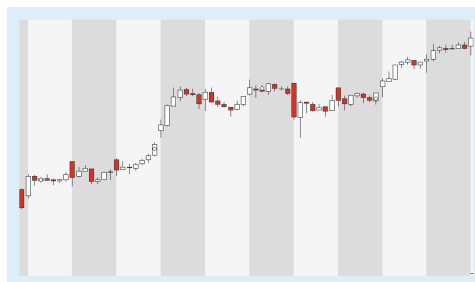
PARAMETERS

ColorA
The background color for one of the two alternating days.

ColorB
The background color for one of the two alternating days.

USAGE

This indicator is used to analyze the relationship between significant volume or price changes and day transitions. The following example shows a volume indicator applied in combination with the Back Color Daily:
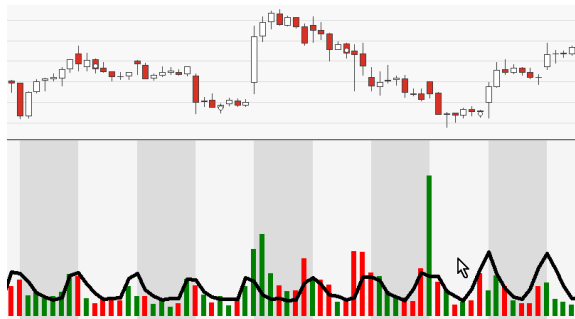
↑ A VOLUME HIKE OCCURRING AT THE TRANSITION FROM ONE DAY TO THE NEXT.

BOLLINGER BANDS

Shortcode: BBD

DESCRIPTION

This indicator calculates the volatility of a price as well as the relative price level. It consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility.
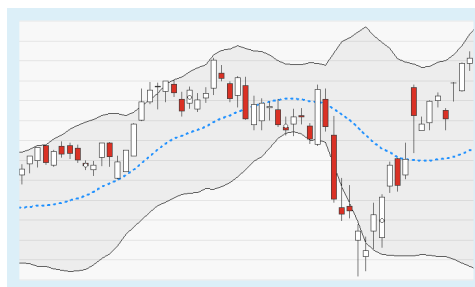
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period
The number of bars used to calculate the Simple Moving Average.

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.

Default: 2

CALCULATION

A Simple Moving Average is calculated and used to draw the center line. Adding the standard deviation to the SMA produces the upper band, subtracting the standard deviation from the SMA produces the lower band.

USAGE

Bollinger Bands are often used in combination with other indicators in order to identify price changes and reversals. Some of the most common interpretations are:

→ When prices continually touch the upper band, they are overbought, when prices continually touch the lower band they are oversold.

→ A large distance between the bands indicates high volatility, a small distance between the bands indicates low volatility.

→ Breakouts suggest a continuation of the price movement.

→ When both bands move towards the Simple Moving Average, a strong price movement is imminent.

→ Tops or bottoms point to an impending trend reversal.

↑ NARROW BANDS (LOW VOLATILITY) PRECEDED AND FOLLOWED BY EXPANDING BANDS (HIGH VOLATILITY).

Price breakouts suggest a continuation of the price movement.

BOLLINGER BAND BREAKOUT STRATEGY

DESCRIPTION

This complete strategy generates trading signals when the current price breakouts from the Bollinger Band channel. The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Bollinger Band Breakout Portfolio Strategy" on the next page.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
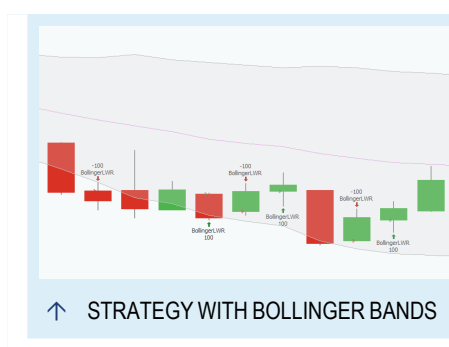The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

Bullish
Defines what kind of orders are placed

Default: LongEntry

Bearish
Defines what kind of orders are placed

Default: LongExit

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

A crossover between the price line and the channel generates trading signals.

USAGE

↑ OPTIMIZER FOR BOTH INPUTS AND FOR EACH INPUT INDIVIDUALLY

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually. The different results are shown on the figure.

BOLLINGER BAND BREAKOUT PORTFOLIO STRATEGY

DESCRIPTION

The complete strategy generates trading signals when the current price breakouts from the Bollinger Band channel. The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see

"Bollinger Bands" on page 559. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

Bullish
Defines what kind of orders are placed

Default: LongEntry

Bearish
Defines what kind of orders are placed

Default: LongExit

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

A crossover between the price line and the channel generates trading signals.

↑   OPTIMIZER FOR BOTH INPUTS AND
FOR EACH INPUT INDIVIDUALLY

USAGE

The Bollinger Band shows the price movements in the market in a given period.
Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are

using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.
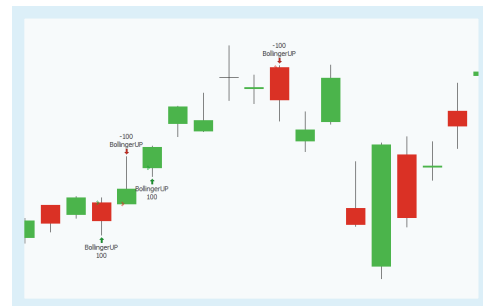
In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually. The different results are shown on the figure.

BOLLINGER BAND REVERSAL STRATEGY

DESCRIPTION

The complete strategy generates trading signals based on a reversal price breakout from the Bollinger Bands channel. The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
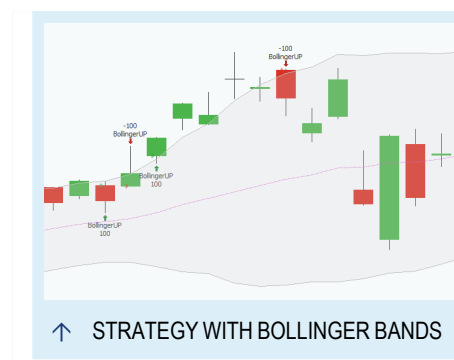The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

Bullish
Defines what kind of orders are placed

Default: LongEntry

Bearish
Defines what kind of orders are placed

Default: LongExit

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

A reversal price breakout from the Bollinger Bands channel generates trading signals.

↑ STRATEGY WITH BOLLINGER BANDS

USAGE

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.
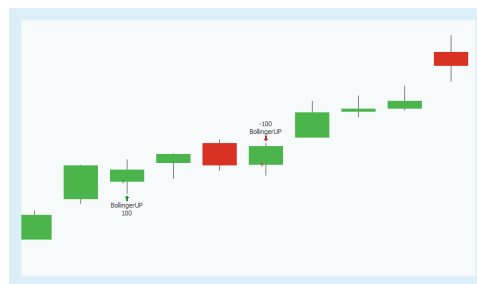
John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually.

BOLLINGER LOWER BAND - ENTRY STRATEGY

DESCRIPTION

The strategy generates long entry signals based on a crossover with the price and the lower band of the Bollinger Band. The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559.

For Exit signals with the same trigger, please use the "Bollinger Lower Band - Exit Strategy" on page 567.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.
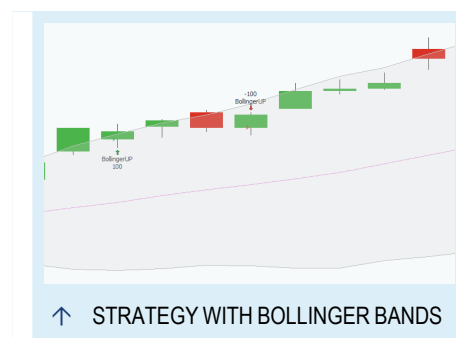
Default: 2.0

EntryMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

The strategy generates a long entry signal when the close crosses over the lower band. When the close crosses under the lower band, a short entry signal generated.

↑ STRATEGY WITH BOLLINGER BANDS

USAGE

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can

optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually.

BOLLINGER LOWER BAND - EXIT STRATEGY

DESCRIPTION

The strategy generates long exit signals based on a crossover with the price and the lower band of the Bollinger Band. For Entry signals with the same trigger, please use the "Bollinger Lower Band - Entry Strategy" on page 565.

The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

ExitMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see"Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

↑   STRATEGY WITH BOLLINGER BANDS
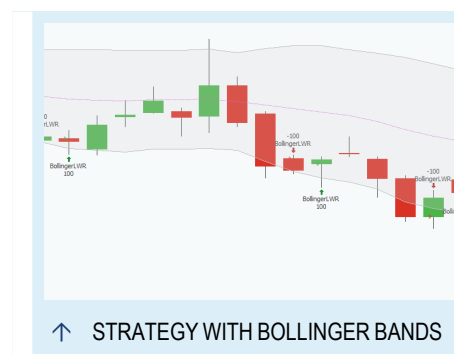
A long exit signal is generated when the close crosses under the lower band. When the close crosses over the lower band, is short exit signal generated.

USAGE

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually.

BOLLINGER UPPER BAND - ENTRY STRATEGY

DESCRIPTION

The strategy generates long entry signals based on a crossover with the price and the upper band of the Bollinger Band. The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559.

For Exit signals with the same trigger, please use the "Bollinger Upper Band - Exit Strategy" on page 570.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

EntryMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

↑   STRATEGY WITH BOLLINGER BANDS

The strategy generates a long entry signal when the close crosses over the upper band. When the close crosses under the upper band, a short entry signal generated.

USAGE

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually.

BOLLINGER UPPER BAND - EXIT STRATEGY

DESCRIPTION

The strategy generates long exit signals based on a crossover with the price and the upper band of the Bollinger Band. For Entry signals with the same trigger, please use the "Bollinger Upper Band - Entry Strategy" on page 568.

The Bollinger Band itself consists of a Simple Moving Average represented by the center line and two outer bands visualizing the volatility, see "Bollinger Bands" on page 559.

PARAMETERS

Period
The number of bars used to calculate

Default: 20

StdDevs
The number of standard deviations used in the calculation of the outer bands.

Default: 2.0

ExitMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The Bollinger Band uses three SMA which use the inputs Period and StdDevs. For the calculation of the indicator itself, see "Bollinger Bands" on page 559 or "Moving Average Simple" on page 705.

↑   STRATEGY WITH BOLLINGER BANDS

A long exit signal is generated when the close crosses under the upper band. When the close crosses over the upper band, is short exit signal generated.

USAGE

The Bollinger Band shows the price movements in the market in a given period. Sharp price movements will lead to a wider channel. If the market is consolidated, the bands will be thinner. The generated signals give hints if the market is overbought or oversold.

John Bollinger itself stated several times that a crossover between the price and the Bollinger Bands is only an indication for a trading signal. As a lot of traders are using the Bollinger Bands, sometimes are profits self fulfilling prophecies. Bollinger suggested to combine the strategy with additional indicators. Several traders published already studies about useful combinations like Candle Patterns or "Relative Strength Index" on page 753.

In addition it could be worth to try different StdDevs as the exact standard deviation is not know for a specific symbol. The "Optimizer" on page 274 can optimize both inputs, period and StdDevs, in one go. It is also possible to optimize only one of the inputs individually.

BUY & HOLD

Shortcode: n/a

DESCRIPTION

This indicator calculates the open equity of a theoretical Buy & Hold strategy investing the initial capital.

PARAMETERS

StartingDate
When the long position should be entered. Select TradingStart to use the date configured in the Money Management properties. Select FirstStrategyEntry to take a position when another strategy takes its first position.

Default: TradingStart

Mode
How the gain should be displayed. AbsoluteMoneyMgmt (show equity gain using initial capital from Money Management properties), PercentMoneyMgmt (show percent change using initial capital from Money Management properties), Absolute (show equity gain using initial capital from the Capital input), Percent (show percent change using initial capital from the Capital input).

Default: AbsoluteMoneyMgmt

Capital

The starting capital to use when Mode is Absolute or Percent.

Default: 1000

CALCULATION

Depending on the money management settings, e.g. start date and initial capital, this indicator calculates the open equity of a theoretical Buy & Hold strategy.

USAGE

In general, Buy & Hold means that an investor buys stocks and holds them for a long period of time, completely disregarding market movements. Investors employing a Buy & Hold strategy actively select stocks, but are not concerned with short-term price movements and technical indicators. This indicator offers a way to compare other strategies applied the underlying instrument to a theoretical Buy & Hold strategy, visualizing the open equity based on the money management settings.

↑ THE INDICATOR COMPARES A THEORETICAL BUY & HOLD STRATEGY TO OTHER STRATEGIES APPLIED TO THE CURRENT CHART.

BUY & HOLD BENCHMARK

Shortcode: n/a

DESCRIPTION

This indicator calculates the open equity of a theoretical Buy & Hold strategy on a specified benchmark symbol, investing the initial capital.

It can be used in a chart or portfolio to compare the equity of a strategy against a benchmark Buy & Hold.
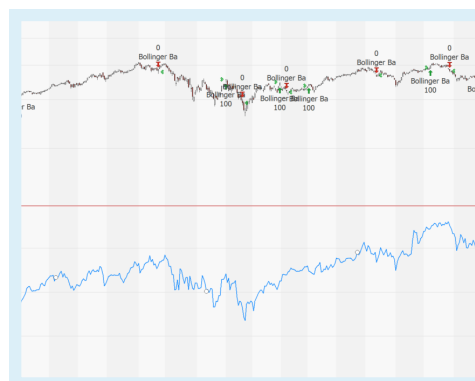
PARAMETERS

Benchmark
The instrument to be used for calculating the theoretical Buy & Hold open equity.

StartingDate
When the long position should be entered. Select TradingStart to use the date configured in the Money Management properties. Select FirstStrategyEntry to take a position when another strategy takes its first position.

Default: TradingStart

Mode
How the gain should be displayed. AbsoluteMoneyMgmt (show equity gain using initial capital from Money Management properties), PercentMoneyMgmt (show percent change using initial capital from Money Management properties), Absolute (show equity gain using initial capital from the Capital input), Percent (show percent change using initial capital from the Capital input).

Default: AbsoluteMoneyMgmt

Capital
The starting capital to use when Mode is Absolute or Percent.

Default: 1000

CALCULATION

Depending on the money management settings, e.g. start date and initial capital, this indicator calculates the open equity of a theoretical Buy & Hold strategy on a benchmark symbol.

USAGE

In general, Buy & Hold means that an investor buys stocks and holds them for a long period of time, completely disregarding market movements. Investors employing a Buy & Hold strategy actively select stocks, but are not concerned with short-term price movements and technical indicators. This indicator offers a way to compare other strategies applied the underlying instrument to a theoretical Buy & Hold strategy, visualizing the open equity based on the money management settings.

↑ THE INDICATOR COMPARES A THEORETICAL BUY & HOLD STRATEGY TO OTHER STRATEGIES APPLIED TO THE CURRENT CHART.

CANDLE BEARISH ENGULFING PATTERN - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when the candle pattern bearish "Engulfing pattern" on page 117 is identified in the chart. This pattern is a bearish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle Bearish Engulfing Pattern - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Engulfing pattern" on page 117. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   BULLISH AND BEARISH ENGULFING PATTERN

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BEARISH ENGULFING PATTERN - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when the candle pattern bearish "Engulfing pattern" on page 117 is identified in the chart. This pattern is a bearish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle Bearish Engulfing Pattern - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod

The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Engulfing pattern" on page 117. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BULLISH AND BEARISH ENGULFING PATTERN

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.
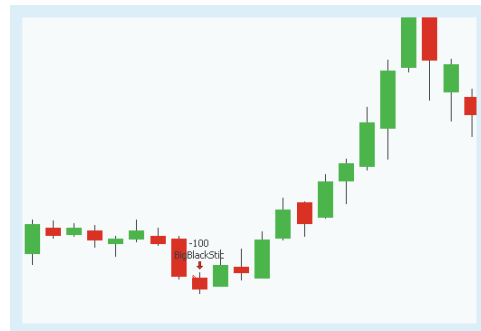
When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BELT HOLD BEARISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when the candle pattern bearish "Belt Hold" on page 116 is identified in the chart. This pattern is a bearish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle Belt Hold Bearish - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
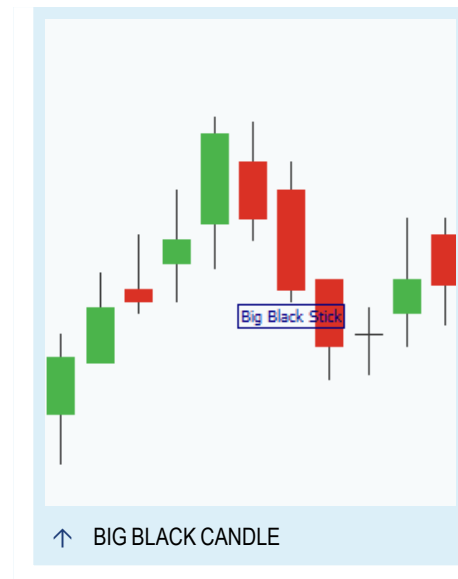Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Belt Hold" on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

↑ BULLISH AND BEARISH BELT HOLD

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BELT HOLD BEARISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when the candle pattern bearish "Belt Hold" on page 116 is identified in the chart. This pattern is a bearish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle Belt Hold Bearish - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Belt Hold" on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

↑ BULLISH AND BEARISH BELT HOLD

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BELT HOLD BULLISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when the candle pattern bullish "Belt Hold" on page 116 is identified in the chart. This pattern is a bullish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle Belt Hold Bullish - Exit Strategy" on page 581.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod

Determines average values of some candlestick components.

Default: 5

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Belt Hold" on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

↑ BULLISH AND BEARISH BELT HOLD

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BELT HOLD BULLISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when the candle pattern bullish "Belt Hold" on page 116 is identified in the chart. This pattern is a bullish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle Belt Hold Bullish - Entry Strategy" on page 579.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Belt Hold" on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

↑   BULLISH AND BEARISH BELT HOLD

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG BLACK BEARTREND - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a big black candle appears in a bearish trend. Big black candles show a strong sell pressure. In a bearish trend that is a signal for a trend reversal. For Exit signals with the same trigger, please use the "Candle Big Black Beartrend - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big black candle in a downwards trend which is a signal for a trend reversal. For the definition of a big black candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BIG BLACK CANDLE

USAGE

The strategy uses a big black candle in a downwards trend which is a signal for a trend reversal. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Big Black Candlestick - Entry Strategy" on page 585 is the same strategy without a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG BLACK BEARTREND - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a big black candle appears in a bearish trend. Big black candles show a strong sell pressure. In a bearish trend that is a signal for a trend reversal. For Entry signals with the same trigger, please use the "Candle Big Black Beartrend - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
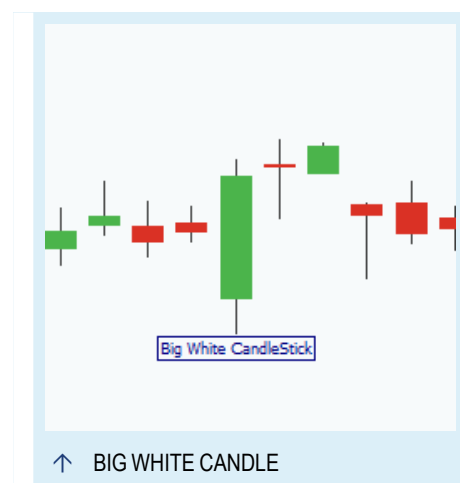Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big black candle in a downwards trend which is a signal for a trend reversal. For the definition of a big black candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BIG BLACK CANDLE

USAGE

The strategy uses a big black candle in a downwards trend which is a signal for a trend reversal. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The strategy "Candle Big Black Candlestick - Exit Strategy" on page 586 is the same strategy without a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG BLACK CANDLESTICK - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a big black candle appears. Big black candles show a strong sell pressure and can be a signal for a trend reversal. For Exit signals with the same trigger, please use the "Candle Big Black Candlestick - Exit Strategy" on the next page.

PARAMETERS

CandlePeriod
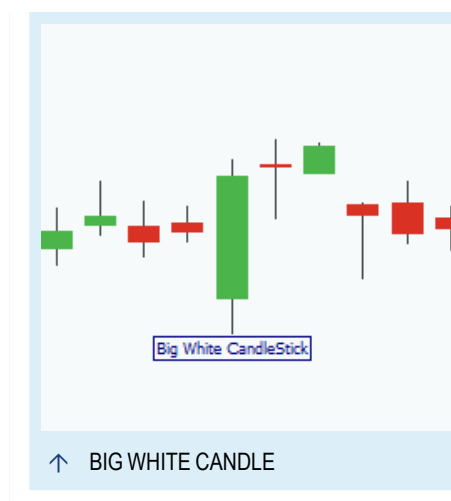Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big black candle as trading signal. For the definition of a big black candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

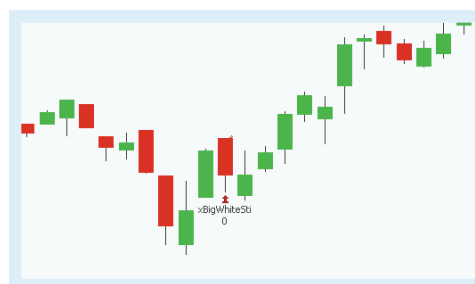

↑ BIG BLACK CANDLE

USAGE

The strategy uses a big black candle without a confirmation as trading signal. When you execute the trades immediately without a confirmation, the quick trade

can result in a higher profit but is also riskier. If you want to use a strategy with confirmation, please use "Candle Big Black Beartrend - Entry Strategy" on page 582.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG BLACK CANDLESTICK - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a big black candle appears. Big black candles show a strong sell pressure and can be a signal for a trend reversal. For Entry signals with the same trigger, please use the "Candle Big Black Candlestick - Entry Strategy" on the previous page.

PARAMETERS

CandlePeriod
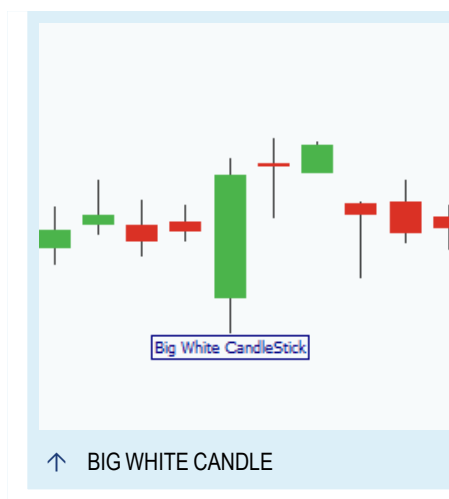Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big black candle as trading signal. For the definition of a big black candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.
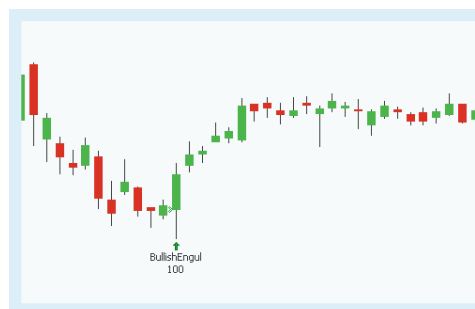

↑   BIG BLACK CANDLE

USAGE

The strategy uses a big black candle without a confirmation as trading signal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. If you want to use a strategy with confirmation, please use "Candle Big Black Beartrend - Exit Strategy" on page 583.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG WHITE BULLTREND - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a big white candle appears in a bullish trend. Big white candles show a strong buy pressure. In a bullish trend that is a signal for a trend reversal. For Exit signals with the same trigger, please use the "Candle Big White Bulltrend - Exit Strategy" on page 589.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
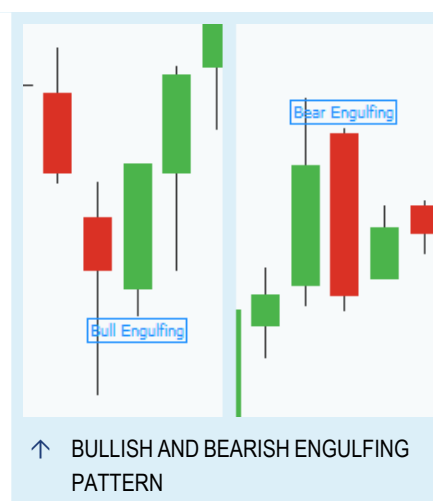Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big white candle in a upwards trend which is a signal for a trend reversal. For the definition of a big white candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BIG WHITE CANDLE

USAGE

The strategy uses a big white candle in a upwards trend which is a signal for a trend reversal. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The is the same strategy without a confirmation "Candle Big White Candlestick - Entry Strategy" on page 590.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG WHITE BULLTREND - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a big white candle appears in a bullish trend. Big white candles show a strong buy pressure. In a bullish trend that is a signal for a trend reversal. For Entry signals with the same trigger, please use the "Candle Big White Bulltrend - Entry Strategy" on page 587.

PARAMETERS

FilterPeriod
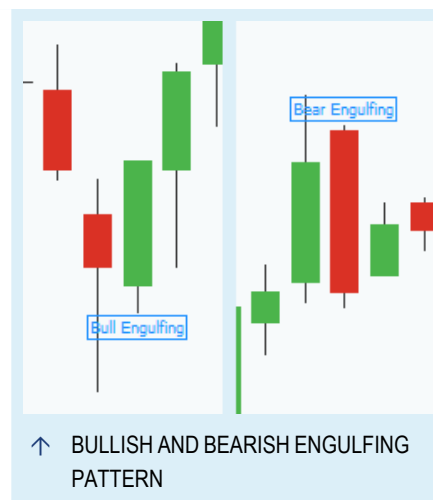The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big white candle in a upwards trend which is a signal for a trend reversal. For the definition of a big white candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ BIG WHITE CANDLE

USAGE

The strategy uses a big white candle in a upwards trend which is a signal for a trend reversal. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Big White Bulltrend - Exit Strategy" on the previous page is the same strategy without a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG WHITE CANDLESTICK - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a big white candle appears. Big white candles show a strong buy pressure and can be a signal for a trend reversal. For Exit signals with the same trigger, please use the "Candle Big White Candlestick - Exit Strategy" on the next page

PARAMETERS

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big white candle as trading signal. For the definition of a big white candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

Big White CandleStick

↑ BIG WHITE CANDLE

USAGE

The strategy uses a big white candle without a confirmation as trading signal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. If you want to use a strategy with confirmation, please use "Candle Big White Bulltrend - Entry Strategy" on page 587.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BIG WHITE CANDLESTICK - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a big white candle appears. Big white candles show a strong buy pressure and can be a signal for a trend reversal. For Entry signals with the same trigger, please use the "Candle Big White Candlestick - Entry Strategy" on the previous page.

xBigWhiteSti 0

PARAMETERS

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a big white candle as trading signal. For the definition of a big white candle, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

Big White CandleStick

↑ BIG WHITE CANDLE

USAGE

The strategy uses a big white candle without a confirmation as trading signal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. If you want to use a strategy with confirmation, please use "Candle Big White Bulltrend - Entry Strategy" on page 587.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BULLISH ENGULFING PATTERN - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when the candle pattern bullish "Engulfing pattern" on page 117 is identified in the chart. This pattern is a bullish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle Bullish Engulfing Pattern - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
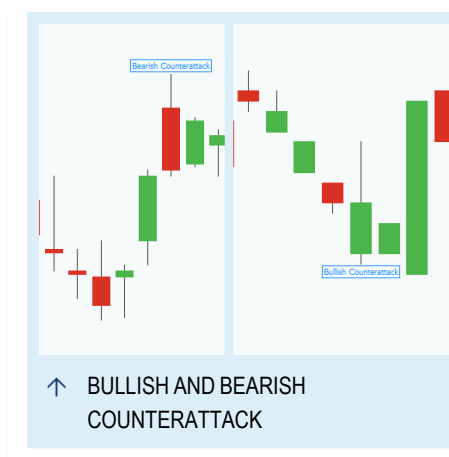The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Engulfing pattern" on page 117. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ BULLISH AND BEARISH ENGULFING PATTERN

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE BULLISH ENGULFING PATTERN - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when the candle pattern bullish "Engulfing pattern" on page 117 is identified in the chart. This pattern is a bullish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle Bullish Engulfing Pattern - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.
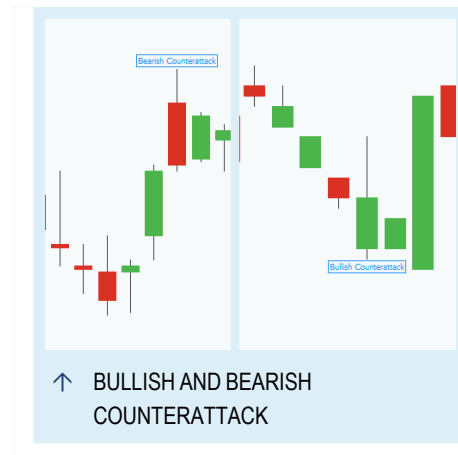
Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Engulfing pattern" on page 117. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BULLISH AND BEARISH ENGULFING PATTERN

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE COUNTERATTACK BEARISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when the candle pattern bearish "Counterattack " on page 116 is identified in the chart during. This pattern is a bearish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle CounterAttack Bearish - Exit Strategy" on page 597.

PARAMETERS

FilterPeriod

The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Counterattack " on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   BULLISH AND BEARISH
     COUNTERATTACK

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.
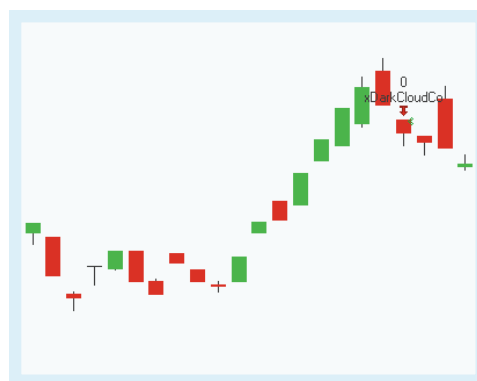
When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE COUNTERATTACK BEARISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when the candle pattern bearish "Counterattack " on page 116 is identified in the chart. This pattern is a bearish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle CounterAttack Bearish - Entry Strategy" on page 595.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a "Counterattack " on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BULLISH AND BEARISH COUNTERATTACK

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE COUNTERATTACK BULLISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when the candle pattern bullish "Counterattack " on page 116 is identified in the chart during. This pattern is a bullish trend reversal pattern. For Exit signals with the same trigger, please use the "Candle CounterAttack Bullish - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a bullish "Counterattack " on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BULLISH AND BEARISH
     COUNTERATTACK

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE COUNTERATTACK BULLISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when the candle pattern bullish "Counterattack " on page 116 is identified in the chart. This pattern is a bullish trend reversal pattern. For Entry signals with the same trigger, please use the "Candle CounterAttack Bullish - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod

The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a bullish "Counterattack " on page 116. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BULLISH AND BEARISH
    COUNTERATTACK

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DARK CLOUD COVER - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a dark cloud cover appears. A dark cloud cover is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Dark Cloud Cover - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a dark cloud cover in a upwards trend which is a signal for a trend reversal. For the definition of a dark cloud cover, see "Piercing Pattern and Dark Cloud Cover" on page 118. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ DARK CLOUD COVER WITH OPPOSITE PATTERN PIERCING LINE

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DARK CLOUD COVER - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a dark cloud cover appears. A dark cloud cover is a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Dark Cloud Cover - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a dark cloud cover in a upwards trend which is a signal for a trend reversal. For the definition of a dark cloud cover, see "Piercing Pattern and Dark Cloud Cover" on page 118. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ DARK CLOUD COVER WITH OPPOSITE PATTERN PIERCING LINE

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DELIBERATION - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a "Deliberation" on page 121 appears. In this strategy, the deliberation is used as a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Deliberation - Exit Strategy" on page 605.

PARAMETERS

FilterPeriod
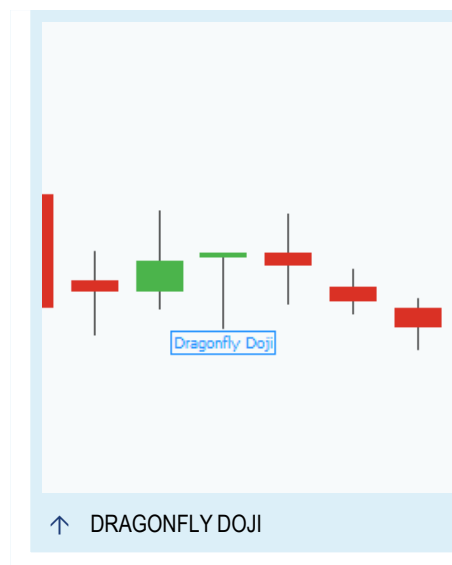The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

A "Deliberation" on page 121 can be both, bearish and bullish. In this strategy it is used as a bearish signal. For the definition of a deliberation, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.
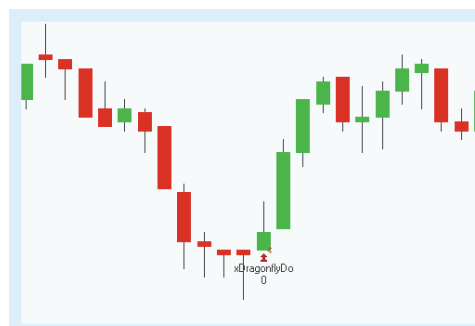

↑   BEARISH DELIBERATION

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DELIBERATION - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a "Deliberation" on page 121 appears. In this strategy, the deliberation is used as a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Deliberation - Entry Strategy" on page 603.

PARAMETERS

FilterPeriod
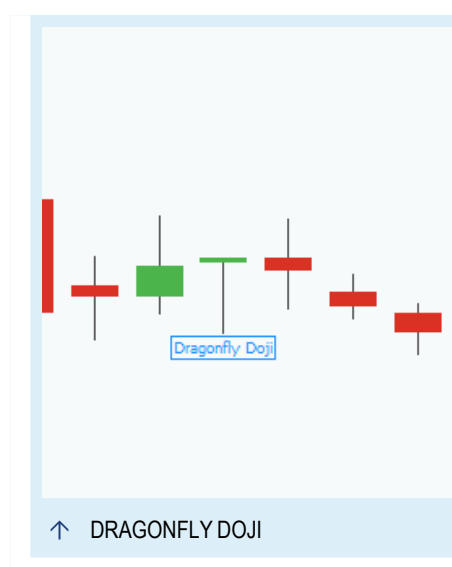The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

A "Deliberation" on page 121 can be both, bearish and bullish. In this strategy it is used as a bearish signal. For the definition of a deliberation, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   BEARISH DELIBERATION

USAGE

The strategy uses a candle pattern which is a signal for a trend reversal. The identification of trend reversal are important for swing traders.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DOJI - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short or long entry signal when the candle pattern "Doji" on page 115 is identified in the chart. As this pattern is neither bullish nor bearish the strategy does not include a trend confirmation. For Exit signals with the same trigger, please use the "Candle Doji - Exit Strategy" on the next page.

PARAMETERS

EntryMethod
Defines what kind of orders are placed.

Default: LongEntry

CALCULATION

The strategy identifies a "Doji" on page 115. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short or long entry signal is generated as defined with the input **EntryMethod**.

USAGE

The strategy uses a candle pattern which shows the indecision of the market. However, it gathers importance depending on the surrounding patterns. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

↑ BULLISH AND BEARISH DOJIS

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DOJI - EXIT STRATEGY

DESCRIPTION

This strategy generates a short or long exit signal when the candle pattern "Doji" on page 115 is identified in the chart. As this pattern is neither bullish nor bearish the strategy does not include a trend confirmation. For Entry signals with the same trigger, please use the "Candle Doji - Entry Strategy" on the previous page.

PARAMETERS

ExitMethod
Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The strategy identifies a "Doji" on page 115.
For a description of the candle pattern, see
"Using Candlestick Patterns" on page 113. If
the pattern is identified, a short or long exit
signal is generated as defined with the input
ExitMethod.

USAGE

The strategy uses a candle pattern which
shows the indecision of the market. However, it
gathers importance depending on the
surrounding patterns. Price movements taking
place after a doji often signal new trends or a

↑ BULLISH AND BEARISH DOJIS

trend inversion. Therefore, dojis are good support signals for resistance and
support lines. A doji in an overbought or oversold market shows that the market is
vulnerable to corrections.

Candle patterns do not indicate any price targets. Different traders use in addition
western techniques like "Pivot Points Analysis" on page 737, "Relative Strength
Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DRAGONFLY DOJI - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal
when the candle pattern Dragonfly "Doji" on
page 115 is identified in a bullish trend. For
Exit signals with the same trigger, please use
the "Candle Dragonfly Doji - Exit Strategy" on
the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a Dragonfly "Doji" on page 115. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. The long lower shadow of the Dragonfly Doji shows that trades are also made in the lower trading range.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ DRAGONFLY DOJI

USAGE

The strategy uses a candle pattern which shows the indecision of the market. However, it gathers importance depending on the surrounding patterns and the special Dojis. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DRAGONFLY DOJI - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when the candle pattern Dragonfly "Doji" on page 115 is identified in a bullish trend. For Entry signals with the same trigger, please use the "Candle Dragonfly Doji - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a Dragonfly "Doji" on page 115. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. The long lower shadow of the Dragonfly Doji shows that trades are also made in the lower trading range.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ DRAGONFLY DOJI

USAGE

The strategy uses a candle pattern which shows the indecision of the market. However, it gathers importance depending on the surrounding patterns and the special Dojis. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DUMPLING TOP - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a dumpling top appears in a bullish trend. Dumpling tops are a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Dumpling Top - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a rounding top in a upwards trend which is a signal for a bearish trend reversal. If the pattern is identified, a short entry signal is generated. A dumpling top shows that the bulls are not convinced with the upwards trend. The indecisive market can be represented by "Doji" on page 115, "Hammer" on page 114 or similar candles.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last
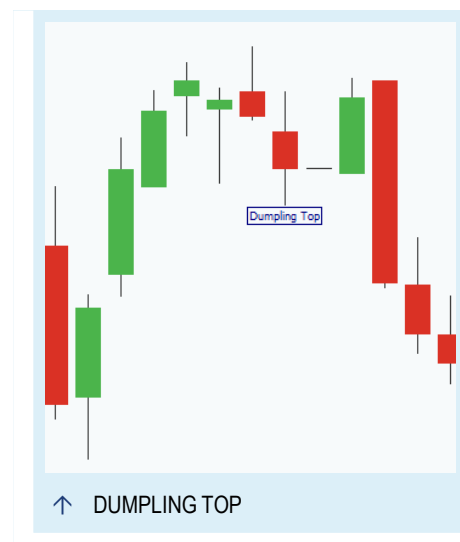
↑ DUMPLING TOP

option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The dumpling top is built up slowly, so there is plenty time for some trades until the pattern is closed. The price movements are indecisive and flat in the meanwhile. Please consider that there is a hard sell-off at the end of the pattern.

The strategy includes already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE DUMPLING TOP - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a dumpling top appears in a bullish trend. Dumpling tops are a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Dumpling Top - Exit Strategy" above.
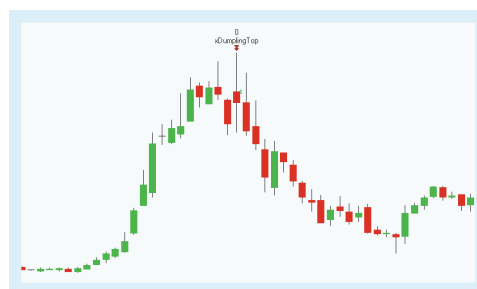
PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a dumpling top in a upwards trend which is a signal for a bearish trend reversal. If the pattern is identified, a long exit signal is generated. A rounding top shows that the bulls are not convinced with the upwards trend. The indecisive market can be represented by "Doji" on page 115, "Hammer" on page 114 or similar candles.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ DUMPLING TOP

USAGE

The dumpling top is built up slowly, so there is plenty time for some trades until the pattern is closed. The price movements are indecisive and flat in the meanwhile. Please consider that there is a hard sell-off at the end of the pattern.

The strategy includes already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.
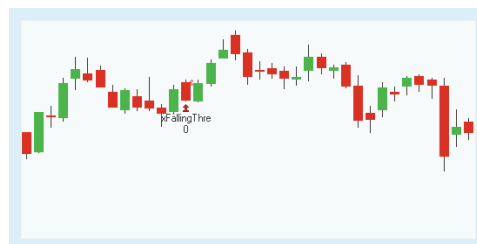
CANDLE EVENING STAR - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when an evening star appears in a bullish trend, see "Morning/Evening Star" on page 121. In a bullish trend that is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Evening Star - Exit Strategy" on page 615.

PARAMETERS

FilterPeriod

The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod

Determines average values of some candlestick components.
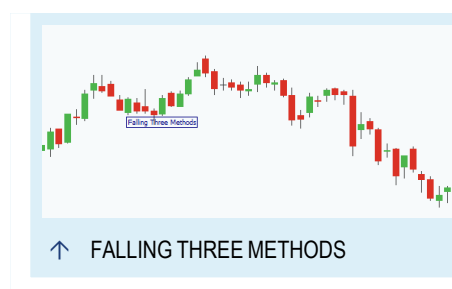
Default: 5

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy uses an evening star in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ EVENING STAR WITH THE OPPOSITE CANDLE PATTERN MORNING STAR

USAGE

The strategy uses an evening star in a upwards trend which is a signal for a trend reversal. The evening star rises from the bright day into the dark night. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE EVENING STAR - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when an evening star appears in a bullish trend, see "Morning/Evening Star" on page 121. In a bullish trend that is a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Evening Star - Entry Strategy" on page 613.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses an evening star in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   EVENING STAR WITH THE OPPOSITE CANDLE PATTERN MORNING STAR

USAGE

The strategy uses an evening star in a upwards trend which is a signal for a trend reversal. The evening star rises from the bright day into the dark night. The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING THREE METHODS - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a falling three appears in a downtrend. A falling three is a trend confirmation, see "Falling Three/Rising Three" on page 122. For Exit signals with the same trigger, please use the "Candle Falling Three Methods - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling three in a downwards trend which is a signal for a trend continuation. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

↑ FALLING THREE METHODS

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend continuation and shows that the bulls are not confident enough to take over.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING THREE METHODS - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a falling three appears in a downtrend. A falling three is a trend confirmation, see "Falling Three/Rising Three" on page 122. For Entry signals with the same trigger,

please use the "Candle Falling Three Methods - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling three in a downwards trend which is a signal for a trend continuation. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

↑ FALLING THREE METHODS

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a candle pattern which is a signal for a trend continuation and shows that the bulls are not confident enough to take over.

When you execute the trades immediately without the confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING WINDOW BEARTREND - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a falling window appears in a bearish trend. A falling "Window" on page 116 is the same as an downwards gap and can show the strength of the downwards trend. For Exit signals with the same trigger, please use the "Candle Falling Window BearTrend - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.
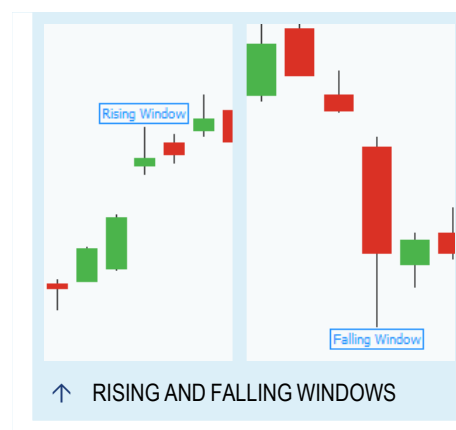
Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling window which is a signal for the continuation of the downwards trend. For the definition of a window, see "Using Candlestick Patterns" on page 113. If the pattern is identified in a downwards trend, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last

↑　RISING AND FALLING WINDOWS

option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a falling window as a signal for the continuation of the bearish trend. The strategy includes therefor already the c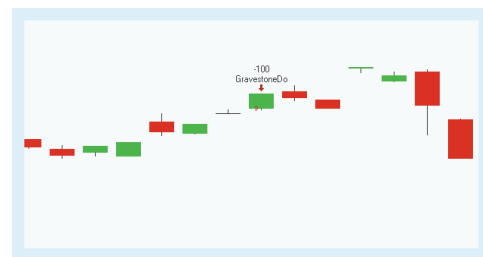onfirmation for the trend continuation. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Falling Window - Entry Strategy" on the next page is the same strategy with a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING WINDOW BEARTREND - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a falling window appears in a bearish trend. A falling "Window" on page 116 is the same as an downwards gap and can show the strength of the downwards trend. For Entry signals with the same trigger, please use the "Candle Falling Window BearTrend - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
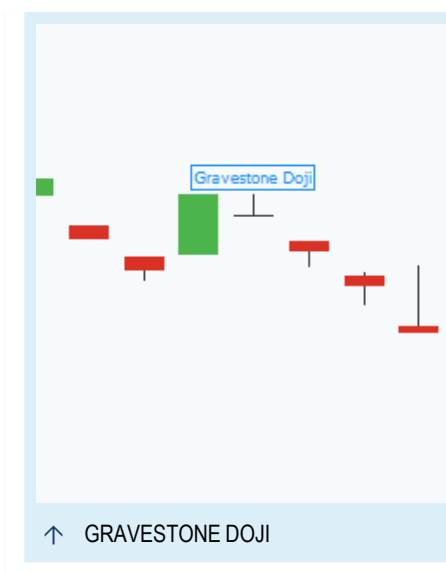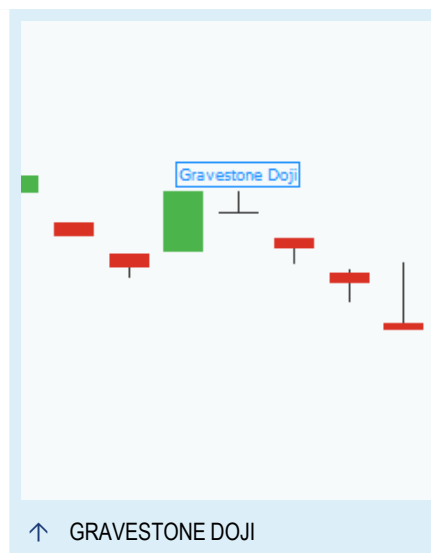The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling window which is a signal for the continuation of the downwards trend. For the definition of a window, see "Using Candlestick Patterns" on page 113. If the pattern is identified in a downwards trend, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   RISING AND FALLING WINDOWS
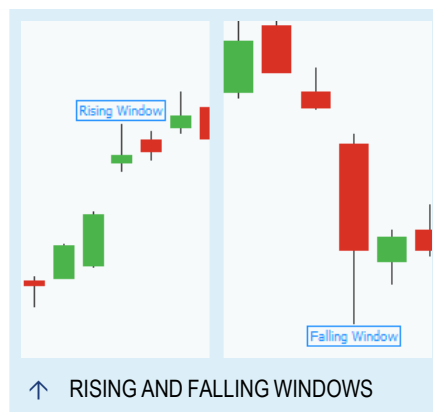
USAGE

The strategy uses a falling window as a signal for the continuation of the bearish trend. The strategy includes therefor already the confirmation for the trend continuation. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Falling Window - Exit Strategy" on page 623 is the same strategy without a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING WINDOW - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a falling window appears in the chart. A falling "Window" on page 116 is the same as an downwards gap and can show the strength of the downwards trend. For Exit signals with the same trigger, please use the "Candle Falling Window - Exit Strategy" on page 623.

PARAMETERS

CandlePeriod

Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling window which is a signal for the continuation of the downwards trend. For the definition of a window, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   RISING AND FALLING WINDOWS

USAGE

The strategy uses a falling window as a signal for the continuation of the bearish trend. The strategy does not include confirmation for the trend continuation. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Falling Window BearTrend - Entry Strategy" on page 619 is the same strategy with a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE FALLING WINDOW - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a falling window appears in the chart. A falling "Window" on page 116 is the same as an downwards gap and can show the strength of the downwards trend. For Entry signals with the same trigger, please use the "Candle Falling Window - Entry Strategy" on page 621.

PARAMETERS

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a falling window which is a signal for the continuation of the downwards trend. For the definition of a window, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   RISING AND FALLING WINDOWS

USAGE

The strategy uses a falling window as a signal for the continuation of the bearish trend. The strategy does not include confirmation for the trend continuation.

When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier. The "Candle Falling Window BearTrend - Exit Strategy" on page 620 is the same strategy with a confirmation.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE GRAVESTONE DOJI - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when the candle pattern Gravestone "Doji" on page 115 is identified in a bearish trend. For Exit signals with the same trigger, please use the "Candle Gravestone Doji - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a Gravestone "Doji" on page 115. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. The long upper shadow of the Gravestone Doji shows that trades are also made in the upper trading range.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ GRAVESTONE DOJI

USAGE

The strategy uses a candle pattern which shows the indecision of the market. However, it gathers importance depending on the surrounding patterns and the special Dojis. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE GRAVESTONE DOJI - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when the candle pattern Gravestone "Doji" on page 115 is identified in a bearish trend. For Entry signals with the same trigger, please use the "Candle Gravestone Doji - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy identifies a Gravestone "Doji" on page 115. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. The long upper shadow of the Gravestone Doji shows that trades are also made in the upper trading range.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

Gravestone Doji

↑   GRAVESTONE DOJI

USAGE

The strategy uses a candle pattern which shows the indecision of the market. However, it gathers importance depending on the surrounding patterns and the special Dojis. Price movements taking place after a doji often signal new trends or a trend inversion. Therefore, dojis are good support signals for resistance and support lines. A doji in an overbought or oversold market shows that the market is vulnerable to corrections.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HAMMER - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a hammer appears in a chart, see "Hammer" on page 114. In a bearish trend that is a signal for a bullish trend reversal. For Exit signals with the same trigger, please use the "Candle Hammer - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

Multiplier
Used to determine the relation between the lower shadow and the body

Default: 2.0

OrderMethod
Defines the order method
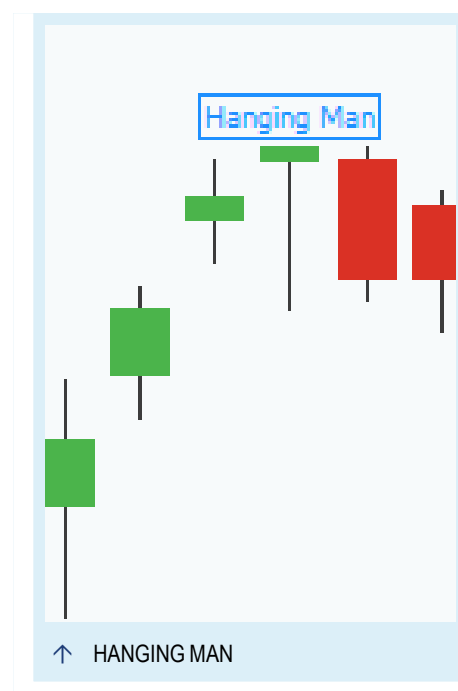
Default: atMarket

CALCULATION

The strategy uses a hammer which is a signal for a bullish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ HAMMER

USAGE

The strategy uses a hammer which is a signal for a trend reversal. The hammer is "hammering a floor" and showing that the bulls won. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HAMMER - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a hammer appears in a chart, see "Hammer" on page 114. In a bearish trend that is a signal for a bullish trend reversal. For Entry signals with the same trigger, please use the "Candle Hammer - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

Multiplier

Used to determine the relation between the lower shadow and the body

Default: 2.0

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy uses a hammer which is a signal for a bullish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a hammer which is a signal for a trend reversal. The hammer is "hammering a floor" and showing that the bulls won. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

↑ HAMMER

CANDLE HANGING MAN - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a hanging man appears in a chart, see "Hanging Man" on page 114. In a bullish trend that is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Hanging Man - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

Multiplier
Used to determine the relation between the lower shadow and the body

Default: 2.0

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a hanging man which is a signal for a bearish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses a hanging man which is a signal for a trend reversal. Hanging man looks like a man hanging from a gallows and shows that the bears won. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HANGING MAN - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a hanging man appears in a chart, see "Hanging Man" on page 114. In a bullish trend that is a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Hanging Man - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

Multiplier
Used to determine the relation between the lower shadow and the body

Default: 2.0

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a hanging man which is a signal for a bearish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

Hanging Man

↑   HANGING MAN

USAGE

The strategy uses a hanging man which is a signal for a trend reversal. Hanging man looks like a man hanging from a gallows and shows that the bears won. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI BEARISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a bearish "Harami" on page 119 appears. In a bullish trend that is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Harami Bearish - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bearish "Harami" on page 119 in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   BEARISH AND BULLISH HARAMI

USAGE

The strategy uses a bearish Harami in a upwards trend which is a signal for a downwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI BEARISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a bearish "Harami" on page 119 appears. In a bullish trend that is a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle Harami Bearish - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bearish "Harami" on page 119 in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BEARISH AND BULLISH HARAMI

USAGE

The strategy uses a bearish Harami in a upwards trend which is a signal for a downwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI BULLISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a bullish "Harami" on page 119 appears. In a bearish trend that is a signal for a bullish trend reversal. For Exit signals with the same trigger, please use the "Candle Harami Bullish - Exit Strategy" on page 637.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod

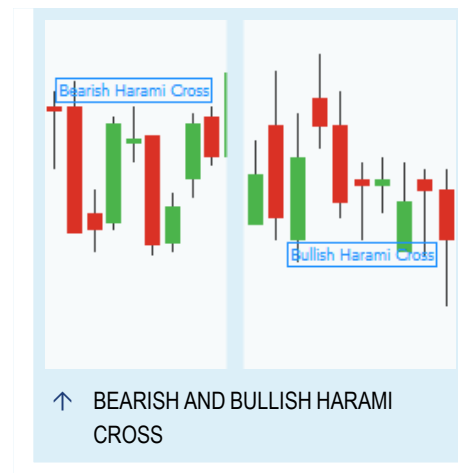Determines average values of some candlestick components.

Default: 5

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bullish "Harami" on page 119 in a downwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ BEARISH AND BULLISH HARAMI

USAGE

The strategy uses a bullish Harami in a downwards trend which is a signal for an upwards trend reversal. It shows the imbalance of the market's health.
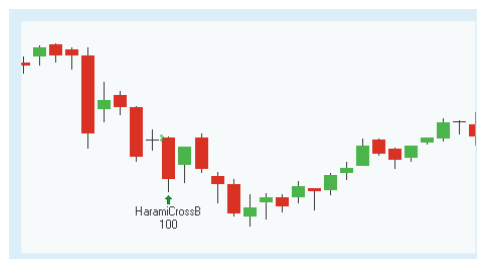
The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI BULLISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a bullish "Harami" on page 119 appears. In a bearish trend that is a signal for a bullish trend reversal. For Entry signals with the same trigger, please use the "Candle Harami Bullish - Entry Strategy" on page 635.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bullish "Harami" on page 119 in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BEARISH AND BULLISH HARAMI

USAGE

The strategy uses a bullish Harami in a downwards trend which is a signal for an upwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI CROSS BEARISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when a bearish "Harami" on page 119 Cross appears. In a bullish trend that is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle Harami Cross Bearish - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

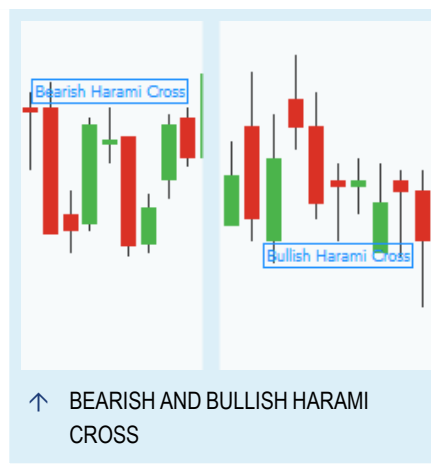Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bearish "Harami" on page 119 Cross in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BEARISH AND BULLISH HARAMI CROSS

USAGE

The strategy uses a bearish Harami Cross in a upwards trend which is a signal for a downwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI CROSS BEARISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when a bearish "Harami" on page 119 Cross appears. In a bullish trend that is a signal for a bearish trend reversal. "Candle Harami Cross Bearish - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod

The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bearish "Harami" on page 119 Cross in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑ BEARISH AND BULLISH HARAMI CROSS

USAGE

The strategy uses a bearish Harami Cross in a upwards trend which is a signal for a downwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI CROSS BULLISH - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when a bullish "Harami" on page 119 Cross appears. In a bearish trend that is a signal for a bullish trend reversal. For Exit signals with the same trigger, please use the "Candle Harami Cross Bullish - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bullish "Harami" on page 119 Cross in a downwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑ BEARISH AND BULLISH HARAMI CROSS

USAGE

The strategy uses a bullish Harami Cross in a downwards trend which is a signal for an upwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE HARAMI CROSS BULLISH - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when a bullish "Harami" on page 119 Cross appears. In a bearish trend that is a signal for a bullish trend reversal. For Entry signals with the same trigger, please use the "Candle Harami Cross Bullish - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
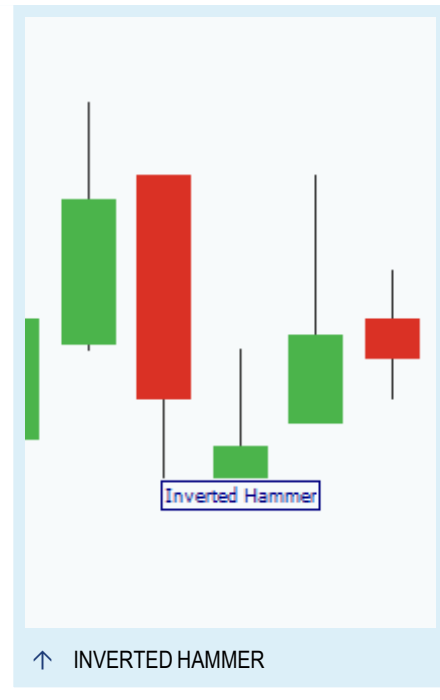Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses a bullish "Harami" on page 119 Cross in a upwards trend which is a signal for a trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bullish trend is confirmed with the price.

↑   BEARISH AND BULLISH HARAMI CROSS

USAGE

The strategy uses a bullish Harami Cross in a downwards trend which is a signal for an upwards trend reversal. It shows the imbalance of the market's health.

The strategy includes therefor already the confirmation for the trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE IN NECK - ENTRY STRATEGY

DESCRIPTION

This strategy generates a short entry signal when an In Neck appears in a chart, see "In Neck and On Neck" on page 117. In a bullish trend that is a signal for a bearish trend reversal. For Exit signals with the same trigger, please use the "Candle In Neck - Exit Strategy" on page 645.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod

Determines average values of some candlestick components.
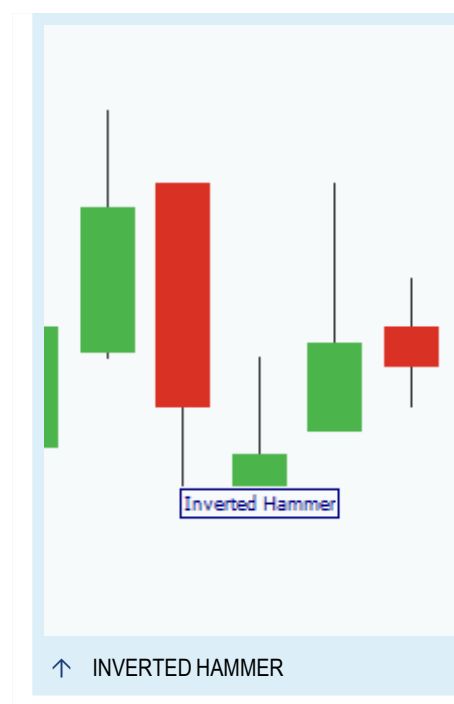
Default: 5

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy uses an In Neck which is a signal for a bearish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

↑   IN NECK

USAGE

The strategy uses an In Neck which is a signal for a trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE IN NECK - EXIT STRATEGY

DESCRIPTION

This strategy generates a long exit signal when an In Neck appears in a chart, see "In Neck and On Neck" on page 117. In a bullish trend that is a signal for a bearish trend reversal. For Entry signals with the same trigger, please use the "Candle In Neck - Entry Strategy" on page 643.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses an In Neck which is a signal for a bearish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long exit signal is generated.

↑   IN NECK

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses under the lowest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses an In Neck which is a signal for a trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE INVERTED HAMMER - ENTRY STRATEGY

DESCRIPTION

This strategy generates a long entry signal when an inverted hammer appears in a chart, see "Shooting Star/Inverted Hammer" on page 115. In a bearish trend that is a signal for a bullish trend reversal. For Exit signals with the same trigger, please use the "Candle Inverted Hammer - Exit Strategy" on the next page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod
Determines average values of some candlestick components.

Default: 5

OrderMethod
Defines the order method

Default: atMarket

CALCULATION

The strategy uses an inverted hammer which is a signal for a bullish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a long entry signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

USAGE

The strategy uses an inverted hammer which is a signal for a trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

↑ INVERTED HAMMER

CANDLE INVERTED HAMMER - EXIT STRATEGY

DESCRIPTION

This strategy generates a short exit signal when an inverted hammer appears in a chart, see "Hammer" on page 114. In a bearish trend that is a signal for a bullish trend reversal. For Entry signals with the same trigger, please use the "Candle Inverted Hammer - Entry Strategy" on the previous page.

PARAMETERS

FilterPeriod
The number of bars used to calculate the candle patterns.

Default: 10

CandlePeriod

Determines average values of some candlestick components.

Default: 5

OrderMethod

Defines the order method

Default: atMarket

CALCULATION

The strategy uses an inverted hammer which is a signal for a bullish trend reversal. For a description of the candle pattern, see "Using Candlestick Patterns" on page 113. If the pattern is identified, a short exit signal is generated.

With the input **OrderMethod** you can define if the order is executed for all patterns, **atMarket**, or only if next days price crosses over the highest price of the pattern, **atPriceTrigger**. With the last option the order is only executed, if the bearish trend is confirmed with the price.

Inverted Hammer

↑ INVERTED HAMMER

USAGE

The strategy uses an inverted hammer which is a signal for a trend reversal. When you execute the trades immediately without a confirmation, the quick trade can result in a higher profit but is also riskier.

Candle patterns do not indicate any price targets. Different traders use in addition western techniques like "Pivot Points Analysis" on page 737, "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675.

CANDLE PATTERN

Shortcode: CANPAT

DESCRIPTION

The Candle Pattern indicator identifies several candlestick patterns in a "Candlestick Chart" on page 110.

PARAMETERS

Pattern
Set here the desired candlestick pattern

Default: Hammer

TrendFilter
Defines if the market is checked for a current up or down trend.

Default: True

TrendFilterPrice
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

TrendFilterPeriod
The number of bars used to calculate the candle patterns.

Default: 5

ShortWickFactor
Sets the value from which a wick is no longer considered.

Default: 0.01

CALCULATION

The indicator checks the market for trend, when **TrendFilter** is true because candlestick patterns are only meaningful during a trend. Very short wicks are not considered as wicks, defined by **ShortWickFactor**. For a description of the possible candle patterns for this indicator, see "Using Candlestick Patterns" on page 113.

USAGE

Candlestick Patterns are useful in predicting a trend reversal and have the advantage over western techniques that they are not behind the trend. As candlestick patterns do not provide any price targets, you can use western techniques like "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675 as additional resource.

↑ CANDLE PATTERN BULLISH SUNRISE WITH MACD

In addition with the confirmed trend you can use the candlestick patterns as good trading signals. Swing traders will profit from the signals of the candlestick patterns. If you want to combine several candlestick patterns to get stronger signals, use the "Candle Patterns" below indicator which can identify more then pattern at once.

CANDLE PATTERNS

Shortcode: CANPATS

DESCRIPTION

The Candle Patterns indicator identifies several candlestick patterns in a "Candlestick Chart" on page 110.

PARAMETERS

TrendFilter
Defines if the market is checked for a current up or down trend.

Default: True

TrendFilterPrice
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

TrendFilterPeriod
The number of bars used to calculate the candle patterns.

Default: 5

ShortWickFactor

Sets the value from which a wick is no longer considered.

Default: 0.01

CALCULATION

The indicator checks the market for trend, when **TrendFilter** is true because candlestick patterns are only meaningful during a trend. Very short wicks are not considered as wicks, defined by **ShortWickFactor**. For a description of the possible candle patterns for this indicator, see "Using Candlestick Patterns" on page 113.

USAGE

Candlestick Patterns are useful in predicting a trend reversal and have the advantage over western techniques that they are not behind the trend. As candlestick patterns do not provide any price targets, you can use western techniques like "Relative Strength Index" on page 753 and moving averages as "MACD" on page 675 as additional resource.

↑ CANDLE PATTERNS TWEEZER TOPS AND BOTTOMS WITH MACD

In addition with the confirmed trend you can use the candlestick patterns as good trading signals. Swing traders will profit from the signals of the candlestick patterns. If you want to identify only a single candlestick patterns for a better overview, use the indicator "Candle Pattern" on page 649.

CHANNEL BREAKOUT STRATEGY

DESCRIPTION

This complete strategy generates trading signals based on a breakout of the "High Low Channel" on page 669. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Channel Breakout Portfolio Strategy" on the next page.

PARAMETERS

Days
The number of bars used to calculate

Default: 44

Bullish

Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The strategy uses the high low channel over a given period **Days**. For the calculation of the indicator itself, see "High Low Channel" on page 669

A breakout from the channel generates a trading signal. With the inputs **Bullish** and **Bearish** you can define if long or short signals are generated.

↑   STRATEGY WITH CORRESPONDING CHANNEL

USAGE

The channel is not so robust in a sideways or noisy markets as in a well-defined market. The indicator is efficient in the identification of major trends in the market but due to the calculation trend reversals are only shown with a delay. Depending on the used period the lag is bigger or smaller.

CHANNEL BREAKOUT PORTFOLIO STRATEGY

DESCRIPTION

This complete strategy generates trading signals based on a breakout of the "High Low Channel" on page 669. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Days

The number of bars used to calculate

Default: 44

LongEntry

Defines what kind of orders are placed.

Default: True

LongExit

Defines what kind of orders are placed.

Default: True

ShortEntry

Defines what kind of orders are placed.

Default: True

ShortExit

Defines what kind of orders are placed.

Default: True

CALCULATION

The strategy uses the high low channel over a given period **Days**. For the calculation of the indicator itself, see "High Low Channel" on page 669

A breakout from the channel generates a trading signal. With the additional inputs you can define if long and/or short signals are generated.
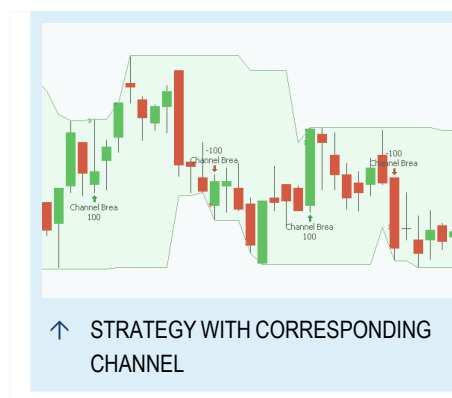
↑ STRATEGY WITH CORRESPONDING CHANNEL

USAGE

The channel is not so robust in a sideways or noisy markets as in a well-defined market. The indicator is efficient in the identification of major trends in the market but due to the calculation trend reversals are only shown with a delay. Depending on the used period the lag is bigger or smaller.

CLENOW MOMENTUM PORTFOLIO STRATEGY

The Clenow Momentum Portfolio strategy is a momentum-based portfolio trading strategy (created for the S&P 500). The strategy will buy symbols that show an upward trend in an upward market, represented by a benchmark symbol (typically the S&P 500 index). Positions are sized using risk parity allocation. All trades

happen on a specific day of the week and positions are rebalanced on a fixed interval.

This strategy can only be applied to portfolios with daily bars.

PARAMETERS

BenchmarkSymbol
Select which symbol should be used as benchmark.

TradingDay
Select the trading day.

Default: Wednesday

MomPeriod
Period used for calculating the momentum (in days).

Default: 90

SmaPeriod
Period for the simple moving average.

Default: 100

AtrPeriod
Period for the average true range.

Default: 20

BenchmarkSmaPeriod
Period for the moving average of the benchmark symbol.

Default: 200

BestBuyPercent
Percentage of the portfolio to buy based on the selection criteria.

Default: 20

GapPeriod
Number of bars used to check for big gaps between prices.

Default: 90

MaxGapPct
Maximum gap percentage that a symbol might have before it will be eliminated (a high gap percentage corresponds to a high volatility).

Default: 15

AvgDailyImpactPercent

How much can investing in a security affect your daily investment? This is a measure for risk exposure. The calculation uses the ATR value for deciding how much to invest in a security you have decided to invest in.

Default: 0.1

Rebalance

Should the positions be rebalanced automatically (True) or not (False)?

Default: True

RebalanceWeeks

After how many weeks should be rebalanced?

Default: 2

TradingDays

Select the approximate number of trading days in a year.

Default: 252

CALCULATION

In its core, the calculation is an exponential regression, with the regression being calculated on the *log* of prices over time.

Two factors are being considered: The regression coefficient is a measure of trend strength; the R2 factor is a measure of the quality of the trend. These are multiplied to result in:

Clenow Momentum = annualized slope of regression coefficient (%) * R2 of regression (%)

The greater the Clenow Momentum value, the higher the rank.

USAGE

Buy symbols that show an upward trend in an upward market by following a benchmark symbol of your choice.

CORRELATION

Shortcode: COR

DESCRIPTION

This indicator calculates and visualizes the correlation between two securities.

PARAMETERS

Price1
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period
The number of bars used to calculate the correlation between the two securities.

Default: 30

Method
The method used to calculate the correlation between the two securities.

CALCULATION

This indicator calculates and visualizes the correlation between two securities.

USAGE

The Correlation indicator can be used as a statistical tool that measures the degree of how two securities move in relation to each other. The correlation coefficient can assume values between -1 and +1:

→ A value of exactly +1 indicates complete positive correlation.

→ The closer the value is to 0, the smaller the correlation.

→ A value of exactly -1 indicates complete negative correlation.

↑ THE INDICATOR INSERTED TWICE.

CORRELATION BENCHMARK

DESCRIPTION

This indicator calculates and visualizes the correlation between a security and a benchmark.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Benchmark
The data field (e.g. index) to which to compare the security.

Period
The number of bars used to calculate the correlation between security and benchmark.

Default: 30

Method
The Method used to calculate the correlation between security and benchmark.

CALCULATION

This indicator calculates and visualizes the correlation between a security and a benchmark.

USAGE

The Correlation Benchmark indicator can be used as a statistical tool that measures the degree of how a security moves in relation to a benchmark. The

correlation coefficient can assume values between -1 and +1:

→ A value of exactly +1 indicates complete positive correlation.

→ The closer the value is to 0, the smaller the correlation.

→ A value of exactly -1 indicates complete negative correlation.

↑   THE INDICATOR INSERTED TWICE.

COUNTER CLOCKWISE

Shortcode: CCW

DESCRIPTION

This indicator analyzes the relationship between the value and volume of its parent instrument and visualizes it. It produces a chart that disregards time in favor of volume, making it a helpful tool for identifying bearish and bullish trends as well as trend changes.
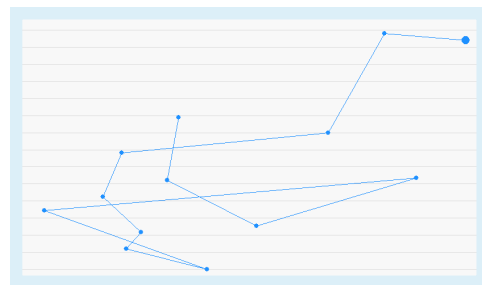
PARAMETERS

This indicator requires a single parent instrument that has a data field for Volume available.

PriceField
The price field from the parent instrument (or indicator) on which to calculate this indicator.

VolumeField
The volume field from the parent instrument (or indicator) on which to calculate this indicator.

CALCULATION

Percentage differences in price between the current and the preceding bar are added to or subtracted from the most recent line. Changes in volume effect a movement of the endpoint to the right or the left. Surging prices are plotted upward, falling prices downward on the x-axis. Increasing volume is plotted leftward, decreasing volume is plotted rightward on the y-axis.

USAGE

Trend changes are indicated by two crossing, opposing trendlines (x-reversal) which may yield buy or sell signals. Please note that an x-reversal is only valid if both lines are moving rightwards.

Both decreasing and ascending lines moving rightward are considered trendlines. In addition, bearish and bullish trends can identified by this indicator (see below).
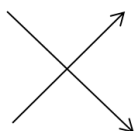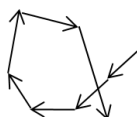
X Reversal   Bearish Trend   Bullish Trend
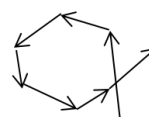
Tip: In order to be able to better follow the course of the indicator the trading volume should be displayed in the chart.

DAY RANGE

Shortcode: DRG

DESCRIPTION

This indicator calculates and displays the difference between the current price and the opening price of a trading day as a bar chart. The trading range of the resulting chart parallels the range of price movements within that day.
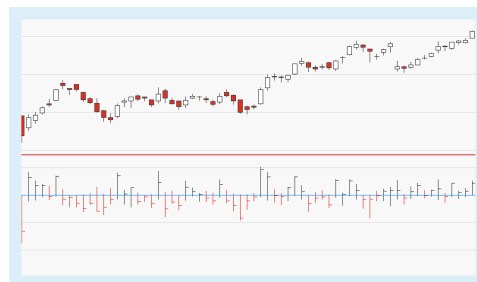
CALCULATION

The current period values are subtracted from the opening price of that day.

USAGE

This indicator offers a way to analyze the daily trading range between opening and closing price. The calculation of the indicator values results in patterns identical to those found in regular bar charts. An indicator line crossing the zero line top down indicates a trend reversal; the price is now lower than the indicator

value. Similarly, an indicator line crossing the zero line bottom-up also indicates a trend reversal; the price is now higher than the indicator value.
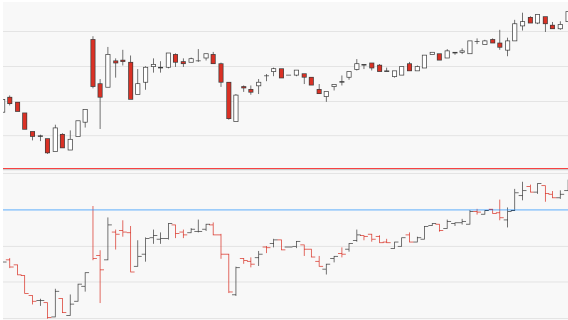
↑   THE DAY RANGE INDICATOR IN AN
    INTRADAY CHART.

DIRECTIONAL MOVEMENT INDEX

Shortcode: DMI

DESCRIPTION

This indicator analyzes the strength of a trend and confirms or disproves its significance. It consists of four lines, the DMI+ line, the DMI- line, the DMI line and the ADX line.

PARAMETERS

Period
The number of bars used to calculate the indicator.

Default: 14

CALCULATION

The basis of this indicator are two partial indicators:

→   +DI (Upward Directional Indicator), which is calculated by determining the +DM (Upward Directional Movement). THe +DM measures the difference between today's high and yesterday's high and dividing it by the True Range based on the selected period.

→   -DI (Downward Directional Indicator), which is calculated by determining the -DM (Downward Directional Movement). The -DM measures the difference between today's low and

yesterday's low and dividing it by the True Range based on the selected period.

The difference between the +DI and -DI is divided by the sum of the +DI and -DI. The result is multiplied by 100.

USAGE

The calculation of the indicator produces a percentage value which provides information on the strength of the current trend. It does not say anything about the direction of the trend. High values indicate strong trends, low values indicate weak trends. The DMI is a fairly volatile indicator and usually smoothed and transformed into the "Average Directional Index" on page 551.
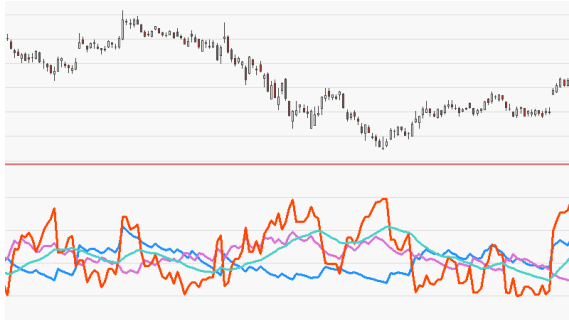
↑ A STRONG DOWNWARD TREND REFLECTED IN HIGH INDICATOR VALUES.
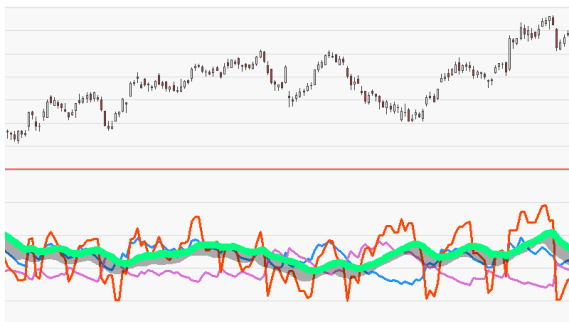
↑ THE ADX LINE (IN GREEN, HIGHLIGHTED) IS A SMOOTHED DMI.

DOGS OF THE DOW STRATEGY

This strategy will once per year find the index members (typically from the DJI index) with the highest dividend yield and invest equally in each.

It can only be applied to portfolios in which all stocks have the same currency.

PARAMETERS

DogCount
In how many top performers should be invested?

Default: 10

TradeMonth
Select at the end of which month in each year the highest dividend yield should be calculated.

Default: Jan

USAGE

The Dogs of Dow strategy is a rather straightforward long-term strategy that historically outperformed the stock market as measured by the Dow Jones Industrial Index. Once per year the top stocks with the highest dividend yield are found and the capital is rebalanced towards these top performers. Then for another year, no trades take place (saving on tradings costs). The DogCount ensures a lower portfolio volatility compared to investing in only 1-2 top performers.

EASE OF MOVEMENT

Shortcode: EOM

DESCRIPTION

This indicator illustrates the relationship between the rate of a security's price change and its volume, attempting to identify the amount of volume required to move prices.

PARAMETERS

SmoothingPeriod
The number of bars used to calculate the smoothing.

Default: 14

ShowAlert
Controls whether alerts are displayed for this indicator.

Default: False

CALCULATION

First, the trading range is calculated by subtracting the daily high from the daily low.

```
Range(t) = High(t) - Low(t)
```

Then, the scope and the direction of the trend are calculated by subtracting the mean of today's trading range from the mean of yesterday's trading range. If today's trading range value is higher than yesterday's the value is positive, if it is lower the value is negative.

```
MedChange(t) = (High(t) + Low(t) / 2) - (High(t-1) + Low(t-1) / 2)
```

Now the box range is calculated, which is defined as the ratio of volume and trading range.

```
BoxRange(t) = Volume(t) / Range(t)
```

Underlyings with a high volume such as indexes produce results that cannot be displayed by the software; they need to be divided by a certain factor in order to create a manageable result. The exact factor is not important.

The indicator value is calculated by dividing the mean movement by the box range. The resulting line needs to smoothed, e.g. by applying a 13-day simple moving average.

```
EOM(t) = Sum(n)(MedChange / BoxRange) / n
```

USAGE

Generally a value greater than zero is an indication that the security is being accumulated (bought) and negative values are used to signal increased selling pressure. A high positive value appears when prices move upward on low volume. Strong negative numbers indicate that the price is moving downward on low volume. A greater distance between indicator line and zero line indicates a smaller amount of volume and a wide trading range. If the indicator line crosses the zero line bottom-up it is regarded a buy signal, if it crosses the zero line top-down it is regarded a sell signal.

↑ A 13-DAY SIMPLE MOVING AVERAGE
   APPLIED TO THE INDICATOR.

GROUP ALLOC PORTFOLIO STRATEGY

This strategy invests capital according to the order given to portfolio groups. Use the **Set Group** option to define the individual groups. Up to ten groups in a portfolio are supported.

It can only be applied to portfolios in which all stocks have the same currency.

PARAMETERS

RebalancePeriod
Define how often the investments should be rebalanced (each day, week, month, quarterly or yearly).

Default: Yearly

Group1
Assign a first group to invest in.

Group2
Assign a second group to invest in.

Group3
Assign a third group to invest in.

Group4
Assign a fourth group to invest in.

Group5
Assign a fifth group to invest in.

Group6
Assign a sixth group to invest in.

Group7
Assign a seventh group to invest in.

Group8
Assign a eighth group to invest in.

Group9
Assign a nineth group to invest in.

Group10
Assign a tenth group to invest in.

USAGE

Automatically allocate investments to groups defined by you in the portfolio. The groups are processed from top to bottom until the available capital is distributed. This may already happen at e.g. group 3 of 9, depending on your settings.

This strategy works similarly to the "Sector Alloc Portfolio Strategy" on page 770, but instead of fixed sectors, the groups and their contained stocks are defined by you.

HEIKIN-ASHI

Shortcode: HA

DESCRIPTION

This indicator is a variation of Japanese candlestick charts. It increases the readability of candlestick charts and helps to isolate trends, making opportunities more visible.

PARAMETERS

This indicator requires a single parent instrument that has data fields for Open, High, Low, Close available.

ClassicMode
Sets how the first candle is calculated. In classic mode, the bar's close price is used instead of the average price.

Default: No

CALCULATION

The Heikin Ashi is often described as a weighted version of a candlestick chart. It uses the open-close data from the prior period and the Open, High, Low, Close data from the current period to create a combo candlestick. The following formulae are used to calculate the individual bars:

→ Close = (Open+High+Low+Close)/4

→ Open = [xOpen(Previous Bar) + Close(Previous Bar)]/2

→ High = Max(High, xOpen, xClose)

→ Low = Min(Low, xOpen, xClose)

USAGE

The Heikin Ashi is based on the standard Open, High, Low, Close values and represents a different mode of visualization with the following characteristics (based on the default settings):

→ Hollow candles represent upward trends, filled candles represent downward trends.

→ The stronger the trend, the longer the candle body.

→ Small candles indicate trend changes or neutral phases.

→ Candles with two wicks are "unsafe" candles. They often appear in phases of consolidation or at trend beginnings or trend ends

→ Quick alternation between red and green candles indicates consolidation.

→ Candles without bottom wick indicate a strong upward trend.

→ Candles without top wick indicate a strong downward trend.
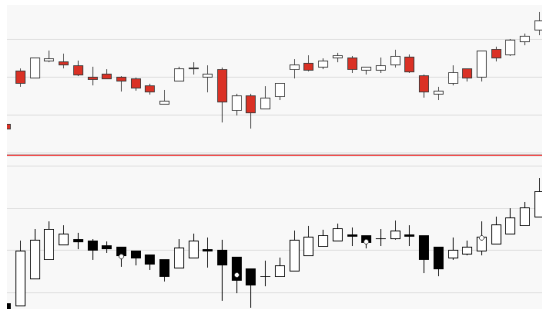
↑ THE HEIKIN ASHI ELIMINATES MARKET NOISE
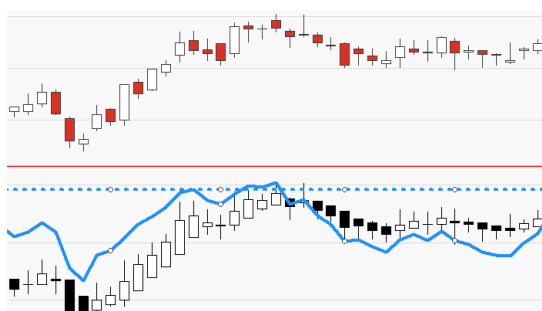
↑ ITS IMPROVED SIGNALS CAN BE USED IN COMBINATION WITH OTHER INDICATORS SUCH AS THE RELATIVE STRENGTH INDEX.

HIGH LOW CHANNEL

Shortcode: HILOC

DESCRIPTION

This indicator displays a channel based on the highest high and lowest low over a given period.
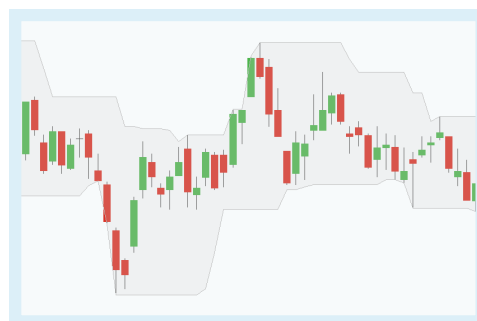
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: 10

Displacement
The number of bars to shift the regression curve into the past or future.

Default: 0

DisplacementMode
Determines, if the displacement is applied on the chart or the values.

Default: DisplaceChart

CALCULATION

The indicator uses the highest high and the lowest low in the given period to draw a channel. The upper border is defined by the highest high and the lower border by the lowest low.

With the displacement, you can either displace the values for the calculation or shift the whole channel in the chart.

↑   INDICATOR WITH A LONG AND A SHORT PERIOD
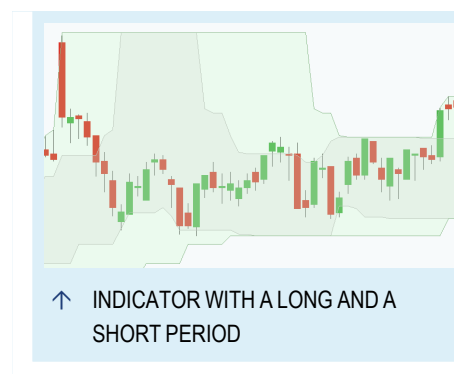
USAGE

Break-outs and break-ins can be trading signals. The channel is not so robust in a sideways or noisy markets as in a well-defined market. The indicator is efficient in the identification of major trends in the market but due to the calculation trend reversals are only shown with a delay. Depending on the used period, the lag is

bigger or smaller. Two channels with different periods can be helpful as well to identify both, the long- and the short-term trends.

ICHIMOKU KINKŌ-HYŌ

Shortcode: IKH

DESCRIPTION

This indicator calculates a span called cloud (Kumo) and consists of three graphs and a cloud (Senkou Span A+B). The Ichimoku Kinko Hyo indicator characterizes the market trend, momentum, support and resistance levels. Therefor it is used to improve the accuracy of forecast price moves of trending markets. This indicator works best with weekly and daily charts.
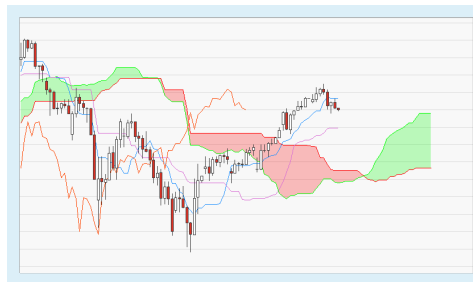
PARAMETERS

Period_K
The number of bars used to calculate the Tenkan-sen.

Default: 9

Period_L
The number of bars used to calculate the Kijun-sen.

Default: 26

Period_M
The number of bars used to calculate the Senkou Span Cloud.

Default: 52

Period_N
The number of bars used to to project the Chikou Span into the past.

Default: 26

CALCULATION

The Ichimoku Cloud is calculated from the average values of the highest and lowest closing values of the defined periods.

Tenkan-sen: (highest high + lowest low)/2 for **Period_K** bars.

Kijun-sen (highest high + lowest low)/2 for **Period_L** bars.

Senkou Span A: (Tenkan-sen + Kijun-sen)/2.

Senkou Span B: (M-day high + M-day low) / 2 for **Period_M** bars.

Chikou Span: Closing price with the negative offset of **Period_N** bars.

USAGE

The Tenkan-Sen line is s a trend indicator. A buy signal can be interpreted if the Tenkan-Sen line crosses the Kijun-Sen-Linie upwards. A sell signal can be interpreted, if the Tenkan-sen line crosses the Kijun-Sen line downwards. The Kijun-Sen line is a signal line, if the actual price is above the Kijun-Sen a further price increase is probable.

The Senkou-Span-A line and the Senkou-Span-B line define the support and resistance lines. The Ichimoku Cloud is drawn between the Senkou Span A and B.
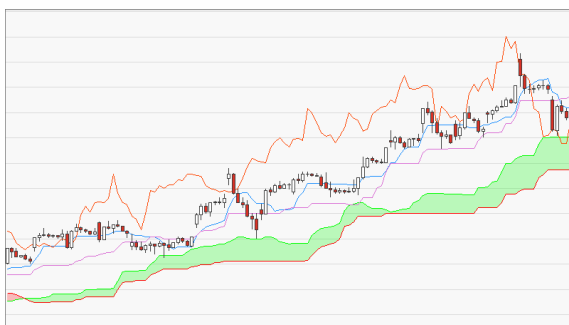
↑ IF THE PRICE LIES ABOVE THE SENKOU SPAN LINES, THE CLOUD IS IN AN AREA OF SUPPORT
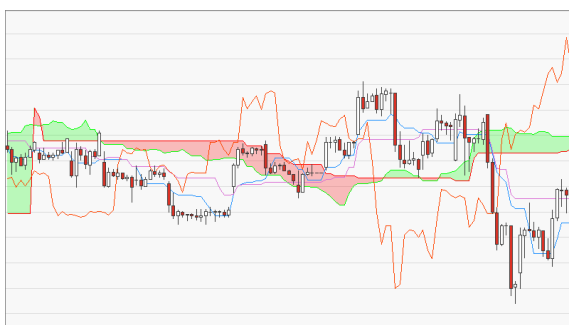
↑ IF THE PRICE LIES BELOW THE SENKOU SPAN, THE CLOUD IS IN AN AREA OF RESISTANCE

KAHLER'S VOLATILITY

Shortcode: KVOLA

DESCRIPTION

This indicator plots a measure for volatility derived from the expected return of a straddle strategy.

Historical volatility uses standard deviation of daily log returns to describe the volatility of the market. Kahler's Volatility in comparison uses a fair bet strategy. One of the resulting advantages is that singular events have less effect on the resulting number. Another advantage is that e.g. in a phase of high upside, Kahler's volatility will take note of the large change compared to past returns, while the historical volatility will remain lower, as a steady upside has one direction and no setbacks.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period
The number of bars used to calculate Kahler's Volatility.

Default: 30

ReturnPeriod
The period in bars used to calculate the volatility.

Default: 5

Result
Enter the way the result is displayed, either as percent, absolute, or rank.

Default: Percent

Multiplier
A multiplier for the standard deviation can be entered here.

Default: 1

RankPeriod

The period in bars used to calculate the rank based on the highest high and lowest low, if the Result option "Rank" is selected.

Default: 100

CALCULATION

Kahler's Volatility loops over the given past bars (i, Period value) and calculates the returns of call and put.

Sum of call returns = sum + MaxItems((Price[i] - Price[i + ReturnPeriod]) / Price[i + ReturnPeriod], 0); // % return of call

Sum of put returns = sum + MaxItems((Price[i + ReturnPeriod] - Price[i]) / Price[i + ReturnPeriod], 0); // % return of put

Kahler's Volatility = (sum of call returns + sum of put returns) / period

USAGE

Kahler's Volatility can be used for analysis, for placing stop loss markers, for calculating indicators, or for general risk assessment.

The higher the value, the stronger the periodic price changes. Usually the volatility increases when a base value is in a consolidation phase (in which there is no directional trend movement) or when the price is in a very strong downward movement.

LINEAR REG CURVE

Shortcode: LINREG

DESCRIPTION

This indicator plots the linear regression value for a bar as a continuous curve. It highlights where the trend is going.

PARAMETER

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period

The number of bars used to calculate the linear regression. The number chosen will determine the number of data points used in the calculation. The smaller the value, the more closely the regression curve will follow the course of the price.

Default: 5

Displacement

The number of bars to shift the regression curve into the past or future.

Default: 0

CALCULATION

The Linear Regression curve is the result of plotting a line through each end point of linear regression trend lines. Each trend line plots the minimal distance between data points, using the "least squares" method, over the number of bars defined in the Period input.

USAGE

This indicator determines where a market's price might be in the near future using current and past price history. If prices are trending up, linear regression attempts to determine what the upward bias of the price may be relative to the current price. If prices are trending down, it will attempt to determine the downward bias of the price. Some analysts believe that when prices rise above or fall below the linear regression line, they are overextended and will begin to move back towards the line. Thus, the line is used to monitor when a price move may change direction.

This indicator is often used in combination with the RSquare indicator in order to determine the significance of the trend and to calculate its confidence level. It can also be used to generate trading signals. A few examples are:

→ Going long if the regression curve is ascending, going short if the regression curve is descending

→ Signal generation based on the price relative to the regression curve.
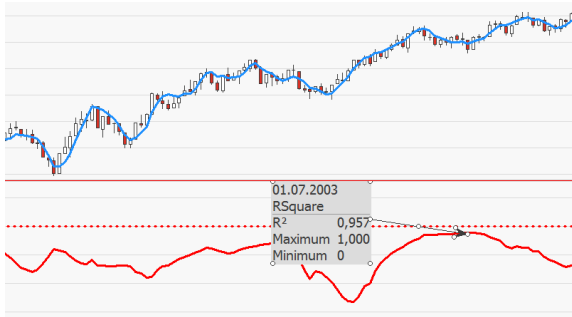
↑ THIS INDICATOR IS OFTEN USED IN COMBINATION WITH THE RSQUARE INDICATOR. A VALUE OF 0.8 OR MORE INDICATES A STRONG CONFIDENCE LEVEL.

↑ THE INDICATOR INSERTED TWICE WITH DIFFERENT PERIOD SETTINGS.

MACD

Shortcode: MACD

DESCRIPTION

This trend-following indicator is the result of combining two exponentially smoothed moving averages that are plotted above and below a zero line. Crossovers, movements through the zero line and divergences generate buy and sell signals.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast

The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow

The number of bars used to calculate the slow exponential moving average.

Default: 26

Trigger

The number of bars used to calculate the trigger line.

Default: 9

CALCULATION

Two Exponential Moving Averages (EMAs) with different period settings, 12 (fast) and 26 (slow), are calculated. The 26-bar EMA is then subtracted from the 12-bar EMA. In addition, a 9-bar EMA of the MACD is plotted on top of the MACD, serving as a trigger line for buy and sell signals.

USAGE

There are three common ways to interpret the indicator:

→ Trigger Line Crossovers: An indicator line falling below the trigger line is a bearish signal, indicating downward momentum. An indicator line rising above the trigger line is a bullish signal, indicating upward momentum.

→ Zero Line Crossovers: An indicator line crossing the zero line bottom-up is a bullish signal, an indicator line crossing the zero line top-down is a bearish signal.

→ Divergences: An indicator line diverging from the price of the security (or vice versa) signals the end of the current trend.

↑ A ZERO LINE CROSSOVER
INDICATING A TREND REVERSAL.
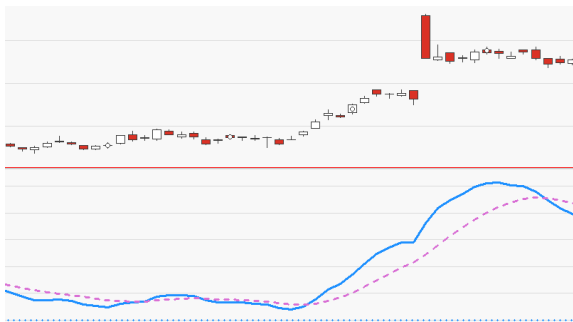
↑ DIVERGENCES BETWEEN INDICATOR
AND PRICE INDICATE THE END OF THE
CURRENT TREND.

MACD - EXIT STRATEGY

DESCRIPTION

This strategy is based on the "MACD" on page 675 indicator, which uses two exponentially smoothed moving averages with different periods and a zero line. Trading signals are generated, when the MACD value crosses the signal line. For Entry signals with the same trigger, please use the "MACD - Entry Strategy" on page 679.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow
The number of bars used to calculate the slow exponential moving average.

Default: 26

TriggerPeriod
The number of bars used to calculate the trigger line.

Default: 9

SigMethod
Defines which line should be used a second line for the crossover

Default: ZeroLine

ExitMethod
Defines what kind of orders are placed

Default: Both

CALCULATION

The strategy generates trading signals depending on a crossover of the MACD line with the chosen signal line. A long exit signal is generated if the MACD value crosses under the chosen signal line. If the MACD value crosses over the chosen signal line, a short exit signal is generated.

For the calculation of the indicator itself, see "MACD" on page 675.

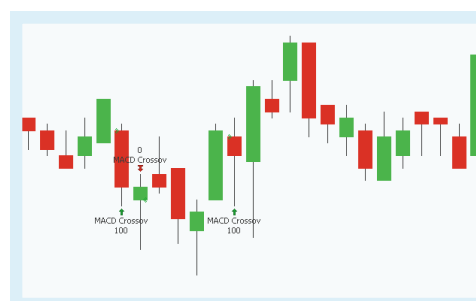↑ MACD - EXIT STRATEGY WITH THE CORRESPONDING MACD INDICATOR

USAGE

The exponentially smoothed moving average with the short period reacts faster to a upcoming trend then the exponentially smoothed moving average with the longer period. The distance between the averages is bigger when the trend is getting stronger. In this period this strategy does not generate a signal. A crossover between the MACD line and the signal line is a hint for trend reversal. Spikes and big gaps are more likely to happen during an active trend and both

have a big and persistent impact on averages. Therefore, the strategy is more useful in a trading range as in an active trend.

Different types of moving averages are always behind the trends due to the calculation itself. Consequently, it would be worth to add some additional indicators or conditions to the strategy to predict a trend reversal quicker. For example, the zero line of the MACD indicator or chart pattern like wedges can be used for this purpose.

MACD - ENTRY STRATEGY

DESCRIPTION

This strategy is based on the "MACD" on page 675 indicator, which uses two exponentially smoothed moving averages with different periods and a zero line. Trading signals are generated, when the MACD value crosses the signal line. For Exit signals with the same trigger, please use the "MACD - Exit Strategy" on page 677.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow
The number of bars used to calculate the slow exponential moving average.

Default: 26

TriggerPeriod
The number of bars used to calculate the trigger line.

Default: 9

SigMethod

Defines which line should be used a second line for the crossover

Default: ZeroLine

EntryMethod

Defines what kind of orders are placed

Default: Both

CALCULATION

The strategy generates trading signals depending on a crossover of the MACD line with the chosen signal line. A long entry signal is generated when the MACD value crosses over the chosen signal line. If the MACD value crosses under the chosen signal line, a short entry signal is generated. For the calculation of the indicator itself, see "MACD" on page 675.

↑   MACD - ENTRY STRATEGY WITH THE CORRESPONDING MACD INDICATOR

USAGE

The exponentially smoothed moving average with the short period reacts faster to a upcoming trend then the exponentially smoothed moving average with the longer period. The distance between the averages is bigger when the trend is getting stronger. In this period this strategy does not generate a signal. A crossover between the MACD line and the signal line is a hint for trend reversal. Spikes and big gaps are more likely to happen during an active trend and both have a big and persistent impact on averages. Therefore, the strategy is more useful in a trading range as in an active trend.

Different types of moving averages are always behind the trends due to the calculation itself. Consequently, it would be worth to add some additional indicators or conditions to the strategy to predict a trend reversal quicker. For example, the zero line of the MACD indicator or chart pattern like wedges can be used for this purpose.

MACD CROSSOVER STRATEGY

DESCRIPTION

This complete strategy is based on the "MACD" on page 675 indicator, which uses two exponentially smoothed moving averages with different periods and a trigger line. Trading signals are generated, when the MACD value crosses the trigger line.

This strategy is a complete system. If you would like to use two separate systems for Exit and Entry signals based on a MACD indicator, please use "MACD - Entry Strategy" on page 679 and "MACD - Exit Strategy" on page 677 instead. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "MACD Crossover Portfolio Strategy" on the next page.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow
The number of bars used to calculate the slow exponential moving average.

Default: 26

Trigger
The number of bars used to calculate the trigger line.

Default: 9

Bullish
Defines what kind of orders are placed

Default: LongEntry

Bearish
Defines what kind of orders are placed

Default: LongExit

CALCULATION

The strategy generates trading signals depending on a crossover of the MACD line with the trigger line. A entry signal is generated when the MACD value crosses over the trigger line. If the MACD value crosses under the trigger line, a exit signal is generated. For the calculation of the indicator itself, see "MACD" on page 675.

↑ MACD CROSSOVER STRATEGY WITH THE CORRESPONDING MACD INDICATOR

USAGE

The exponentially smoothed moving average with the short period reacts faster to a upcoming trend then the exponentially smoothed moving average with the longer period. The distance between the averages is bigger when the trend is getting stronger. In this period this strategy does not generate a signal. A crossover between the MACD line and the signal line is a hint for trend reversal. Spikes and big gaps are more likely to happen during an active trend and both have a big and persistent impact on averages. Therefore, the strategy is more useful in a trading range as in an active trend.

Different types of moving averages are always behind the trends due to the calculation itself. Consequently, it would be worth to add some additional indicators or conditions to the strategy to predict a trend reversal quicker. For example, the zero line of the MACD indicator or chart pattern like wedges can be used for this purpose.

MACD CROSSOVER PORTFOLIO STRATEGY

DESCRIPTION

This complete strategy is based on the "MACD" on page 675 indicator, which uses two exponentially smoothed moving averages with different periods and a trigger line. Trading signals are generated, when the MACD value crosses the trigger line.

This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow
The number of bars used to calculate the slow exponential moving average.

Default: 26

Trigger
The number of bars used to calculate the trigger line.

Default: 9

Bullish
Defines what kind of orders are placed

Default: LongEntry

Bearish
Defines what kind of orders are placed

Default: LongExit

CALCULATION

The strategy generates trading signals depending on a crossover of the MACD line with the trigger line. A entry signal is generated when the MACD value crosses over the trigger line. If the MACD value crosses under the trigger line, a exit signal is generated. For the calculation of the indicator itself, see "MACD" on page 675.

↑ MACD CROSSOVER STRATEGY WITH THE CORRESPONDING MACD INDICATOR

USAGE

The exponentially smoothed moving average with the short period reacts faster to a upcoming trend then the exponentially smoothed moving average with the longer period. The distance between the averages is bigger when the trend is getting stronger. In this period this strategy does not generate a signal. A crossover between the MACD line and the signal line is a hint for trend reversal. Spikes and big gaps are more likely to happen during an active trend and both have a big and persistent impact on averages. Therefore, the strategy is more useful in a trading range as in an active trend.

Different types of moving averages are always behind the trends due to the calculation itself. Consequently, it would be worth to add some additional indicators or conditions to the strategy to predict a trend reversal quicker. For example, the zero line of the MACD indicator or chart pattern like wedges can be used for this purpose.

MACD FOREST

Shortcode: MACDF

DESCRIPTION

This indicator calculates and displays the difference between the MACD indicator and its trigger line. The resulting histogram indicates trend strength and direction.
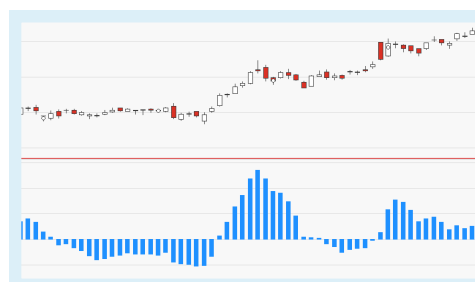
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate the fast exponential moving average.

Default: 12

PeriodSlow
The number of bars used to calculate the slow exponential moving average.

Default: 26

Trigger

The number of bars used to calculate the trigger line.

Default: 9

CALCULATION

First, the MACD and its trigger line are determined by calculating the two underlying exponential moving averages and subtracting the slow moving average from the fast moving average. The result is the MACD. Another exponential moving average is applied to the MACD to calculate the trigger line. To calculate the MACDF, the trigger line is subtracted from the MACD.

```
Ema1(t) = Ema(x)(Close)
```

```
Ema2(t) = Ema(y)(Close)
```

```
MACD(t) = Ema1(t) - Ema2(t)
```

```
Trigger(t) = Ema(z)(MACD)
```

```
MACDHist(t) = MACD(t) - Trigger(t)
```

USAGE

This indicator is an additional means of analysis and usually not used to generate trading signals (which would be identical to those generated by the underlying MACD). The MACDF's zero line parallels the MACD's trigger line. A few examples:

→ Positive MACDF histogram values mean that the MACD moves above its trigger line

→ Negative MACDF histogram values mean that the MACD moves below its trigger line

→ Crossovers of MACDF histogram and zero line correlate with the MACD crossing its trigger line

The use of the MACDF as an early warning system is based on the analysis of divergences between MACDF and MACD.

MOMENTUM

Shortcode: MOM

DESCRIPTION

The Momentum indicator is predicting the strength or weakness of a current market based on price statistics and indicates any overbought or oversold market situations. In addition the indicator indicates turning points within the market with a crossing with the zero line.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
Defines the amount of bars for the lookback period of the calculation

Default: 10

ShowAlerts
Alerts are shown, if true

Default: False

CALCULATION

The calculation is relatively easy. The price from n days before is subtracted from today's price:

Mom(t) = Close(t) – Close(t-n)

N is defined by Period.

USAGE

As seen on the image the indicator has a similar trend as the symbol itself. The crossing with zero line indicates a market change and is sometimes quicker then the market. If the Momentum is above the zero line is the current market cycle

bullish. The stronger the Momentum converges to the zero line, so slower are the movements in the market. After the crossing with the zero line is the Momentum below the zero line and indicates a bearish market.

MOMENTUM ZERO LINE CROSSOVER STRATEGY

DESCRIPTION

The Momentum Zero Line Crossover Strategy generates signals if the momentum indicator is crossing the zero line. The Momentum is predicting the strength or weakness of a current market based on price statistics and indicates any overbought or oversold market situations, please see "Momentum" on the previous page. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Momentum Zero Line Crossover Portfolio Strategy" on the next page.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
Defines the amount of bars for the lookback period of the calculation

Default: 10

Bullish
Defines what kind of orders are placed.

Default: LongEntry

Bearish
Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The crossing with zero line indicates a market change. If the Momentum is above the zero line is the current market cycle bullish. The stronger the Momentum converges to the zero line, so slower are the movements in the market. After the crossing with the zero line is the Momentum below the zero line and indicates a bearish market.

For the calculation of the indicator itself, see "Momentum" on page 686.

USAGE

As seen on the image the indicator has a similar trend as the symbol itself and the strategy placed automatically orders along the trends. With the adjustment of the period it is possible to decide whether short- or long-term trends should be used for the trades.

MOMENTUM ZERO LINE CROSSOVER PORTFOLIO STRATEGY

DESCRIPTION

The Momentum Zero Line Crossover Portfolio Strategy generates signals if the momentum indicator is crossing the zero line for a portfolio. The Momentum is predicting the strength or weakness of a current market based on price statistics and indicates any overbought or oversold market situations, please see "Momentum" on page 686. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
Defines the amount of bars for the lookback period of the calculation

Default: 10

Bullish

Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The crossing with zero line indicates a market change. If the Momentum is above the zero line, is the current market cycle bullish. The stronger the Momentum converges to the zero line, so slower are the movements in the market. After the crossing with the zero line is the Momentum below the zero line and indicates a bearish market.

For the calculation of the indicator itself, see "Momentum" on page 686.

USAGE

As seen on the image the indicator has a similar trend as the symbol itself and the strategy placed automatically orders along the trends. With the adjustment of the period it is possible to decide whether short- or long-term trends should be used for the trades.

MONTHLY PERF GRID

Shortcode: none

DESCRIPTION

This indicator shows a grid of the monthly performance (over the prior month) of the parent instrument. Years are displayed as rows, and months are displayed as columns.

PARAMETERS

StartYear

Bottom year in the grid.

Default: 2000

EndYear
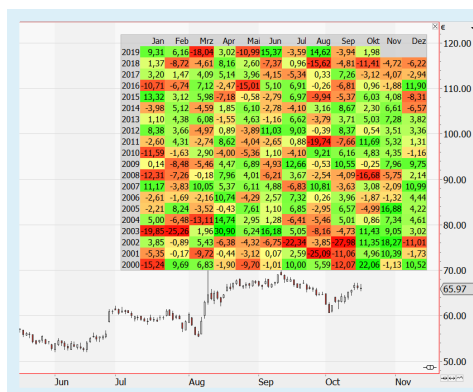
Top year in the grid.

Default: 2050

TextSize
Set the text size within the grid.

Default: 9

Labels
Select which labels should be displayed: Both, Months, Years, None.

Default: None

TextColor
The color for the text.

BorderColor
The color for the border around the grid.

BackColor
The background color for the row and column heading and for empty fields.

UpColor
The color for months on which the instrument performance went up.

DownColor
The color for months on which the instrument performance went down.

MidColor
The color for months where the instrument performance moved very little.

Graduation
The number that defines the level of color change on performance differences.
The smaller the number, the sharper the color differences.

Default: 10

CALCULATION

The percentage of change based on the monthly close bars is calculated.

USAGE

The indicator shows the monthly instrument baseline performance over the years.

A calculation of a monthly return based on portfolios etc. is not possible.

MOVING AVERAGE ADAPTIVE

Shortcode: KAMA

DESCRIPTION

The Moving Average Adaptive indicator was invented by Perry J. Kaufmann is also known as KAMA. The indicator focused more on trend efficiency then on volatility. The gradient of the signal line indicates the current trend and has the same direction as the trend itself.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 10

CALCULATION

The indicator uses a Moving Average Exponential to calculate the signal line. The weighting factor a for the calculation is adaptive and based on the efficiency ratio ER. This efficiency ratio is calculated with the net and gross price range in the period. The net price range is the absolute difference between the first and the last price in the period. The gross price range is the sum of all absolute price ranges in the period.

$$KAMA_t = a_t * (Close_t - KAMA_{t-1}) + KAMA_{t-1}$$

$$a_t = (ER_t * (Fastest_t - Slowest_t) + Slowest_t)^2$$

$$ER_t = \frac{net\ price\ range}{gross\ price\ range} = \frac{abs(Close_t - Close_{t-n})}{\sum_n abs(Close_t - Close_{t-1})}$$

USAGE

The indicator reacts due to the efficiency ratio different to the current trend and movements in the market. If the trend efficiency is high, is thereby the weighting factor also high. With the high weighting factor reacts the KAMA quick to changes in the market. On the other hand reacts the KAMA slower to changes in the market if the trend efficiency is lower.

↑ COMPARISON BETWEEN MOVING AVERAGE SIMPLE (SMA), MOVING AVERAGE EXPONENTIAL (EMA) AND MOVING AVERAGE ADAPTIVE (KAMA)

In comparison to the Moving Average Simple and Moving Average Exponential is clearly to see, how the adaptive element of the KAMA is reacting with changes in the market.

The indicator can create signals, when the signal line is crossing the current candles. In addition can the signal line also indicate a support or resistance line.
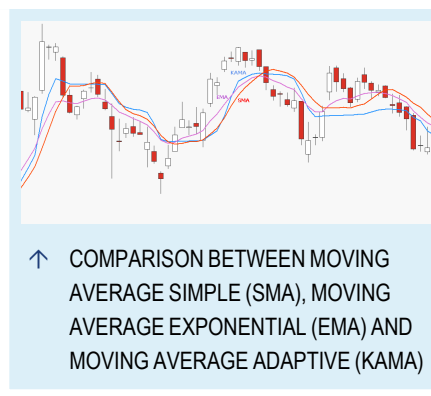
MOVING AVERAGE DOUBLE

Shortcode: SMA2

DESCRIPTION

The Moving Average Double indicator used the arithmetic mean to calculate the signal lines and is a variation of "Moving Average Simple" on page 705. The indicator draws two signal lines: one with a fast and one with a slow moving average.
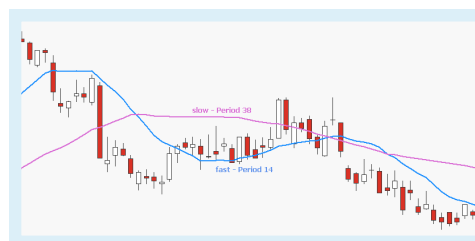
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate

Default: 10

PeriodSlow

The number of bars used to calculate

Default: 18

ShowAlert
Alerts are shown, if true

Default: False

CALCULATION

The calculation of a simple moving average with the period n is as follows:

$$SMA_t = \frac{\sum_{n=1}^{n}(Close)}{n}$$

For this indicator are two moving averages calculated. The fast version is calculated with a short period and brings fast results. On the other hand is the slow version calculated with longer period and needs some time to show results.

USAGE

The fast version reacts quick to trend reversal in the market. The slow version indicates a longer trend in the market.

A crossing of the signal lines indicates buying pressure when crossed in the upward direction and in the other way around a selling pressure.

If the market is currently in a consolidation and is only moving sideways, is the indicator not helpful, because it will create a lot of signals without a solid trend or trend reversal.

↑ MOVING AVERAGE DOUBLE

↑ MOVING AVERAGE DOUBLE IN CONSOLIDATED MARKET
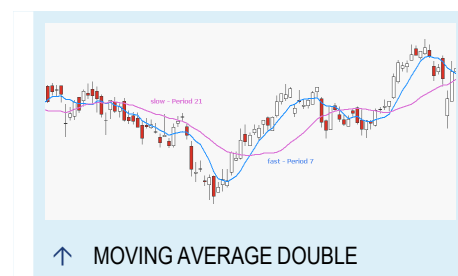
MOVING AVERAGE DOUBLE CROSS PORTFOLIO STRATEGY

DESCRIPTION

This strategy is a complete strategy, which uses a crossover with two "Moving Average Simple" on page 705 as trading signals. The periods of the two Moving Average Simple should reflect a fast and a slow one. This strategy is optimized for a "Portfolio" on page 251.
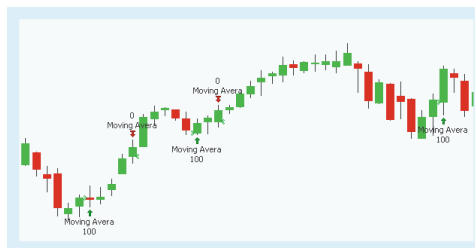
PARAMETERS

PeriodFast
The number of bars used to calculatefor the fast moving average adaptive

Default: 14

PeriodSlow
The number of bars used to calculatefor the slow moving average adaptive

Default: 38

LongEntry
Defines what kind of orders are placed.

Default: True

LongExit
Defines what kind of orders are placed.

Default: True

ShortEntry
Defines what kind of orders are placed.

Default: False

ShortExit
Defines what kind of orders are placed.

Default: False

CALCULATION

The strategy generates trading signals when a crossover between the two Moving Averages Simple occurs. For the calculation of the indicator itself, see"Moving Average Simple" on page 705

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

USAGE

Due to the Moving Average Simple used, the
strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal helps to find the right period settings.

MOVING AVERAGE DOUBLE CROSSOVER STRATEGY

DESCRIPTION

This strategy is a complete strategy, which uses a crossover with two "Moving Average Simple" on page 705 as trading signals. The periods of the Moving Averages Simple should reflect a fast and a slow one. When

you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Moving Average Double Cross Portfolio Strategy" on the previous page.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodFast
The number of bars used to calculate for the fast moving average adaptive.

Default: 14

PeriodSlow
The number of bars used to calculate for the slow moving average adaptive.

Default: 38

Bullish

Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The strategy generates trading signals when a crossover between the two Moving Averages Simple occurs. For the calculation of the indicator itself, see "Moving Average Simple" on page 705

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

USAGE

Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal can help to find the right period settings.

MOVING AVERAGE DOUBLE SLOPE - ENTRY STRATEGY

DESCRIPTION

This strategy uses a crossover with two "Moving Average Simple" on page 705 and the slope of the fast simple moving average as trading signals. The periods of the Moving Averages Simple should reflect a fast and a slow one. For Exit signals with the same trigger, please use the "Moving Average Double Slope - Exit Strategy" on page 698.

PARAMETERS

PeriodMA1

The number of bars used to calculatefor the fast moving average adaptive

Default: 20

PeriodMA2
The number of bars used to calculatefor the slow moving average adaptive

Default: 40

LookBack
Defines the lookback period for the slope

Default: 2

EntryMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

The strategy relies for trading signals on a crossover between a fast and a slow simple moving average and the slope of the fast simple moving average.

The strategy generates a long entry signal when a fast simple moving average is less than a slow simple moving average and the slope of the fast one is positive. The other way round, is a short entry signal generated when a fast simple moving average is greater than a slow simple moving average and the slope of the fast one is negative. For the calculation of the indicator itself, see "Moving Average Simple" on page 705.

USAGE

Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal can help to find the right period settings.

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

MOVING AVERAGE DOUBLE SLOPE - EXIT STRATEGY

DESCRIPTION

This strategy uses a crossover with two "Moving Average Simple" on page 705. The periods of the Moving Averages Simple should reflect a fast and a slow one. For Entry signals with the same trigger, please use the"Moving Average Double Slope - Entry Strategy" on page 696.

PARAMETERS

PeriodMA1
The number of bars used to calculate for the fast moving average adaptive

Default: 20

PeriodMA2
The number of bars used to calculate for the slow moving average adaptive

Default: 40

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

The strategy relies for trading signals on a crossover between a fast and a slow simple moving average. For the calculation of the indicator itself, see"Moving Average Simple" on page 705.

The strategy generates a long exit signal when the slow simple moving average crosses under a fast one. The other way round, a short exit signal is generated when the slow simple moving average crosses over the fast one.

USAGE

Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal can help to find the right period settings.

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

MOVING AVERAGE EXPONENTIAL

Shortcode: EMA

DESCRIPTION

The Moving Average Exponential indicator is based on a moving average with a weighting factor which lays more stress on the recent values then on the older values. In this way decreases the weighted factor the delay of a moving average, to which it is reacting to changes on the market. The indicator is calculated consecutively.
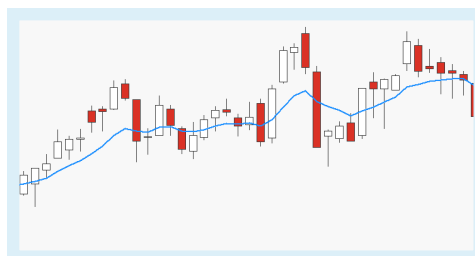
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 10

CALCULATION

The calculation of the indicator used the weighting factor EW with the set period n. In this way is a weighted rate of today's close added to yesterday's EMA.

$$EMA_t = (Close_t - EMA_{t-1}) * EW_t + EMA_{t-1}$$

$$EW_t = \frac{2}{n+1}$$

Sometimes are 10-days-EMA used. The days are set with the period n and define accordingly the weighting factor as follows:

$$EW_t = \frac{2}{10+1} = \frac{2}{11} = 0,1818 \approx 18\%$$

USAGE

For the usage of any moving average as an indicator are three factors important to classify the significance: trend, noise, and delay, see "Moving Average Simple" on page 705. The Moving Average Exponential improves the factor delay because the indicator reacts quicker to the market as the "Moving Average Simple" on page 705. The noise in the market is still smoothed away and the trend is also obviously.

↑ COMPARISON BETWEEN MOVING AVERAGE EXPONENTIAL (EMA) AND MOVING AVERAGE SIMPLE (SMA)
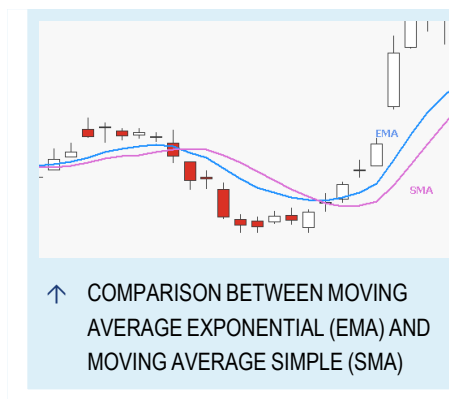
MOVING AVERAGE EXPONENTIAL MODIFIED

Shortcode: MEMA

DESCRIPTION

The Moving Average Exponential Modified indicator is based on a moving average with a weighting factor which lays more stress on the recent values then on the older values. In this way decreases the weighted factor the delay of a moving average, to which it is reacting to changes on the market. The indicator is calculated consecutively. The difference between "Moving Average Exponential" on the previous page and Moving Average Exponential Modified is a different calculation of the weighting factor, see Calculation.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 10

CALCULATION

The calculation of the indicator used the weighting factor EW with the set period n. In this way is a weighted rate of today's close added to yesterday's EMA.

$$EMA_t = (Close_t - EMA_{t-1}) * EW_t + EMA_{t-1}$$

$$EW_t = \frac{1}{n}$$

USAGE

For the usage of any moving average as an indicator are three factors important to classify the significance: trend, noise, and delay, see "Moving Average Simple" on page 705. The Moving Average Exponential Modified improves the factor delay because the indicator reacts quicker to the market as the "Moving Average Simple" on page 705. The noise in the market is still smoothed away and the trend is also obviously.

↑ COMPARISON BETWEEN MOVING AVERAGE SIMPLE (SMA), MOVING AVERAGE EXPONENTIAL (EMA) AND MOVING AVERAGE EXPONENTIAL MODIFIED (MEMA)

Compared to the "Moving Average Exponential" on page 699 are the older values less weighted. Therefore are the current values even more important for the signal line of the modified version as for the standard version of the Moving Average Exponential.
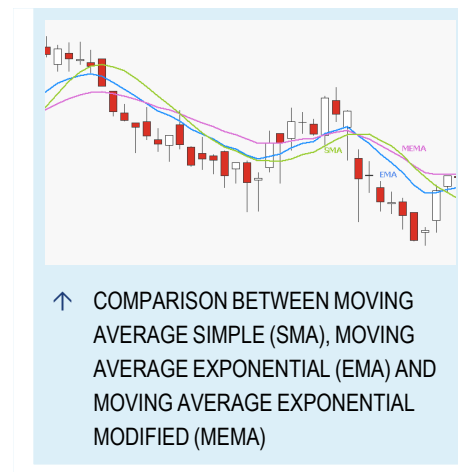
MOVING AVERAGE INDEX DYNAMIC

Shortcode: VIDYA

DESCRIPTION

The Moving Average Index Dynamic indicator is a variation of the "Moving Average Exponential" on page 699 and invented by Tushar S. Chande and Stanley Kroll. The indicator is a variable-length exponential moving average which is indexed to the Chande Momentum Oscillator.
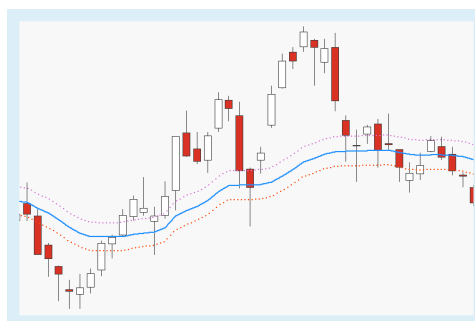
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 9

Smoothing
Defines the smoothing factor

Default: 12

Percent Deviation
Defines the percent deviation for the additional bands

Default: 0.01

CALCULATION

The indicator includes a smoothing factor SC and the Chande Momentum Oscillator CMO. The CMO can also have negative values and therefore the calculation uses the absolute values.

$$VIDYA_t = (SC * abs(CMO) * Price) + (1 - SC * abs(CMO)) * VIDYA_{t-1}$$

$$SC = \frac{2}{Smoothing + 1}$$

USAGE

If the market is stable, is the CMO and therefore the scaling factor as a whole low and decrease the impact of price movements. If the market is moving, are the CMO and the scaling factor high and increase the impact of price movements.

The comparison between the Moving Average Index Dynamic (VIDYA) and Moving Average Exponential (EMA) is the effect of the scaling factor and the CMO obviously.

The bands which represent the VIDYA adjusted with the percent deviation can be used similar to the "Bollinger Bands" on page 559 for signals.

↑ COMPARISON BETWEEN MOVING AVERAGE INDEX DYNAMIC (VIDYA) AND MOVING AVERAGE EXPONENTIAL (EMA)
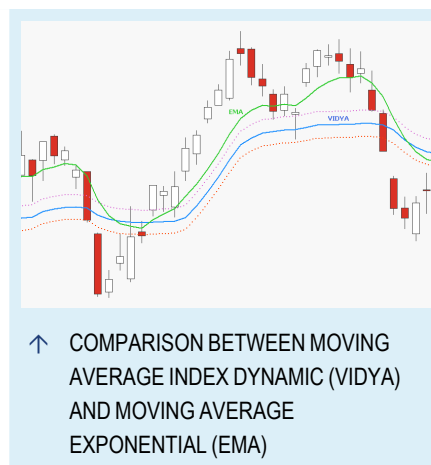
MOVING AVERAGE MODIFIED

Shortcode: MMA

DESCRIPTION

The Moving Average Modified indicator is a variation of the "Moving Average modified" above. For this indicator is only the value of yesterday needed. Additionally is a smoothing factor added to the calculation.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 10

CALCULATION

The calculation of the indicator is similar to a "Moving Average Simple" on the next page with a smoothing factor.

$$MMA_t = MMA_{t-1} + Smoothing * (Price_{t-1} - MMA_{t-1})$$

$$Smoothing = \frac{1}{Period}$$

USAGE

For the usage of any moving average as an indicator are three factors important to classify the significance: trend, noise, and delay. The factor delay is improved because the indicator needs just the data of yesterday for the calculation.

MOVING AVERAGE MONTHLY

Shortcode: MSMA

DESCRIPTION

The Moving Average Monthly indicator used the arithmetic mean to calculate the signal line. As the name is already suggesting is the arithmetic mean calculate for a whole month.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 1

MonthsToSkip
Defines the number of months which are ignored prior the current month

Default: 0

CALCULATION

The calculation of the indicator is a simple moving average with the period n. Here is the period n at least one month.

$$SMA_t = \frac{\sum_{n=1}^{n}(Close)}{n}$$

With the input MonthsToSkip is it possible to exclude months from the calculation.

USAGE

The indicator can be used as trend filter but is more a supporting indicator then a signal generator. If the current candles are above the signal line, is the current trend more in a upwards direction. Otherwise is the trend more in downwards direction.

↑ MOVING AVERAGE MONTHLY IN A LONG TIME FRAME
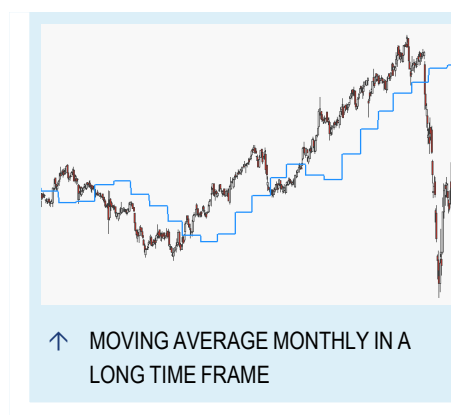
MOVING AVERAGE SIMPLE

Shortcode: SMA

DESCRIPTION

The Moving Average Simple indicator used the arithmetic mean to calculate the signal line. With the Moving Average Simple it is possible to reduce the noise of the market but at the same time is the Moving Average Simple chasing the trend.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate.

Default: 10

ShowAlert
Alerts are shown, if true.

Default: False

CALCULATION

The calculation of indicator is a simple moving average with the period n.

$$SMA_t = \frac{\sum_{n=1}^{n}(Close)}{n}$$

USAGE

For the usage of any moving average as an indicator are three factors important to classify the significance: trend, noise, and delay. Trend means what kind of signals should be generated. Noise means how much noise in the market will be smoothed away. Delay means how long the indicator needs to react if the market is changed. Concerning the Moving Average Simple it is possible to reduce the noise in the market with the use of a longer period.

↑   MOVING AVERAGE SIMPLE WITH DIFFERENT PERIODS
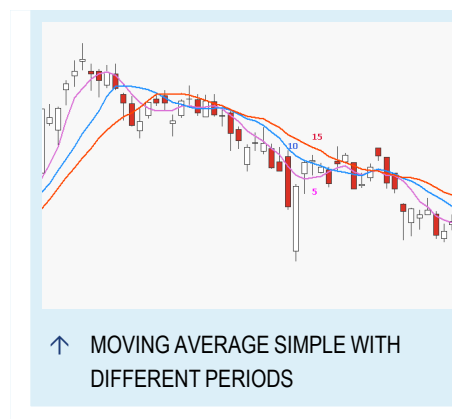
The Moving Average Simple weights every candle in the same way so that a spike has the same weight as a normal candle. The effect of the spikes is significant at two points of time: when the candle is the first or the last candle in the period n.

MOVING AVERAGE SINGLE CROSSOVER STRATEGY

DESCRIPTION

This strategy is a complete strategy which uses a crossover between a "Moving Average Simple" on the previous page and the close as trading signals. When you want to use this strategy in a "Portfolio" on

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close
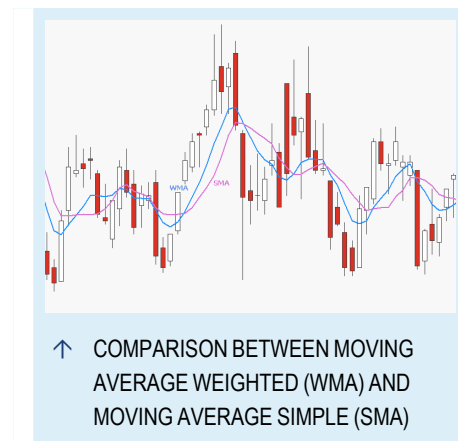
Period

The number of bars used to calculate for the simple moving average.

Default: 38

Bullish

Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

The strategy generates trading signals when a crossover between the simple moving average and the close occurs. For the calculation of the indicator itself, see "Moving Average Simple" on page 705

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

USAGE

Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal can help to find the right period settings.

MOVING AVERAGE SINGLE CROSS PORTFOLIO STRATEGY

DESCRIPTION

This strategy is a complete strategy which uses a crossover between a "Moving Average Simple" on page 705 and the close as trading signals. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Period
The number of bars used to calculate for the simple moving average

Default: 38

LongEntry
Defines what kind of orders are placed.

Default: True

LongExit
Defines what kind of orders are placed.

Default: True

ShortEntry
Defines what kind of orders are placed.

Default: False

ShortExit
Defines what kind of orders are placed.

Default: False

CALCULATION

The strategy generates trading signals when a crossover between the simple moving average and the close occurs. For the calculation of the indicator itself, see "Moving Average Simple" on page 705

↑ STRATEGY BEFORE AND AFTER OPTIMIZER RUN

USAGE

Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. Noise on the market like spikes or gaps can be handled with the right periods for the Moving Average Simple. The optimizer in Tradesignal can help to find the right period settings.

MOVING AVERAGE TRIPLE

Shortcode: SMA3

DESCRIPTION

The Moving Average Triple indicator used the arithmetic mean to calculate the signal lines and is a variation of "Moving Average Simple" on page 705. The indicator draws three signal lines with different periods.
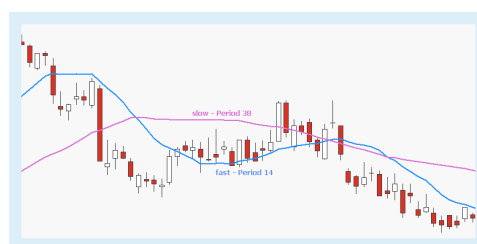
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

PeriodVeryFast
The number of bars used to calculate

Default: 4

PeriodFast
The number of bars used to calculate

Default: 10

PeriodSlow
The number of bars used to calculate

Default: 18

CALCULATION

The calculation of a simple moving average with the period n is as follows:

$$SMA_t = \frac{\sum_{n=1}^{n}(Close)}{n}$$

For this indicator are three moving averages calculated. The very fast and fast version are calculated with short periods and bring fast results. On the other hand is the slow version calculated with longer period and needs some time to show results.

USAGE

The fast versions react quick to trend reversal in the market. The slow version indicates a longer trend in the market.

If the very fast signal line crosses over the fast signal line and the fast signal line is over the slow signal line, is a buying pressure indicated. Selling pressure is indicated if the very fast signal line crosses back under the fast signal line.

If the market is currently in a consolidation and is only moving sideways, is the indicator not helpful, because it will create a lot of signals without a solid trend or trend reversal.

MOVING AVERAGE WEIGHTED

Shortcode: WMA

DESCRIPTION

The Moving Average Weighted indicator is a variation of the "Moving Average Weighted" above and add a linear weighting factor to the calculation. Older values are weighted lesser then current values.
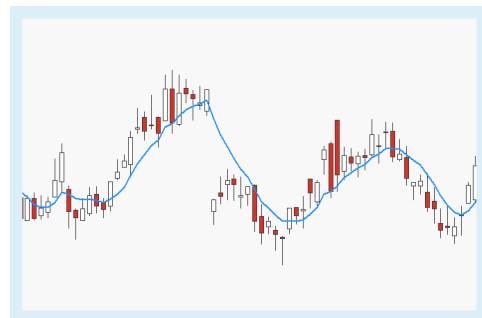
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 10

CALCULATION

The calculation of indicator is a simple moving average with the weighting factor w. The weighting factor is linear and use the period n for the linear weighting.

$$WMA_t = \frac{\sum_{n=1}^{n}(w*close)}{\sum_{n=1}^{n}(w)}$$

$$w_t = n, w_{t-1} = n - 1, \ldots, w_n = 1$$

USAGE

For the usage of any moving average as an indicator are three factors important to classify the significance: trend, noise, and delay. The Moving Average Weighted improves the factor delay compared the "Moving Average Simple" on page 705 because the weighting factor places a greater emphasis on the newer values.

↑ COMPARISON BETWEEN MOVING AVERAGE WEIGHTED (WMA) AND MOVING AVERAGE SIMPLE (SMA)

MOVING AVERAGE GAP

Shortcode: MAG

DESCRIPTION

This indicator calculates the difference between two moving averages with different period settings. The resulting the indicator line oscillates around a zero line. The indicator is similar to the "MACD" on page 675 with the exception that two simple moving averages are used in the calculation instead of two exponential moving averages.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period_Short
The number of bars used to calculate the fast moving average.

Default: 3

Period_Long
The number of bars used to calculate the slow moving average.

Default: 10

CALCULATION

Two Simple Moving Averages (SMAs) with different period settings, 3 (fast) and 10 (slow), are calculated. The slow SMA is then subtracted from the fast SMA.

USAGE

This indicator can be used for identifying the strength or weakness, or direction, of momentum behind a security's move. The indicator line oscillates around the zero line:

→ Crossovers indicate trend reversals.

→ Increasing indicator values, especially when above the zero line, indicate a positive (bullish) momentum.

→ Decreasing indicator values, especially when below the zero line, indicate a negative (bearish) momentum.

↑ MAG (CENTER) OSCILLATOR (BOTTOM) COMPARED.

ON BALANCE VOLUME

Shortcode: OBV

DESCRIPTION

This indicator calculates the trading volume of a security and relates it to the respective closing price. It calculates a cumulative sum for each day and displays it as a line on the chart. By analyzing divergences and convergences between security and indicator the strength of a trend can be evaluated and trend changes anticipated.

CALCULATION

If the current close is higher than the previous period's close the volume is added to the previous period's indicator value, if it is lower it is subtracted from the indicator value. The result is a cumulative sum which is displayed as a line on the chart.

USAGE

The indicator is used to analyze divergences and convergences between security and indicator. The numerical value of the indicator is irrelevant, only the direction of the line created bears significance. A strong trend is indicated by an indicator line which confirms the direction of the underlying security, i.e. by an indicator line that moves in the same direction as the price of the security (convergence). Divergences indicate a weakening of the trend or a possible trend reversal.

Trend lines applied to the indicator often generate trading signals even earlier than the security. Those signals can be used to confirm signals from the security itself. Trading signals can also be created by applying a Simple Moving Average (SMA) to the indicator. For example, a buy signal is created when the indicator crosses the SMA bottom-up.

↑ THE SECOND DIVERGENCE STRETCHES OVER A LONGER TIME PERIOD AND THUS BEARS MORE SIGNIFICANCE.

↑ THE INDICATOR TREND LINE IS CROSSED BEFORE THE TREND LINE IN THE CHART.

OPEN PRICE GAP STRATEGY

DESCRIPTION

The complete strategy trades along open price gaps and goes long or short depending on the direction of the open price gap. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Open Price Gap Portfolio Strategy" on the next page.

PARAMETERS

StopLoss
Defines the threshold for stop loss trades.

Default: 0.5

MinGap

Defines the minimal threshold for the gaps.

Default: 0.5

CALCULATION

The strategy is based on the indicator Opening Gaps. For the calculation of the indicator itself, see Opening Gap.

↑ PORTFOLIO VERSION OF THIS STRATEGY

When an upwards gap is formed, the strategy goes short. In the other direction, the strategy goes long with matching stops and limits as protection, when a downwards gap is formed.

The position is not held longer then a bar due to a timed exit.

USAGE

With this strategy, there is limited potential for a high profit with each symbol. A recurrent optimization of the inputs is useful. When the profit is good, the profit is evenly gained with long and short trades.

The strategy works especially well with a "Portfolio" on page 251 but the variety of open positions always includes more risk. A careful selection of the symbols can increase the profit.

OPEN PRICE GAP PORTFOLIO STRATEGY

DESCRIPTION

The complete strategy trades along open price gaps and goes long or short depending on the direction of the open price gap. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

StopLoss
Defines the threshold for stop loss trades.

Default: 0.5

MinGap

Defines the minimal threshold for the gaps.

Default: 0.5

CALCULATION

The strategy is based on the indicator Opening Gaps. For the calculation of the indicator itself, see Opening Gap.

When an upwards gap is formed, the strategy goes short. In the other direction, the strategy goes long with matching stops and limits as protection, when a downwards gap is formed.

↑ PORTFOLIO VERSION OF THIS STRATEGY

The position is not held longer then a bar due to a timed exit.

USAGE

With this strategy, there is limited potential for a high profit with each symbol. A recurrent optimization of the inputs is useful. When the profit is good, the profit is evenly gained with long and short trades.

The strategy works especially well with a "Portfolio" on page 251 but the variety of open positions always includes more risk. A careful selection of the symbols can increase the profit.

OSCILLATOR

Shortcode: OSC

DESCRIPTION

This indicator calculates the difference between two moving averages with different period settings. The resulting the indicator line oscillates around a zero line. The indicator is similar to the "MACD" on page 675 with the exception that two simple moving averages are used in the calculation instead of two exponential moving averages. It is identical to the "Moving Average Gap" on page 711.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period_Short

The number of bars used to calculate the fast moving average.

Default: 3

Period_Long

The number of bars used to calculate the slow moving average.

Default: 10

CALCULATION

Two Simple Moving Averages (SMAs) with different period settings, 3 (fast) and 10 (slow), are calculated. The slow SMA is then subtracted from the fast SMA.

USAGE

This indicator can be used for identifying the strength or weakness, or direction, of momentum behind a security's move. The indicator line oscillates around the zero line:

→ Crossovers indicate trend reversals.

→ Increasing indicator values, especially when above the zero line, indicate a positive (bullish) momentum.

→ Decreasing indicator values, especially when below the zero line, indicate a negative (bearish) momentum.

↑ OSCILLATOR (CENTER) AND MACD (BOTTOM) COMPARED.
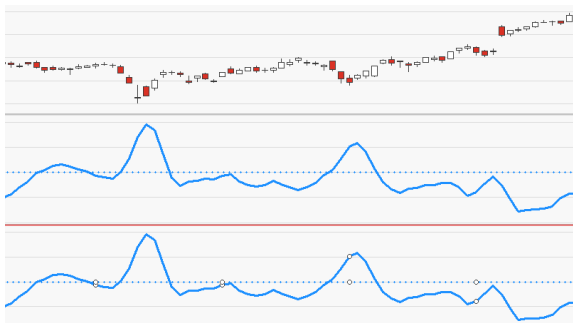
↑ OSCILLATOR (CENTER) AND MAG (BOTTOM) COMPARED.

ORDER BOOK DEPTH

This indicator represents the order book on the Bid and Ask side, so it shows bid/ask volume up to a certain depth. Your Joule account needs access to BID/ASKDEPTH FIDs.

PARAMETERS

Depth
Defines the used depth.

Default: 10

VScale
A scale for vertical height of the box. Increase the value to close the gap between the values.

Default: 1

Labels
Whether the labels with the volume should be drawn.

Default: False

FontSize
Font Size of the labels.

Default: 5

CALCULATION

The indicator draws the given order on the bid and ask side for the given candle.

USAGE

The indicator should be used on intraday data in low periods like 1-minute because it needs tick data for the calculation. The Order Book Depth can be useful for a backtesting.

PARABOLIC SAR

Shortcode: PSAR

DESCRIPTION

The Parabolic SAR (Stop And Reversal) is an indicator developed by J. Wells Wilder which is following the current trend and sets stops accordingly to the previous trend (see red trendlines in the image). These stops are following a parabolic pattern defined by the Acceleration Factor (AF). As soon as a stop is reached a reversal of the current trend will follow. The AF is variable until the maximum or a trend reversal is reached (see pink trendlines in the image).
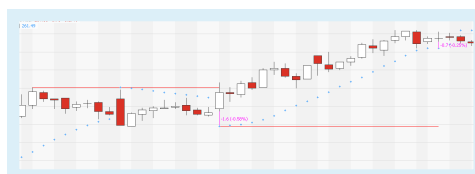
PARAMETERS

AccStart
Defines the start value of the AF (Acceleration Factor)

Default: 0.02

AccInc
Defines the increment which is added to AF with each new bar

Default: 0.02

AccMax
Defines the maximum of AF

Default: 1

ShowAlerts
Alerts are shown, if true

Default: false

CALCULATION

The calculation is based on the extreme values of the previous trend SAR and SIP and the acceleration factor AF.

$$SAR(t) = SAR(t-1) + AF * [SIP(t-1) - SAR(t-1)]$$

The values for the inputs depend if a short follows a long or otherwise. For the first evaluation the indicator assumes a long trade.

If a short follows a long trade, is SIP the highest value of the first candle of the new trend cycle and will be adjusted with every new highest high. SAR is the lowest value from the previous trend cycle and will be adjusted with AF. AF will be increased with AccInc with every new candle. Additional, if the evolution of the short trade is positive, the AF will be adjusted quicker in the direction of the SAR. Therefore the stop will be reached quicker.

If a long follows a short trade, is SIP the lowest value of the first candle in the new trend cycle and will be adjusted with every new lowest low. SAR ist the highest value from the previous trend cycle and will be adjusted with AF. AF will be increased with AccInc with every new candle. Additional, if the evolution of the short trade is positive, the AF will be adjusted quicker in the direction of the SAR. Therefore the stop will be reached quicker.

USAGE

The indicator is helpful to detect stops and reversals for current trends. Problematic are lateral movements, because they will create too many signals. If AF is small, the Parabolic SAR will follow the trend precisely.

PARABOLIC REVERSAL STRATEGY

DESCRIPTION

The Parabolic Reversal Strategy is based on the Parabolic SAR indicator. The Parabolic SAR is following the current trend and sets stops accordingly to the previous trend. If the trend reversal is reached and the stop is crossed, the strategy will generate a trade. For more information concerning the indicator itself, please see "Parabolic SAR" on the previous page. When you want to use
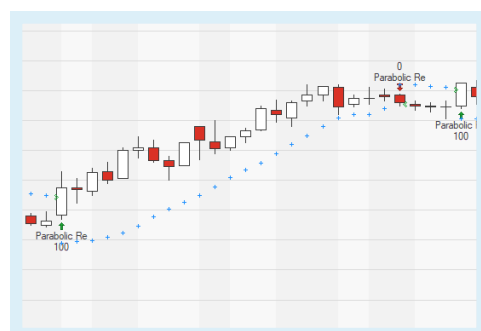
this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Parabolic Reversal Portfolio Strategy" on the next page.

PARAMETERS

Start
Defines the start value of the Acceleration Factor (AF)

Default: 0.02

Increment
Defines the increment which is added to AF with each new bar

Default: 0.02

Max
Defines the maximum of AF

Default: 1

Bullish
Defines what kind of orders are placed.

Default: LongEntry

Bearish
Defines what kind of orders are placed.

Default: LongExit

CALCULATION

For the calculation of the indicator itself, see "Parabolic SAR" on page 719.

USAGE

The strategy is very helpful to detect stops and reversals for current trends.

Problematic are lateral movements, because they will create too many signals. An additional filter like a Moving Average Exponential (EMA) could be helpful. If the graph of the EMA is relatively flat, a sidewards movement is currently active in the market (see image).

PARABOLIC REVERSAL PORTFOLIO STRATEGY

DESCRIPTION

The Parabolic Reversal Portfolio Strategy is based on the Parabolic SAR indicator. The Parabolic SAR is following the current trend and sets stops accordingly to the previous trend. If the trend reversal is reached and the stop is crossed, the strategy will generate a trade. This strategy is optimized for a "Portfolio" on page 251.
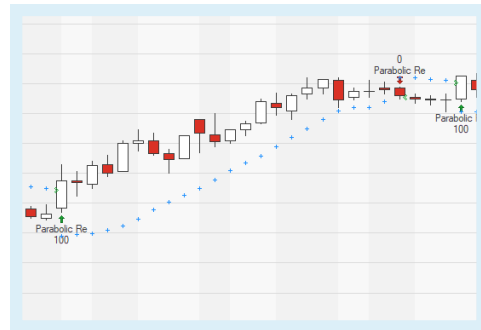
PARAMETERS

Start
Defines the start value of the Acceleration Factor (AF)

Default: 0.02

Increment
Defines the increment which is added to AF with each new bar

Default: 0.02

Max
Defines the maximum of AF

Default: 1

LongEntry
Defines what kind of orders are placed.

Default: True

LongExit
Defines what kind of orders are placed.

Default: True

ShortEntry
Defines what kind of orders are placed.

Default: True

ShortExit
Defines what kind of orders are placed.

Default: True

CALCULATION

For the calculation of the indicator itself, see "Parabolic SAR" on page 719.

USAGE

The strategy is very helpful to detect stops and reversals for current trends.

Problematic are lateral movements, because they will create too many signals. An additional filter like a Moving Average Exponential (EMA) could be helpful. If the graph of the EMA is relatively flat, a sidewards movement is currently active in the market (see image).

PARABOLIC SAR - ENTRY STRATEGY

DESCRIPTION

The Parabolic SAR - Entry Strategy is based on the Parabolic SAR indicator. The Parabolic SAR is following the current trend and sets stops accordingly to the previous trend which are variable with a acceleration factor (AF). If the trend reversal is reached and the stop is crossed, the strategy will generate a trade. For Exit signals with the same trigger, please use the "Parabolic SAR - Exit Strategy" on the next page.

PARAMETERS

AccStart
Defines the start value of the Acceleration Factor (AF)

Default: 0.02

AccInc
Defines the increment which is added to AF with each new bar

Default: 0.02

AccMax
Defines the maximum of AF

Default: 1

EntryMethod

Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Parabolic SAR" on page 719.

USAGE

The strategy is very helpful to detect stops and reversals for current trends.

↑ PARABOLIC SAR ENTRY WITH EMA

Problematic are lateral movements, because they will create too many signals. An additional filter like a Moving Average Exponential (EMA) could be helpful. If the graph of the EMA is relatively flat, a sidewards movement is currently active in the market (see image).

PARABOLIC SAR - EXIT STRATEGY

DESCRIPTION

The Parabolic SAR - Exit Strategy is based on the Parabolic SAR indicator. The Parabolic SAR is following the current trend and sets stops accordingly to the previous trend which are variable with a acceleration factor (AF). If the trend reversal is reached and the stop is crossed, the strategy will generate a trade. For Entry signals with the same trigger, please use the "Parabolic SAR - Entry Strategy" on the previous page.
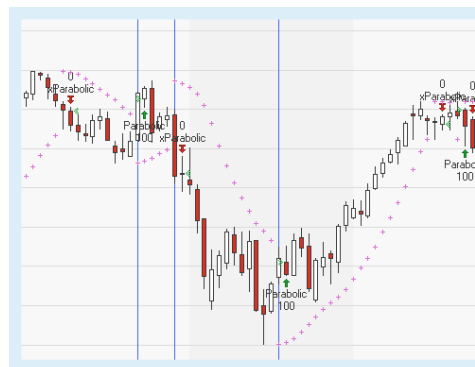
PARAMETERS

AccStart

Defines the start value of the Acceleration Factor (AF)

Default: 0.02

AccInc

Defines the increment which is added to AF with each new bar

Default: 0.02

AccMax
Defines the maximum of AF

Default: 1

ExitMethod
Defines what kind of orders are placed.

Default: Both

Visuals
If active, the symbols for the stop markers are drawn

Default: Inactive

CALCULATION

For the calculation of the indicator itself, see "Parabolic SAR" on page 719.

USAGE

The strategy is very helpful to detect stops and reversals for current trends.

Problematic are lateral movements, because they will create too many signals. An additional filter like a Moving Average Exponential (EMA) could be helpful. If the graph of the EMA is relatively flat, a sidewards movement is currently active in the market (see image).
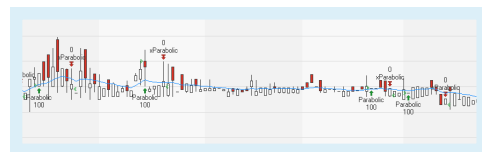
PERCENT PERFORMANCE PERIODIC

Shortcode: PPFP

DESCRIPTION

Plots the percent change over the current calendar period.

PARAMETERS
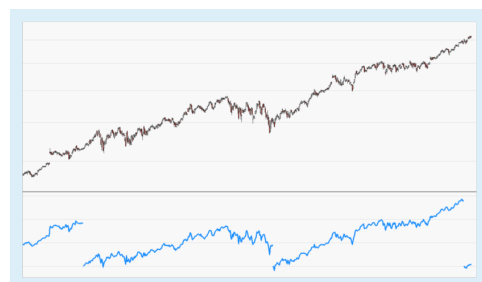
Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period

The period over which the percent performance is calculated. One of Yearly, Quarterly, Monthly, Weekly or Daily.

Default: Yearly

CALCULATION

perf = Price / startPriceOfPeriod * 100 - 100

PERCENTILE

Shortcode: PCNT

DESCRIPTION

This indicator plots the value at the boundary of the specified percentile.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Percent

Enter the percent below which [percent] of the value should be found.

Default: 80

Period

The number of bars used to calculate the percentile.

Default: 100

Method

Enter the calculation method, either Interpolate or NearestRank.

Default: Interpolate

CALCULATION

Nearest Rank:

Rank = (Percentile / 100) * N

with N = ordered number of items from least to greatest

A percentile calculated using the nearest-rank method will always be a member of the original ordered list.

Interpolation uses the linear interpolation method. A percentile calculated by interpolation does not have to be a member of the original list.

USAGE

One way to use the percentile value is as an alert for extreme events. For example, if the current price is in the 99th percentile of range of bars over the last months, chances are high that the market will reverse.

Another way is using it similar to a ranking function to find e.g. stocks performing above the 75th percentile.

PERIODIC CHANGE

Shortcode: PRDC

DESCRIPTION

This indicator shows either the percent or the absolute price change of a parent item over a defined calendar period (day, week, month, quarter or year).

PARAMETERS

Price
The price that should be used: Open, High, Low, Close, Volume.

Default: Close

Period
The time period to use for the calculation: Yearly, Quarterly, Monthly, Weekly, Daily.

Default: Monthly

Value
Controls whether the absolute price or the percentage should be used.

Default: Percent

PartialInitialPeriod

Should the first partial period be considered or not for the calculation?

Default: False

CALCULATION

The absolute value is directly calculated as

diff = Price - startPrice

The percent value as

diff = (Price / startPrice * 100) - 100

USAGE

This is a basic indicator that shows price movements over a calender period, allowing for the analysis of seasonal changes.

P&F HORIZONTAL TARGETS

Shortcode: PFHT

DESCRIPTION

This indicator draws price targets based on congestion patterns and associated breakouts in Point & Figure charts. The width of the resulting U-shape determines either a low or high price target.
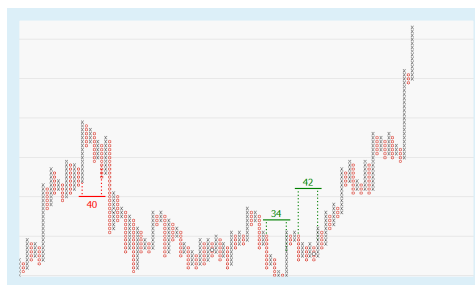
PARAMETERS

MinWidth

The minimum width of a U-shape required for target generation.

Default: 6

MaxWidth

The maximum width of a U-shape allowed for target generation.

Default: 30

MinWallLength

The minimum number of boxes forming the wall of a U-shape.

Default: 10

MaxWallTopDiff

The maximum difference in the number of boxes between the entry and exit column forming a U-shape.

Default: 3

ShorterInnerCols

Controls if columns in patterns may exceed length of the pattern's walls.

Default: True

ShowInvalidated

Controls whether invalidated price targets are shown or removed.

Default: False

ExtendTargets

Controls whether price targets are extended until invalidated or met.

Default: False

ShowPriceMarkers

Show active price targets next to the scale

Default: False

ShowPercentage

Show distance to active targets as percentage of current close

Default: False

Alerts

Generate alerts when price targets are hit

Default: Off

CALCULATION

The calculation of horizontal price targets is based on the width of congestion patterns. The number of columns yielding the congestion pattern determines the width which is then used as the starting point for the calculation:

HORIZONTAL PRICE TARGET WITH CONGESTION BASE AND UPSIDE REVERSAL BREAKOUT

Basis + Width * Box Size * Reversal

HORIZONTAL PRICE TARGET WITH CONGESTION TOP AND DOWNSIDE REVERSAL BREAKOUT

Basis - Width * Box Size * Reversal

USAGE

Price targets may be used to confirm signals generated by other indicators or strategies, or to predict the stability of a trend. They are estimates based on P&F charting techniques with no guarantee of prices reaching the target.

P&F TREND LINES

Shortcode: PFTND

DESCRIPTION

The P&F Trend Lines indicator plots 45 degree trend lines onto a P&F chart based on high and low swings of a specified strength.

This indicator can only be used on a "Point and Figure Chart" on page 144.
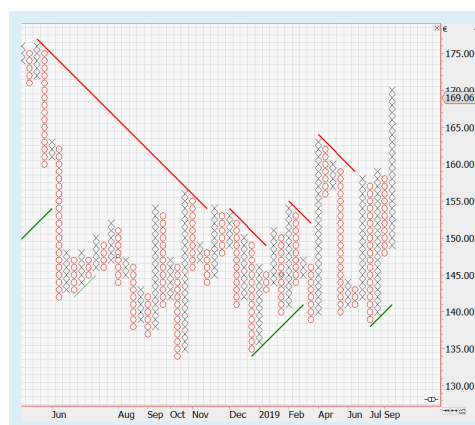
PARAMETERS

MinTrendLength
Minimal number of columns for a trend. If ConfirmTrends is active, the minimum length is effectively 4.

Default: 2

ConfirmTrends
Select whether lows and highs must support the trend (True). That means lows must be rising to confirm support, highs must be falling to confirm resistance.

Default: True

MaxConfirmLookback
Maximum number of bars to look back to confirm trends. Only used for 1-box reversal charts.

Default: 5

ShowNonPrevailingTrends
Select whether non-prevailing trends that do not meet the criteria above should also be displayed, with a thinner line strength.

Default: True

MinNonPrevailingLength
Define the minimum length until a trend is even considered non-prevailing.

Default: 4

CALCULATION

The indicator draws trendlines which are defined by the inputs and the given O- and X-columns.

USAGE

The P&F trend line is used as a predictive indicator. If the following boxes' price falls below the P&F trend line, it may be used as a new resistance level. Conversely, if the market price rises above the trend line, it may act as the new support level.

P&F TRENDS

Shortcode: PFTR

DESCRIPTION

This indicator draws 45 degree trend lines on Point & Figure charts.Trendlines on 3-box Reversal P&F charts are drawn at 45 degrees up and 135 degrees down. An ascending trendline is called a Bullish Support Line and a descending trendline is called a Bearish Resistance Line.
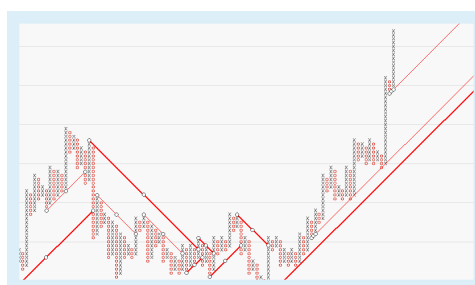
PARAMETERS

MinInnerDistance
The minimal vertical distance required between inner or outer trendlines.

Default: 3

MinInnerLength

The minimal inner horizontal length required for an inner trendline.

Default: 7

ConfirmBreachWithSignal

Controls whether an additional simple buy or sell signal is required when a trendline is breached.

Default: True

MinLengthForConfirm

The minimum length of trendlines required for confirmation.

Default: 3

USAGE

Because these lines are drawn at specific angles, they represent a specific rate of ascent or descent. Chartists can use P&F trendlines to define the overall trend and look for signals in the direction of that trend.

P&F VERTICAL TARGETS

Shortcode: PFVT

DESCRIPTION

This indicator draws price targets based on multi-top patterns in Point & Figure charts.
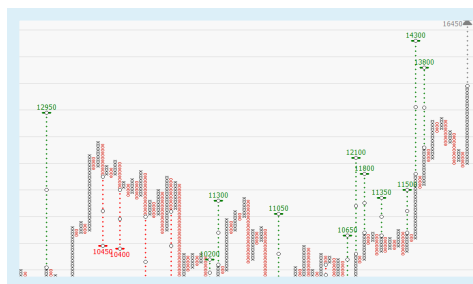
PARAMETERS

MultiTopMinCount

The minimum number of columns with the same price to be considered a multi-top/bottom.

Default: 2

MultiTopMaxDiffCols

The maximum number of columns with lower/higher price before a top/bottom pattern candidate is terminated.

Default: 0

MultiTopMaxBoxDiff

The maximum of number of boxes prices are allowed to differ per column before a top/bottom pattern candidate is terminated.

Default: 0

MinSignifBreakout
The minimum breakout length in boxes for a significant column, only used for vertical counts, significant columns allow an additional count to be taken as soon as they are drawn.

Default: 6

MaxShortColLen
The maximum column length in boxes for a short column, only used for vertical counts, short columns allow an additional count to be taken once they have been reversed.

Default: 3

BullishMultiplier
The multiplier for the (bullish) reversal value (to be set for the underlying symbol) used to define the distance between market price and target price.

Default: 1

BearishMultiplier
The multiplier for the (bearish) reversal value (to be set for the underlying symbol) used to define the distance between market price and target price.

Default: 1

Width
The width of the trendlines used by price targets.

Default: 1

FontSize
The label font size.

Default: 8

ShowInvalidated
Controls whether to show invalidated price targets or to remove them.

Default: False

ExtendTargets

Displays horizontal lines for price targets, extending them over subsequent columns.

Default: False

ShowPriceMarkers
Toggles visibility of active price targets next to the scale.

Default: False

ShowPercentage
Toggles visibility of distance to active targets as percentage of current close.

Default: False

Alerts
Controls whether alerts are generated when price targets are hit.

Default: Off

CALCULATION

The calculation of vertical price targets begins with the Count Column which forms the basis for an upside or downside target. One this column has been identified, the vertical target is calculated as follows:

VERTICAL TARGET FOR UPSIDE TARGETS

Basis + Number of Boxes * Box Size * Reversal

VERTICAL TARGET FOR DOWNSIDE TARGETS

Basis - Number of Boxes * Box Size * Reversal

For both cases, the basis is defined as the low of an X column or the high of an O column.

USAGE

Price targets may be used to confirm signals generated by other indicators or strategies, or to predict the stability of a trend. They are estimates based on P&F charting techniques with no guarantee of prices reaching the target.

P&F VOLUME PROFILE

Shortcode: PFPVP

DESCRIPTION

This indicator displays a histogram of market volume levels distributed according to the respective price levels.
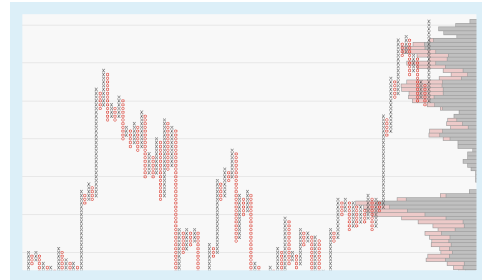
PARAMETERS

Period
The number of columns taken into account for the calculation of the volume bars.

Default: 38

HighLow
Controls whether high-low values are used instead of close values.

Default: True

Extent
The horizontal size of the volume bars.

Default: 25

CALCULATION

The indicator analyzes the columns for the set period and assigns the trading volume to up and down days respectively. It displays a histogram of market volume levels distributed according to the respective price levels.

USAGE

This indicator is used to analyze Point & Figure charts on the basis of the respective trading volume. The analysis facilitated by this indicator allows for predictions regarding the sustainability of chart marks.
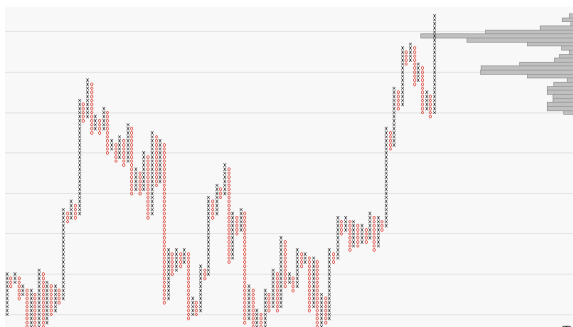
↑ IF PERIOD IS SET TO 1 THE VOLUME
BARS WILL REFLECT ONLY THE LAST
COLUMN.

P&F VOLUME PROFILE VIEWPORT

Shortcode: PFPVPV

DESCRIPTION

This indicator calculates the profile based on
the columns currently visible in the chart's
viewport. If a chart is scrolled, zoomed, or
new data causes the visible data range to
change, the profile will be recalculated.

This indicator can only be used on a "Point
and Figure Chart" on page 144.

PARAMETERS

HighLow
Controls whether high-low values are used instead of close values.

Default: True

Extent
Controls the horizontal stretch of the indicator bars.

CALCULATION

The indicator analyzes the columns for the set period and the currently visible
data and assigns the trading volume to up and down days respectively. It displays
a histogram of market volume levels distributed according to the respective price
levels.
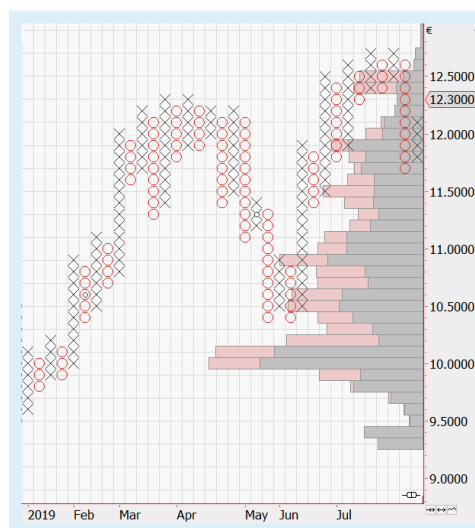
USAGE

Compared to the indicator "P&F Volume Profile" on page 735 this indicator can be used in P&F charts that are currently being updated. E.g. for every new price movement, the viewport gets adjusted and therefore the calculation runs. However, this can be a challenge for the performance.

PIVOT POINTS ANALYSIS

Shortcode: PIV

DESCRIPTION

This indicator calculates the numerical average of a stock's high, low and closing prices.

PARAMETERS

ShowAllLevels

Select whether 3 support and resistance levels should be considered (True) or only 2 (False). With 3, the number of displayed points is higher.

Default: True

CALCULATION

The calculation starts with the prices of the previous period:

Pivot Point for Current = High (previous) + Low (previous) + Close (previous) / 3

Further support and resistance levels can be calculated, most commonly 3. All high and low values used here are from the previous period:

Resistance 3 = 2 * (Pivot Point – Low) + High

Resistance 2 = Pivot Point + (High - Low)

Resistance 1 = (2 x Pivot Point) – Low

Support 1 = (2 x Pivot Point) – High

Support 2 = Pivot Point – (High - Low)

Support 3 = Low – (2* High - Pivot Point)
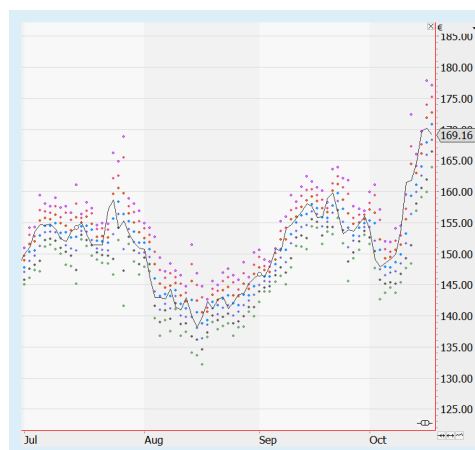
USAGE

The pivot point is used as a predictive indicator. If the following day's market price falls below the pivot point, it may be used as a new resistance level. Conversely, if the market price rises above the pivot point, it may act as the new support level.

PORTFOLIO ALLOCATION

Shortcode: PALLOC

DESCRIPTION

This indicator can be added to a portfolio or chart to show how the portfolio is invested in a specific group or instruments. It creates a stacked bar chart.

The indicator allows grouping by industry sector (for stocks), by instrument type (stock, bond, etc.) or by using the group labels defined in a portfolio (groups can be created by right-clicking in the list of securities and selecting "Set Group" for each grouping).

For the indicator to show industry sectors, the necessary information for the instruments must be available from the data provider.

PARAMETERS

Metric
Select the metric, either Group, Sector or Type.

Default: Sector

Scaling
Select the scaling, either available or invested capital.

Default: AvailableCapital

ShowLabels
Select whether the labels should be displayed (True) or not (False).

Default: True

FontSize
Select a font size.

Default: 8

CALCULATION

The indicator doesn't calculate anything but shows additional grouping information.

USAGE

Use the Portfolio Allocation indicator to check whether the portfolio is sufficiently diversified.

PORTFOLIO LEAVE EXIT STRATEGY

This strategy will exit a position in a security when the security is removed (deactivated) in the current Portfolio.

By default, it gets added automatically when adding the first strategy to a Portfolio (unless changed in the advanced options, see "Indicators & Strategies" on page 327).

PARAMETERS

Mode
Select which mode should be used for exiting the position: ThisBarMarket (the trade is executed immediately), ThisBarClose (the trade is executed when the current bar closes), NextBarMarket (the trade is executed at the next bar's opening price).

Default: ThisBarMarket

USAGE

In principle, it is possible to remove (deactivate) a security in a Portfolio despite still having open positions. This strategy is used to avoid this pitfall and to automate closing all open positions when deactivating the security in the Portfolio.

PRICE TO BOOK MOMENTUM PORTFOLIO STRATEGY

This strategy invests equally in the securities with the lowest price to book ratio, adjusted for strong relative momentum.

It can only be applied to portfolios in which all stocks have the same currency and provide a price-to-book ratio.

PARAMETERS

MomPeriod
Period used for calculating the momentum (in bars).

Default: 100

RebalancePeriod
Define how often the investments should be rebalanced (each day, week, month, quarterly or yearly).

Default: Yearly

PtbWeight
The weight to apply to the price-to-book score versus the momentum score. If the weight is set to 100, the momentum is not being considered in the calculation.

Default: 80

InvestmentThreshold
Set the percentage of the portfolio to invest in.

Default: 20

CALCULATION

The price-to-book ratio is calculated by dividing a company's stock price by its book value per share (net assets).

In this indicator, the price-to-book value and the momentum value are combined.

For all symbols (i) in the Portfolio, calculate:

ptb[i] = Close of priceToBookFields(i - 1); // close price to book value (book value must be available for the symbol)

mom[i] = (Close / Close[MomPeriod]) of symbols(i - 1); // close price vs. close price during the momentum period

Based on these values, the highest and lowest ranks are calculated adjusted by the weight.

ptbRank = (highestPtb - ptb[i]) / (highestPtb - lowestPtb);

momRank = (mom[i] - lowestMom) / (hightestMom - lowestMom);

rank[i] = scaledPtbWeight * ptbRank + scaledMomWeight * momRank;

USAGE

A low price-to-book ratio signals a potentially undervalued stock. Whether a price-to-book ratio is considered good also depends on the industry.

Investing based on the combination of a low price-to-book ratio combined with a high upwards momentum has been shown to yield good returns.

PRICE VOLUME PROFILE

Shortcode: PVP

DESCRIPTION

This indicator calculates the relationship between price levels and the market volume traded at these levels. It displays a histogram of market volume levels distributed according to the respective price levels.
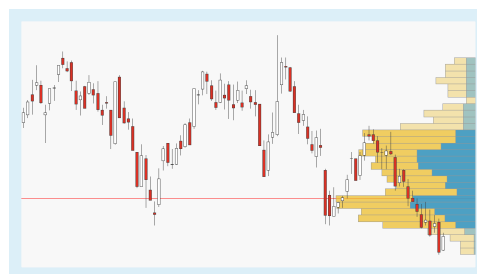
In addition shows the indicator the Point of Control and the corresponding Value Area.

PARAMETERS

Period
The number of bars used to calculate the indicator.

Default: 38

Columns
The number of indicator bars to be displayed.

Default: 23

HighLow
Controls whether the period high and period low is used for the calculation.

Default: Yes

Extent
Controls the horizontal stretch of the indicator bars.

Default: 25

PointOfControl

Controls the thickness of the line for Point of Control

Default: Small

POCExtent

Controls the horizontal stretch of the line for Point of Control

Default: 25

ValueArea

Controls the percentage of volume which is used for the Value Area

Default: 70

CALCULATION

The indicator analyzes the individual bars for the set period and assigns the trading volume to up and down days respectively. It displays a histogram of market volume levels distributed according to the respective price levels.

The indicator highlights the column with the highest volume with the Point of Control. The Value Area marks the columns where most of the volume is distributed. How much of the total volume is to be used for this can be controlled with the ValueArea input.

USAGE

The indicator is commonly used to analyze chart marks on the basis of the respective trading volume. The general opinion is that on the put side of resistance lines the volume should be higher than on the call side, and that on the call side of support lines the volume should be higher than on the put side. The analysis facilitated by this indicator allows for predictions regarding the sustainability of chart marks.
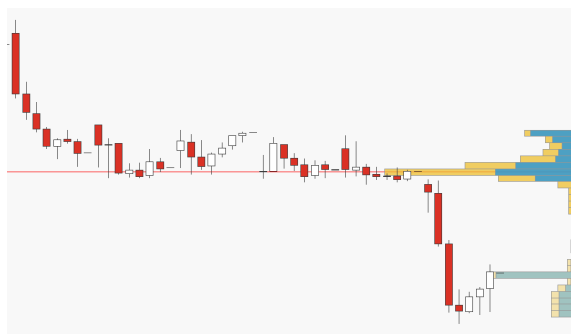
↑ THE INDICATOR IN AN HOURLY
   CHART.

PRICE VOLUME PROFILE INTRABAR

Shortcode: PVPI

DESCRIPTION

This indicator plots the intrabar volume profile for each bar in the chart when the chart is extremely zoomed in. The intrabar volume levels are generated using a lower period specified in the properties. The profiles will only be plotted if twenty or less bars are visible in the chart.
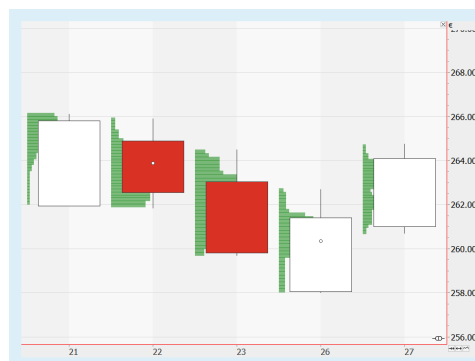
PARAMETERS

Period
The period length, from 1 tick to 60 minutes.

Default: Mins60

Columns
The number of indicator bars to be displayed.

Default: 23

HighLow
Controls whether the period high and period low are used for the calculation (True) or the close values (False).

Default: True

ShowLabels
Controls whether labels should be displayed.

Default: False

Color
Controls the label color and opacity.

CALCULATION

The indicator analyzes the individual bars for the set, very short period and assigns the trading volume to up and down intrabar moments respectively. It displays a histogram of market volume levels within each bar distributed according to the respective price levels.

USAGE

The indicator is commonly used to analyze chart marks on the basis of the respective trading volume. The general opinion is that on the put side of resistance lines the volume should be higher than on the call side, and that on the call side of support lines the volume should be higher than on the put side. The analysis facilitated by this indicator allows for predictions regarding the sustainability of chart marks.

PRICE VOLUME PROFILE PERIODIC

Shortcode: PVPP

DESCRIPTION

This indicator is based on the "Price Volume Profile" on page 741 and calculates the relationship between price levels and the market volume traded at these levels. It displays a histogram of market volume levels distributed according to the respective price levels. The calculation period is based on single days, weeks, months or years. The period can be different to the period in the chart itself.
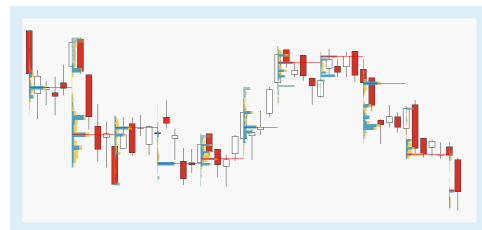
In addition shows the indicator the Point of Control and the corresponding Value Area.

PARAMETERS

RolloverPeriod
Controls the period for the indicator.

Default: Weekly

InnerPeriod
Controls the inner period for calculation of the indicator.

Default: Automatic

Columns
The number of indicator bars to be displayed.

Default: 30

HighLow
Controls whether the period high and period low is used for the calculation.

Default: Yes

Width
Controls the horizontal stretch of the indicator bars.

Default: 40

PointOfControl
Controls the thickness of the line for Point of Control

Default: Small

ShowValueArea
Controls if the Value Area is shown

Default: True

ValueArea
Controls the percentage of volume which is used for the Value Area

Default: 70

CALCULATION

The indicator analyzes the individual bars for the inner period within the rollover period and assigns the trading volume. It displays a histogram of market volume levels distributed according to the respective price levels. The inner period can be chosen automatic according to the period in the chart and the rollover period or can be set to specific period.

The indicator highlights the column with the highest volume with the Point of Control. The Value Area marks the columns where most of the volume is distributed. How much of the total volume is to be used for this can be controlled with the ValueArea input.

USAGE

The indicator is commonly used to analyze chart marks on the basis of the respective trading volume. The general opinion is that on the put side of resistance lines the volume should be higher than on the call side, and that on the call side of support lines the volume should be higher than on the put side. The analysis facilitated by this indicator allows for predictions regarding the sustainability of chart marks.
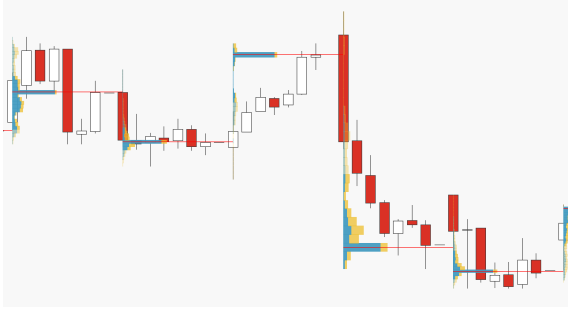
↑ THE INDICATOR IN AN HOURLY CHART
WITH ROLLOVERPERIOD DAILY AND
INNERPERIOD AUTOMATIC.

PRICE VOLUME PROFILE VIEWPORT

Shortcode: PVPV

DESCRIPTION

This indicator is based on the "Price Volume
Profile" on page 741 and calculates the
profile based on the data currently visible in
the chart's viewport. If a chart is scrolled,
zoomed, or new data causes the visible data
range to change, the profile will be
recalculated.
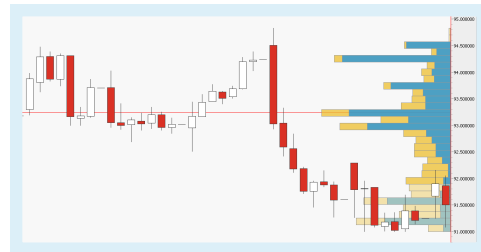
PARAMETERS

Columns
The number of indicator bars to be displayed.

Default: 30

HighLow
Controls whether the period high and period low is used for the calculation.

Default: True

Extent
Controls the horizontal stretch of the indicator bars.

Default: 25

PointOfControl
Controls the thickness of the line for Point of Control

Default: Small

ShowValueArea

Controls if the Value Area is shown

Default: True

POCExtent

Controls the horizontal stretch of the line for Point of Control

Default: 100

ValueArea

Controls the percentage of volume which is used for the Value Area

Default: 70

CALCULATION

The indicator analyzes the individual bars for the currently visible data in the viewport and assigns the trading volume to up and down days respectively. It displays a histogram of market volume levels distributed according to the respective price levels.

USAGE

Compared to the indicator "Price Volume Profile" on page 741 this indicator can be used in charts that are currently being updated. E.g. for every new tick, the viewport gets adjusted and therefore the calculation runs. However, this can be a challenge for the performance.

RATIOCATOR

Shortcode: RAT

DESCRIPTION

This indicator analyzes the performance of two securities relative to a base date. It is similar to the Relative Performance indicator with the exception that the Ratiocator's initial value at the base date will be assigned to 100 instead of 0.
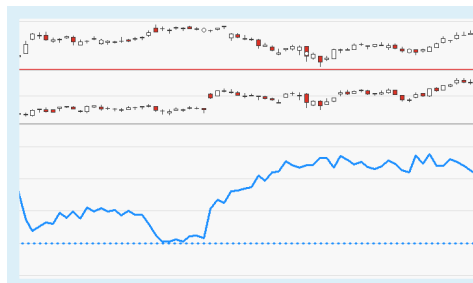
PARAMETERS

This indicator requires two parent instruments.

PriceA

The data field from the parent instrument (or indicator) on which to calculate this indicator.

PriceB

The data field from the parent instrument (or indicator) on which to calculate this indicator.

BaseDate

Base date used for the comparison of the two instruments.

CALCULATION

This indicator calculates the relative performance of two securities.

USAGE

This indicator can be used to analyze the relative performance of securities and to identify strong and weak performances of individual securities.

REF

Shortcode: REF

DESCRIPTION

This indicator allows access to the data from another workspace series from within the current chart (or other document).

This indicator can be used, for example, to access the Strategy Equity values from a portfolio and compare them to a benchmark of some type within another chart.

> **Note:** While several Ref indicators can be added to a chart, the Ref subcharts cannot be referenced themselves. It is also not possible to trade based on the combined data of a chart and its referencing subchart.

Add the Ref indicator to an existing symbol chart, then add a referenced symbol via the parameters.

PARAMETERS

Symbol

The only input for the Ref indicator is a symbol. It is possible to choose items within the same workspace, such as Strategy Equity Portfolio values (see Usage below).

CALCULATION

The indicator doesn't calculate anything, it displays data from another input, with the same x-axis as the chart the Ref indicator was applied to.

USAGE

The Ref indicator is a powerful tool to compare data from various inputs in one workspace. When choosing a symbol, the option **Workspace Symbol List: <workspacename>** displays all inputs available in the workspace.

In the example below, this is a portfolio with various stocks, a performance index and a Strategy Equity indicator which offers open and closed equity. Each of these entries can be chosen to be displayed in the Ref indicator.
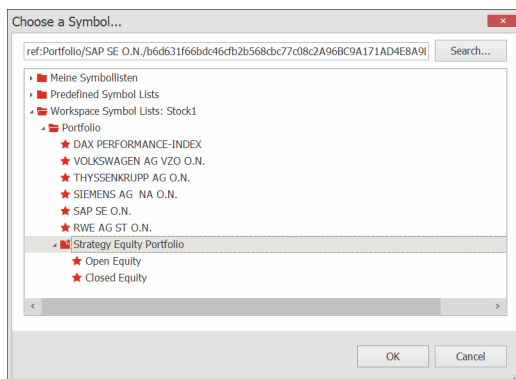
↑ SELECTING A WORKSPACE ELEMENT

In combination with a Bollinger Band Breakout strategy, the resulting Portfolio equity compared to the performance of the DAX performance index can be displayed.
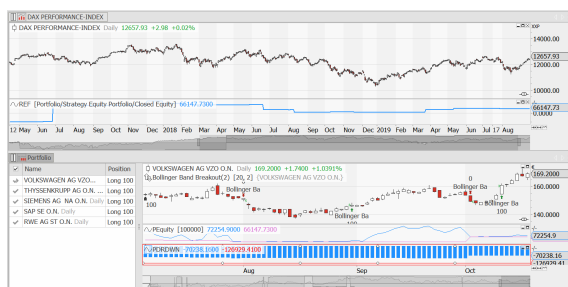
↑ EQUITY OF THE PORTFOLIO OVER
   TIME COMPARED TO THE DAX

RELATIVE MOMENTUM

Shortcode: RMOM

DESCRIPTION

This indicator plots a scatter graph of the relative performance of a security to its benchmark index against the momentum of that performance.
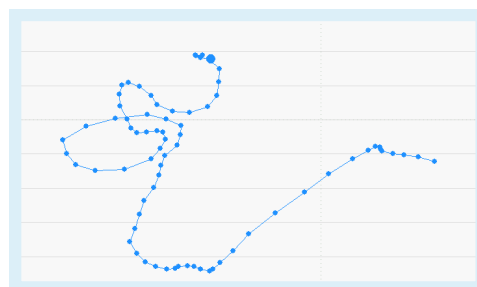
PARAMETERS

Symbol
The data field from the benchmark instrument.

MomPeriod
The number of bars used to calculate the momentum value.

SmoothPeriod
The number of bars used to calculate the simple moving average which is applied to the calculation of the relative performance as well as to the momentum value.

Method
Toggles between RateOfChange and Momentum calculation.

CALCULATION

This indicator calculates both the relative strength of a security versus a benchmark as well as the related momentum. The relative strength is plotted on the x-axis, the momentum on the y-axis. All results are normalized to only take values between -100 and +100. The resulting diagram is divided into four quadrants:

Quadrant 1: Leading - Outperformer with positive momentum

Quadrant 2: Weakening - Outperformer with negative momentum

Quadrant 3: Lagging - Underperformer with negative momentum

Quadrant 4: Improving - Underperformer with positive momentum

USAGE

The Relative Momentum indicator detects underperforming or outperforming securities and identifies changes from weak to strong market phases. It shows the performance of a security relative to a selected benchmark by calculating both the relative strength of securities versus a benchmark as well as the related momentum. Securities whose performance differs significantly from the benchmark can be easily identified.
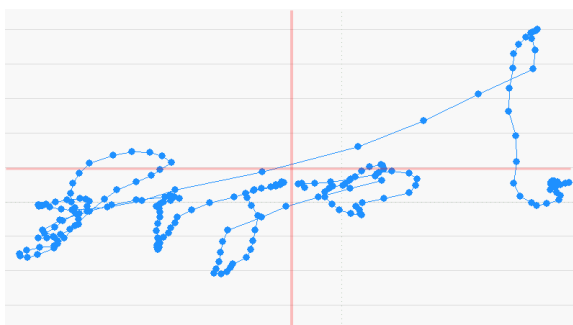

↑ THIS INDICATOR SHOWS THE PERFORMANCE OF A SECURITY RELATIVE TO A SELECTED BENCHMARK ON THE X-AXIS, WHILE THE MOMENTUM IS DISPLAYED ON THE Y-AXIS.

RELATIVE PERFORMANCE

Shortcode: REP

DESCRIPTION

This indicator compares the relative performance of two securities relative to a base date. It is similar to the Ratiocator indicator with the exception that the Relative Performance's initial value at the base date will be assigned to 0 instead of 100.
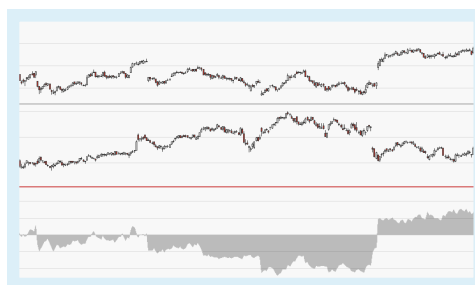
PARAMETERS

This indicator requires two parent instruments.

PriceA

The data field from the parent instrument (or indicator) on which to calculate this indicator.

PriceB

The data field from the parent instrument (or indicator) on which to calculate this indicator.

BaseDate

Base date used for the comparison of the two instruments.

CALCULATION

This indicator calculates the relative performance of two securities.

USAGE

This indicator can be used to analyze the relative performance of securities and to identify strong and weak performances of individual securities.

RELATIVE PERFORMANCE BENCHMARK

DESCRIPTION

This indicator compares the relative performance of a security relative to a base date to a benchmark. It is similar to the Ratiocator Benchmark indicator with the exception that the Relative Performance Benchmark's initial value at the base date will be assigned to 0 instead of 100.

PARAMETERS

This indicator requires two parent instruments.

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Benchmark

The data field from the benchmark instrument to which to compare the instrument.

StartingDate

The base date used for the comparison.

CALCULATION

This indicator compares the relative performance of a security relative to a base date to a benchmark.

USAGE

This indicator can be used to analyze the relative performance of a security against a benchmark and to identify strong and weak performances of a security.
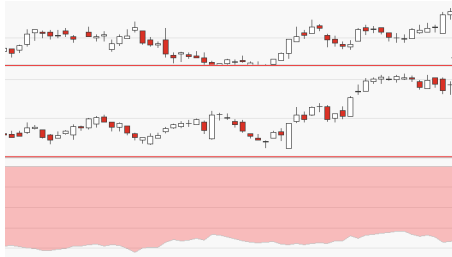
RELATIVE STRENGTH INDEX

Shortcode: RSI

DESCRIPTION

The well known Relative Strength Index was first used by Welles Wilder and is an oscillator based indicator. The indicator indicates the internal strength or weakness of a symbol. If the top or bottom control levels are crossed, the indicator predicts a trend reversal.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

OverSold
Defines value for bottom control level

Default: 30

OverBought
Defines value for top control level

Default: 70

CALCULATION

The calculation of the indicator line is based on a modified exponential moving average with a set period. The modified exponential moving average is a variation of the "Moving Average Simple" on page 705with a smoothing factor which eliminates the noise of the market.

The indicator uses in addition two constant levels, the top and bottom control levels.

USAGE

If the top control level is reached, the market is saturated with buy trades and sale trades will follow. In the other direction is the market saturated with sell trades and buy trades will follow, if the bottom control level is reached. The center line is constant and indicates a undecided market.

Welles Wilder and many others advise for the values for the top and bottom control levels 70 and 30. Other values can be used, if only extremer values should be taken into account (see image).

RELATIVE STRENGTH INDEX SLOPE - ENTRY STRATEGY

DESCRIPTION

The Relative Strength Slope - Entry Strategy is based on the "Relative Strength Index" on page 753 indicator. This indicator is based on an oscillator and indicates the internal strength or weakness of a symbol. The strategy is triggered by the slope of the RSI. For Exit signals with the same trigger, please use the "Relative Strength Index Slope - Exit Strategy" on the next page.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

Lookback
Defines the lookback period for the slope

Default: 2

EntryMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. If the slope is positiv during the set lookback period, the strategy will place buy trades. In the other direction the strategy will place sell trades if the slope is negatively during the lookback period.

USAGE

The strategy is good to identify upcoming trends. In order to get only trigger for stable trends, the lookback period can be adjusted.

RELATIVE STRENGTH INDEX SLOPE - EXIT STRATEGY

DESCRIPTION

The Relative Strength Slope - Exit Strategy is based on the "Relative Strength Index" on page 753 indicator. This indicator is based on an oscillator and indicates the internal strength or weakness of a symbol. The strategy is triggered by the slope of the RSI. For Entry signals with the same trigger, please use the "Relative Strength Index Slope - Entry Strategy" on the previous page.
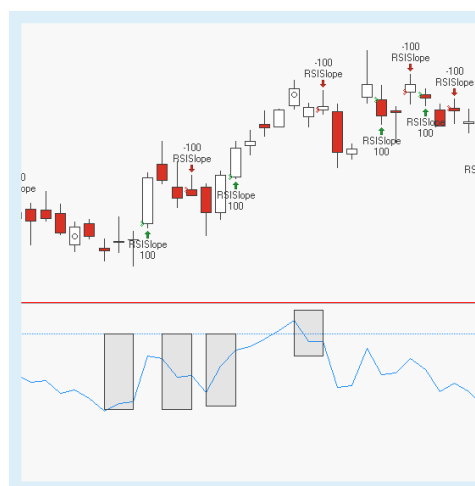
PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

Lookback
Defines the lookback period for the slope

Default: 2

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. If the slope is positive during the set lookback period, the strategy will place buy trades. In the other direction the strategy will place sell trades if the slope is negatively during the lookback period.

USAGE

The strategy is good to identify upcoming trends. In order to get only trigger for stable trends, the lookback period can be adjusted.

RELATIVE STRENGTH INDEX ZONE PORTFOLIO STRATEGY

DESCRIPTION

The Relative Strength Index Zone Portfolio strategy is based on the "Relative Strength Index" on page 753 and follows the logic of the indicator. The strategy is triggered, if the RSI is crossing the top or bottom control levels. This strategy is optimized for a "Portfolio" on page 251.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

OverBought
Defines value for top control level

Default: 70

OverSold
Defines value for bottom control level

Default: 30

Bullish

Defines what kind of orders are placed.

Default: LongEntry

Bearish

Defines what kind of orders are placed.

Default: LongExit

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. The top or bottom control levels are constant.

USAGE

If the bottom control level is reached, is the market saturated with sell trades and buy trades will follow. The strategy is now placing buy trades.

In the other direction the market is saturated with buy trades and sale trades will follow if the top control level is reached. So the strategy will place sell trades.

RELATIVE STRENGTH INDEX ZONE SYSTEM STRATEGY

DESCRIPTION

The Relative Strength Index Zone System strategy is based on the "Relative Strength Index" on page 753 and follows the logic of the indicator. The strategy is triggered, if the RSI is crossing the top or bottom control levels. When you want to use this strategy in a "Portfolio" on page 251, use the portfolio optimized version "Relative Strength Index Zone Portfolio Strategy" on the previous page.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

OverBought
Defines value for top control level

Default: 70

OverSold
Defines value for bottom control level

Default: 30

Bullish
Defines what kind of orders are placed.

Default: LongEntry

Bearish
Defines what kind of orders are placed.

Default: LongExit

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. The top or bottom control levels are constant.

USAGE

If the bottom control level is reached, is the market saturated with sell trades and buy trades will follow. The strategy is now placing buy trades.

In the other direction the market is saturated with buy trades and sale trades will follow if the top control level is reached. So the strategy will place sell trades.

RELATIVE STRENGTH INDEX - ENTRY STRATEGY

DESCRIPTION

The Relative Strength Index - Entry Strategy is based on the "Relative Strength Index" on page 753 indicator. This indicator is based on an oscillator and indicates the internal strength or weakness of a symbol. If either the top or bottom control levels or the center line are crossed, the strategy predicts a trend reversal. For Exit signals with the same trigger, please use the "Relative Strength Index - Exit Strategy" on the next page.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

HigherZone
Defines value for top control level

Default: 70

LowerZone
Defines value for bottom control level

Default: 30

SigMethod
Defines the method for the signals

Default: CenterLine

EntryMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. The strategy has two different signal methods: CenterLine or InsideOut. If InsideOut is chosen, the strategy will be triggered, when the control levels are crossed (see first image). After a crossover with the top control level a buy order will be placed and after a crossover with the bottom control level a sell order will be placed. Any crossover with the same level will have no effect for the current trade.

If CenterLine is chosen, the strategy will be triggered when the RSI is crossing the center line (see second image).

↑ STRATEGY WITH CENTERLINE AS SIGMETHOD

USAGE

If the top control level is reached, the market is saturated with buy trades and sale trades will follow. In the other direction is the market saturated with sell trades and buy trades will follow, if the bottom control level is reached. The center line is used as well as trigger, because the crossover with the center line marks a growing trend in the market.

RELATIVE STRENGTH INDEX - EXIT STRATEGY

DESCRIPTION

The Relative Strength Index - Exit Strategy is based on the "Relative Strength Index" on page 753 indicator. This indicator is based on an oscillator and indicates the internal strength or weakness of a symbol. If either the top or bottom control levels or the center line are crossed, the strategy predicts a trend

reversal. For Entry signals with the same trigger, please use the "Relative Strength Index - Entry Strategy" on the previous page.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Close

Period
The number of bars used to calculate

Default: 14

HigherZone
Defines value for top control level

Default: 70

LowerZone
Defines value for bottom control level

Default: 30

SigMethod
Defines the method for the signals

Default: CenterLine

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Relative Strength Index" on page 753. The strategy has two different signal methods: CenterLine or InsideOut. If InsideOut is chosen, the strategy will be triggered, when the control levels are crossed (see first image). After a crossover with the top control level a buy order will be placed and after a crossover with the bottom control level a sell order will be placed. Any crossover with the same level will have no effect for the current trade.

If CenterLine is chosen, the strategy will be triggered when the RSI is crossing the center line (see second image).

USAGE

If the top control level is reached, the market is saturated with buy trades and sale trades will follow. In the other direction is the market saturated with sell trades and buy trades will follow, if the bottom control level is reached. The center line is used as well as trigger, because the crossover with the center line marks a growing trend in the market.

RENKO SHADOWS

Shortcode: RSHADOW

DESCRIPTION

This indicator draws shadows on a Renko chart, showing the price movement away from the current trend.

It can only be used on a Renko Chart.
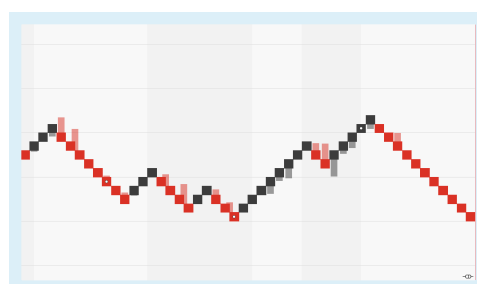
PARAMETERS

UpShadow
The shadow color for the up price.

DownShadow
The shadow color for the down price.

HighLow
Controls whether the period high and period low are used for the calculation (True) or the close values (False).

Default: True

CALCULATION

Renko Shadows looks for the lowest point in the candles (depending on setting either low price or candle with the lowest close) that underlie an upward moving column (and vice versa).

USAGE

Usually, Renko charts are used to condense information into a simple up-down information based on price movements.

The Renko Shadows indicator adds an information on the actual range of price movement that hides behind the boxes, similar to bars. Large shadows indicate large price movements (though not large enough to actually create a new box) and therefore a possible direction of the future movement.

RSQUARE

DESCRIPTION

This indicator quantifies the strength of a trend by measuring the quality of linear regression. It shows how much of a security's movement can be explained by another security's movement.

PARAMETERS

This indicator requires two parent instruments.

Price1
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Period
The number of bars used to calculate this indicator.

Default: 30

CALCULATION

The correlation coefficient r^2 is a measure of the linear correlation between two variables X and Y. The RSquare indicator provides information on the quality of the linear regression.

USAGE

RSquare values range from 0 to 1 which represent percentages from 0% to 100%. An RSquare value of 1 means all movements of a security are completely explained by movements in the other security. Values between 0.85 and 1 are considered high, meaning the security's performance has been in line with the performance of the other security (good model fit). Value of 0.70 or less are considered low (poor model fit). RSquare is typically used in combination with momentum-based indicators such as the "Linear Reg Curve" on page 673.

↑ A LOW RSQUARE VALUE (HERE: 0.03 FOR THE MOST RECENT BAR) INDICATES A WEAK TREND.

RSS

Shortcode: RSS

DESCRIPTION

This indicator allows the user to add a personalized information stream to the charting window.

PARAMETERS

URL
RSS 2.0 or ATOM 1.0 feed URL.

Default: http://feeds.bbci.co.uk/news/rss.xml

RefreshSecs
Specifies the frequency of feed updates in seconds.

Default: 5

Display
Specifies the display method.

ShowHeadlines displays the RSS headlines on top of the chart line.

ShowCount displays the value of feeds as a number on top of the chart line.

Default: ShowCount

MaxHeadLines
Specifies the value of shown headlines.

Default: 5

MaxHeadLinesLen
Specifies the character length of displayed headlines.

Default: 30

USAGE

Parameter can be changed in the properties field.
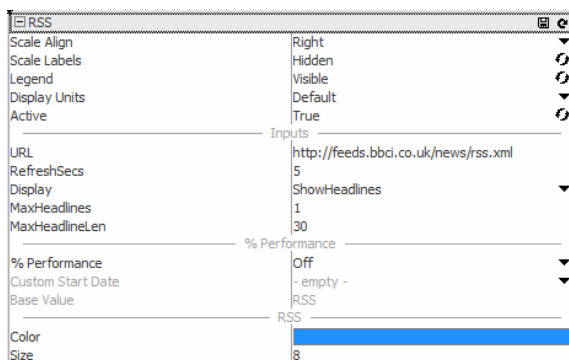
↑   PROPERTIES FIELD

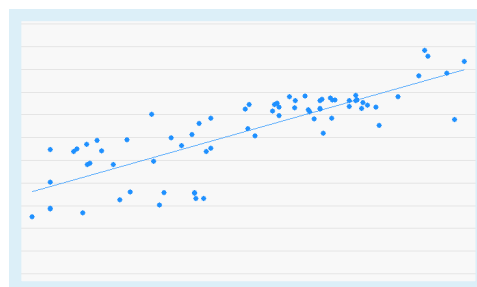The Equilla COM API must be enabled in the options menu, in order to enable general RSS support.
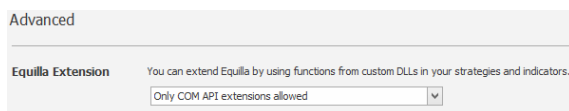
↑   EQUILLA COM API

SCATTER

Shortcode: SCAT

DESCRIPTION

This indicator analyzes two instruments and provides information on the correlation between the two. A regression line can be overlayed to highlight positive or negative correlation.

PARAMETERS

This indicator requires two parent instruments.

PriceX
The data field from the parent instrument (or indicator) on which to calculate this indicator.

PriceY
The data field from the parent instrument (or indicator) on which to calculate this indicator.

CALCULATION

The prices of the two instruments are plotted on the same two-axis diagram and displayed as a scatter plot. The first instrument is plotted on the x-axis, the second instrument is plotted on the y-axis. A regression line with the indicating positive or negative correlation is displayed if necessary. The coefficient of determination R^2 is also shown with the regression line.

USAGE

An ascending plot with points clustered tightly around the regression line indicates positive correlation, a descending plot with points clustered tightly around the regression line indicates negative correlation. A correlation provides information on the direction of the price but not on the extent of the price change. For example, a positive correlation between a security and an index does not provide any information on the price increase. This indicator is often used in combination with the RSquare indicator in order to determine the significance of the trend and to calculate its confidence level.
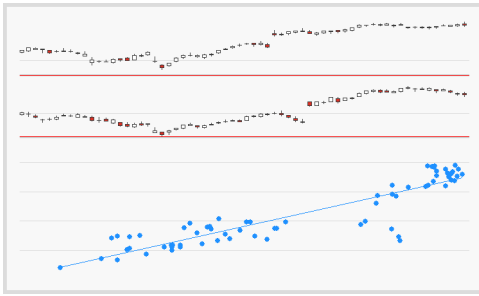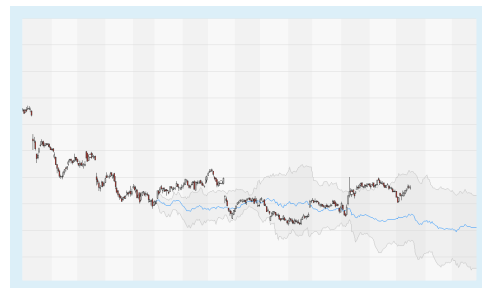
↑   POSITIVE CORRELATION.
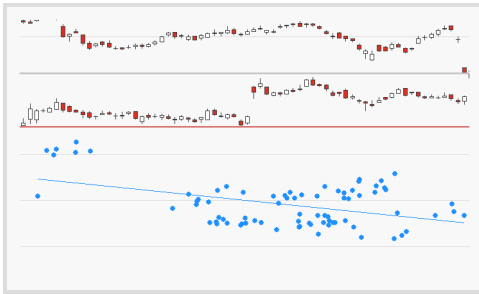
↑   NEGATIVE CORRELATION.

SEASONAL PROJECTION

Shortcode: SEPR

DESCRIPTION

This indicator calculates the average seasonal performance of the underlying security. It displays the seasonal pattern on the chart in order to facilitate comparisons between current and historical performance.

PARAMETERS

PeriodInYears
The number of years to be included in the calculation of the seasonal performance.

Default: 3

YearsShift
The base period of the indicator. Increasing the value shifts the period back in time. An increase by 1 shifts the period one year into the past.

Default: 0

Values

The method used to display seasonal projections: Absolute (normalized price values), Percent (percentage of normalized price values) or Original (un-normalized price values).

Default: Absolute

Mode

The year found in the historic data that will be used to project unencountered days in the current year: ShortestYear or LongestYear.

Default: LongestYear

MinMax

Display the min/max range in addition to the line graph of the average values.

Default: True

CALCULATION

This indicator calculates the bar-by-bar average of the percent performance of past trading years of a security.

USAGE

The calculated results are projected onto the current year. The projection makes seasonal patterns visible and allows for a comparison between current and historical performance. Users are provided with a "seasonal route" which can be used for analysis and as an additional criterion for generating trading signals. This indicator can also be used to compare the current trading year with a specific past year. Multiple insertion of the indicator can reveal changes in the seasonality pattern.

The following example shows a chart where the indicator has been inserted three times with different settings for PeriodInYears:
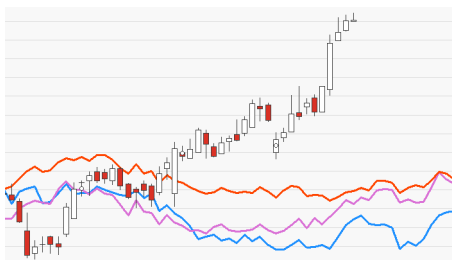
↑ CHANGES IN SEASONALITY ARE INSTANTLY VISIBLE.
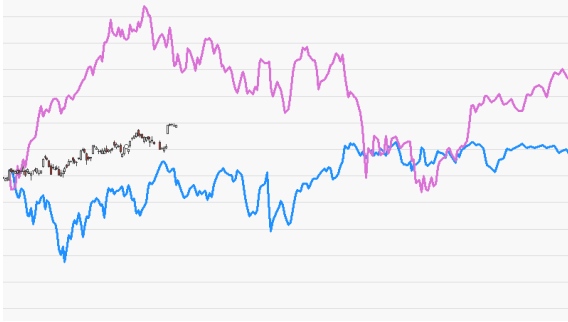
↑ DIFFERENT BASE PERIODS FOR THE
CALCULATION COMPARED, AND THE
RESULTING SEASONAL PATTERNS.

SECTOR ALLOC PORTFOLIO STRATEGY

This strategy invests capital according to weight given to each market sector.

It can only be applied to portfolios in which all stocks have the same currency and provide an industry sector information.

PARAMETERS

RebalancePeriod
Define how often the investments should be rebalanced (each day, week, month, quarterly or yearly).

Default: Yearly

Energy
Enter a weight for the Energy sector.

Materials
Enter a weight for the Materials sector.

Industrials
Enter a weight for the Industrials sector.

ConsumerDiscretionary
Enter a weight for the ConsumerDiscretionary sector.

ConsumerStaples
Enter a weight for the ConsumerStaples sector.

HealthCare
Enter a weight for the HealthCare sector.

Financials
Enter a weight for the Financials sector.

InformationTechnology

Enter a weight for the InformationTechnology sector.

CommunicationsServices

Enter a weight for the CommunicationsServices sector.

Utilities

Enter a weight for the Utilities sector.

RealEstate

Enter a weight for the RealEstate sector.

USAGE

This strategy can be used to automate trading per industry sector. The sectors are processed depending on their weight (from highest to lowest) until the available capital is distributed. This may already happen after e.g. 3 of 5 sectors, depending on your settings.

This strategy works similarly to the "Group Alloc Portfolio Strategy" on page 666, but instead of self-defined groups in your portfolio, you trade in pre-defined sectors.

SPREAD DIFF

Shortcode: SPD

DESCRIPTION

This indicator calculates the difference of two given security price series.
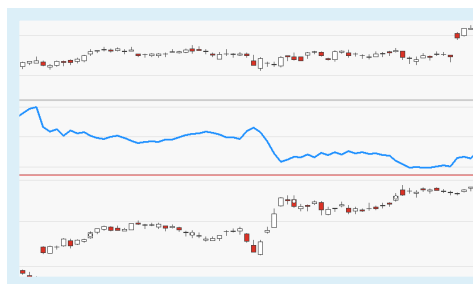

PARAMETERS

This indicator requires two parent instruments.

Price1

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2

The data field from the parent instrument (or indicator) on which to calculate this indicator.

CALCULATION

The indicator calculates the arithmetic difference between two given security price series by subtracting two elements from each other.
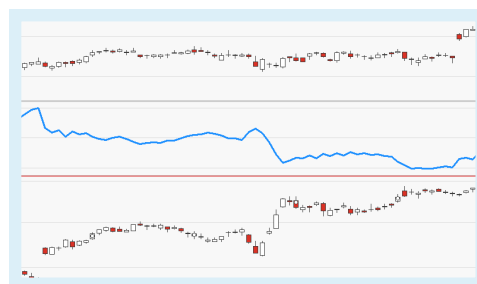
USAGE

This indicator is often used on future spreads, more specifically to follow relationships between related futures' prices. It graphically represents the price difference between securities by displaying a curve. It allows for the comparison of two securities' performances. For example, it may be used to compare a future contract to its underlying.

SPREAD DIFF V

Shortcode: SPDV

DESCRIPTION

This indicator calculates the difference of two given security price series and also outputs a volume value based on the selected combination method.

PARAMETERS

This indicator requires two parent instruments.

Price1
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Volume
The combination method used to calculate the volume value.

Default: Max

CALCULATION

The indicator calculates the arithmetic difference between two given security price series by subtracting two elements from each other.

USAGE

This indicator is often used on future spreads, more specifically to follow relationships between related futures' prices. It graphically represents the price difference between securities by displaying a curve. It allows for the comparison of two securities' performances. In combination with the Price Volume Profile this indicator provides information on the frequency of a spread price reaching certain price regions.

SPREAD QUOT

Shortcode: SPQ

DESCRIPTION

This indicator calculates the division of two given security price series or indicators.
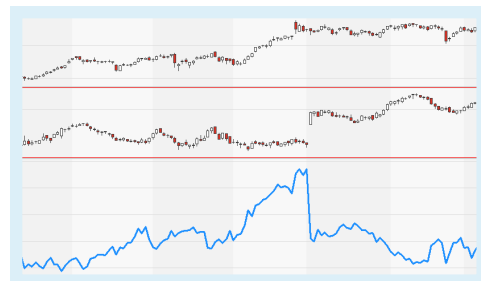

PARAMETERS

This indicator requires two parent instruments.

Price1
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2
The data field from the parent instrument (or indicator) on which to calculate this indicator.

CALCULATION

This indicator calculates the division of two given security price series or indicators.
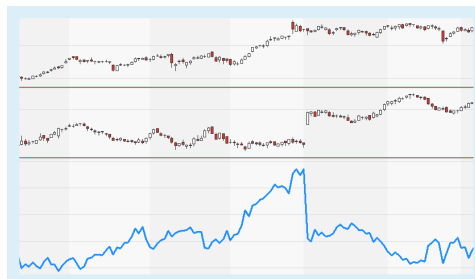
USAGE

This indicator can be used to emulate the Relative Strength concept by dividing one price series by another. For example, it may be used to compare an index to one of its constituents.

SPREAD QUOT V

Shortcode: SPQV

DESCRIPTION

This indicator calculates the division of two given security price series and also outputs a volume value based on the selected combination method.

PARAMETERS

This indicator requires two parent instruments.

Price1
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Price2
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Volume
The combination method used to calculate the volume value.

Default: Max

CALCULATION

This indicator calculates the division of two given security price series or indicators.

USAGE

This indicator can be used to emulate the Relative Strength concept by dividing one price series by another. In combination with the Price Volume Profile this indicator provides information on the frequency of a spread price reaching certain price regions.

STOCHASTIC FAST

Shortcode: FSTOC

DESCRIPTION

This indicator shows the location of the closing price relative to the high-low range over a set number of periods. It displays two lines, the indicator line as well as a smoothed version of the indicator line calculated by applying a simple moving average.

PARAMETERS

This indicator requires a single parent instrument that has data fields for Open, High, Low, Close available.

PeriodStoch
The number of bars used to calculate the %K Line of the indicator.

Default: 5

PeriodSmoothing
The number of bars used to calculate the %D Line, i.e. the smoothed %K Line.

Default: 3

OverBought
The overbought threshold.

Default: 80

OverSold
The oversold threshold.

Default: 20

ShowAlerts
Controls whether alerts are displayed if thresholds are exceeded.

Default: No

CALCULATION

The trading range is determined by calculating the difference between the highest high and the lowest low of the chosen period. Then, the difference between the

current close and the lowest low of the chosen period is calculated and divided by the trading range determined. To determine the %K Line, this result is multiplied by 100:

```
%K = (C - L) / (H - L) *100
```

To determine the %D Line, a simple moving average is applied to the %K Line:

```
%D = Sum(n) (%K) / n
```
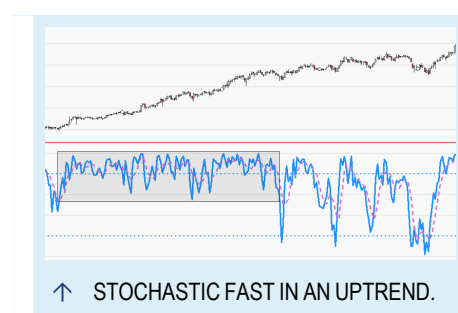
USAGE

Indicator values range from 0 to 100. A value of 20 or lower typically means that the security is oversold, a value of 80 or higher typically means that the security is overbought. A trend reversal is expected in both cases though it may be delayed depending on the strength of trend.

The %D Line may also be used to generate trading signals. For example, if the indicator line (%K Line) crosses the %D Line bottom-up this is regarded as a buy signal, if the indicator line crosses the %D Line top-down, this is regarded as a sell signal.

Divergences between indicator and underlying security may can also be used to create trading signals, especially if followed by a crossing of the %D Line.

Tip: Please note that prices often continue to move in their current direction in situations where the indicator enters a threshold zone.

↑   A BULLISH DIVERGENCE.

↑   STOCHASTIC FAST IN AN UPTREND.

STOCHASTIC FAST - ENTRY STRATEGY

DESCRIPTION

The strategy is based on the indicator "Stochastic Fast" on page 775. The indicator contains two lines: %K and %D. %K is a momentum which is calculated based on a spread between the price in the past and the current price. %D is smoothed version of %K. The strategy is triggered if the two signal lines are crossing. For Exit signals with the same trigger, please use the "Stochastic Fast - Exit Strategy" on the next page.

PARAMETERS

Period
The number of bars used to calculate

Default: 5

TriggerPeriod
The number of bars used to calculate the internal smoothing of %D

Default: 3

EntryMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Stochastic Fast" on page 775.

The strategy is triggered if the signal lines %K and %D are crossing. If %K crossed under %D, generates the strategy a short signal. Otherwise, if %K crosses over %D, is a long signal generated.
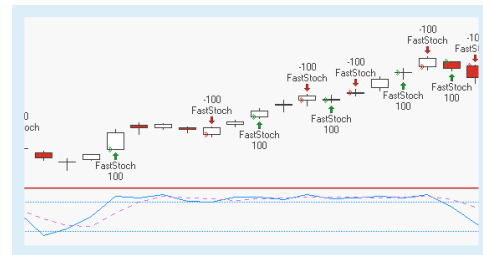
USAGE

The strategy alone indicates the current trend on the market and should be used as other stochastic strategies along with the trend. In addition it is possible to

trade only the crosses in the upper and lower section to trade only trades which a clear trend.

STOCHASTIC FAST - EXIT STRATEGY

DESCRIPTION

The strategy is based on the indicator "Stochastic Fast" on page 775. The indicator contains two lines: %K and %D. %K is a momentum which is calculated based on a spread between the price in the past and the current price. %D is smoothed version of %K. The strategy is triggered if the two signal lines

are crossing. For Entry signals with the same trigger, please use the "Stochastic Fast - Entry Strategy" on the previous page.

PARAMETERS

Period
The number of bars used to calculate

Default: 5

TriggerPeriod
The number of bars used to calculate the internal smoothing of %D

Default: 3

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the calculation of the indicator itself, see "Stochastic Fast" on page 775.

The strategy is triggered if the signal lines %K and %D are crossing. If %K crossed under %D, generates the strategy a short signal. Otherwise, if %K crosses over %D, is a long signal generated.

USAGE

The strategy alone indicates the current trend on the market and should be used as other stochastic strategies along with the trend. In addition it is possible to trade only the crosses in the upper and lower section to trade only trades which a clear trend.

STOCHASTIC SLOW

Shortcode: SSTOC

DESCRIPTION

This indicator is a variant of the "Stochastic Fast" on page 775 Indicator compared to which this indicator produces a quieter, more balanced indicator line. It shows the location of the closing price relative to the high-low range over a set number of periods. Both fast and slow variants consist of two lines; the %K line which compares the latest closing price to the recent trading range while the %D line is a signal line calculated by smoothing the %K line. The Slow Stochastic signal line is a moving average of the %D line.

PARAMETERS

This indicator requires a single parent instrument that has data fields for Open, High, Low, Close available.

PeriodStoch
The number of bars used to calculate the %K Line of the indicator.

Default: 5

PeriodSmoothing1
The number of bars used to calculate the internal smoothing of the indicator.

Default: 3

PeriodSmoothing2
The number of bars used to calculate the %D Line, i.e. the smoothed %K Line.

Default: 3

OverBought
The overbought threshold.

Default: 80

OverSold
The oversold threshold.

Default: 20

ShowAlerts
Controls whether alerts are displayed if thresholds are exceeded.

Default: No

CALCULATION

The trading range is determined by calculating the difference between the highest high and the lowest low of the chosen period. Then, the difference between the current close and the lowest low of the chosen period is calculated and divided by the trading range determined. To determine the %K Line, this result is multiplied by 100:

```
%K = (C - L) / (H - L) *100
```

To determine the %D Line, a simple moving average is applied to the %K Line:

```
%D = Sum(n) (%K) / n
```

To determine the Stochastic Slow, a simple moving average is applied to the %D Line:

```
StochasticSlow = Sum(n) (%D) / n
```

USAGE

Indicator values range from 0 to 100. A value of 20 or lower typically means that the security is oversold, a value of 80 or higher typically means that the security is overbought. A trend reversal is expected in both cases though it may be delayed depending on the strength of trend.

The %D Line may also be used to generate trading signals. For example, if the indicator line (%K Line) crosses the %D Line bottom-up this is regarded as a buy signal, if the indicator line crosses the %D Line top-down, this is regarded as a sell signal.

Divergences between indicator and underlying security may can also be used to create trading signals, especially if followed by a crossing of the %D Line.

Tip: Please note that prices often continue to move in their current direction in situations where the indicator enters a threshold zone.

↑ A BEARISH DIVERGENCE.

↑ STOCHASTIC SLOW (CENTER) AND
FAST (BOTTOM) COMPARED.

STRATEGY DRAWDOWN

Shortcode: STRADD

DESCRIPTION

This indicator plots the current and maximal strategy drawdown of a parent instrument in a chart.

For a Portfolio, we recommend using "Strategy Drawdown Portfolio" on the next page instead.

PARAMETERS

Source
Select the source, either Parent, ParentIntraday, Global, or GlobalIntraday.

Default: Absolute

Calculation

The method used for displaying the drawdown, either Absolute or Percent.

Default: Absolute

ShowDrawDownAsPositive

Select whether the drawdown should be shown as positive numbers (True) or not (False).

Default: False

CALCULATION

Based on the applied strategies, the drawdown is calculated for the instrument.

USAGE

Use this indicator to get a drawdown result for a parent instrument. It can be applied selectively to one instrument in a Portfolio.

STRATEGY DRAWDOWN PORTFOLIO

Shortcode: PDRDWN

DESCRIPTION

This indicator plots the current and max strategy drawdown in a chart in much the same way as "Strategy Drawdown" on the previous page does. It requires no parent, so it will not accidentally be removed if the first item from the chart gets deleted. Its other main advantage is that it will appear in a Portfolio regardless of what is selected.
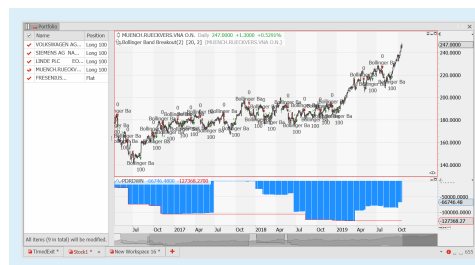
By default, it gets added automatically when adding the first strategy to a Portfolio (unless changed in the advanced options, see "Indicators & Strategies" on page 327).

PARAMETERS

Source

Select the source, either Parent, ParentIntraday, Global, or GlobalIntraday.

Default: Absolute

Calculation

The method used for displaying the Portfolio drawdown, either Absolute or Percent.

Default: Absolute

ShowDrawdownAsPositiveValues
Select whether the drawdown should be shown as positive numbers (True) or not (False).

Default: False

CALCULATION

Based on the applied strategies, the drawdown is calculated for the Portfolio.

USAGE

Use this indicator to get a combined drawdown for a Portfolio.

STRATEGY EQUITY

Shortcode: Equity

DESCRIPTION

This indicator plots the open and closed equity curves for an underlying security.

PARAMETERS

ShowMarketPosition
Select if and how the current market position should be displayed, either Direction and Size, Direction, or None.
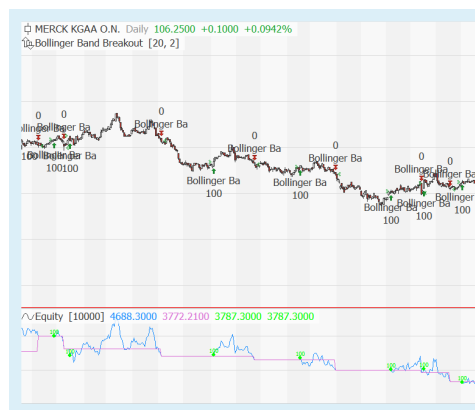
Default: DirectionAndSize

Mode
The method of displaying the equity, either Absolute or Percent or Percent of Money Management.

Default: Absolute

Capital
Capital employed. This is necessary to calculate the equity based on the applied strategies.

Default: 1000

HighlightBacktestingRange

This setting will shade the chart horizontally to show where backtesting began, if **Intrabar Backtesting** in the options of the Money Management is active.

Default: Yes

CALCULATION

The indicator calculates the open and closed equity for the underlying security.

USAGE

Use this indicator to get a single equity result for an instrument.

STRATEGY EQUITY COMBINED

Shortcode: CEquity

DESCRIPTION

This indicator shows the combined strategy equity curve for all traded items in the chart.

This indicator needs a parent object. For a Portfolio, we recommend using "Strategy Equity Portfolio" on the next page instead.

PARAMETERS

Mode
The method of displaying the equity, either Absolute or Percent or Percent of Money Management.

Default: Absolute

Capital
Capital employed. This is necessary to calculate the equity based on the applied strategies.

Default: 1000

HighlightBacktestingRange
This setting will shade the chart horizontally to show where backtesting began, if **Intrabar Backtesting** in the options of the Money Management is active.

Default: True

CALCULATION

The indicator calculates and adds the open and closed equity for all items in a chart and plots the resulting lines.

USAGE

Use this indicator to get a combined equity result for the instruments in a chart.

Applying the Strategy Equity Combined to a Portfolio will show the combined equity of the Portfolio. However, as it needs a parent, it gets applied to a specific instrument in the Portfolio, and might get deleted if the underlying instrument gets deleted from the Portfolio. We therefore recommend using "Strategy Equity Portfolio" below instead.

STRATEGY EQUITY PORTFOLIO

Shortcode: PEquity

DESCRIPTION

This indicator plots the open and closed equity curves for all items in a chart in much the same way as "Strategy Equity Combined" on the previous page does. It requires no parent, so it will not accidentally be removed if the parent item gets deleted from the chart. Its other advantage is that it will appear in a Portfolio regardless of what is selected.

By default, it gets added automatically when adding the first strategy to a Portfolio (unless changed in the advanced options, see "Indicators & Strategies" on page 327).

PARAMETERS

Mode
The method of displaying the equity, either Absolute or Percent or Percent of Money Management.

Default: Absolute

Capital

Capital employed. This is necessary to calculate the equity based on the applied strategies.

Default: 1000

HighlightBacktestingRange
This setting will shade the chart horizontally to show where backtesting began, if "Intrabar Backtesting" in the options of the Money Management is active.

Default: True

CALCULATION

The indicator calculates and adds the open and closed equity for each item in the Portfolio and plots the resulting lines.

USAGE

Use this indicator to get a combined equity result for the instruments in a Portfolio.

STRATEGY EQUITY WORKSPACE

Shortcode: WEquity

DESCRIPTION

This indicator plots the combined open and closed equity for all charts and portfolios in the current workspace.

PARAMETERS

Mode
The method of displaying the equity, either Absolute or Percent or Percent of Money Management.

Default: Absolute

Capital
Capital employed. This is necessary to calculate the equity based on the applied strategies.
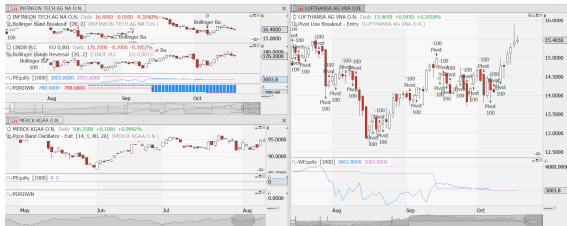
Default: 1000

CALCULATION

The indicator calculates and adds the open and closed equity of each chart and portfolio in the current workspace and then plots the resulting lines.

USAGE

Use this indicator to get a combined equity result for instruments that are not otherwise handled together, for example several charts in one workspace.

↑ THREE CHARTS IN A WORKSPACE
WITH STRATEGY EQUITY
WORKSPACE APPLIED

STRATEGY MARKET POSITION

Shortcode: POS

DESCRIPTION

This indicator shows the strategy's market position as a colored band in the chart.

PARAMETERS

LongColor
Defines the color for the band.

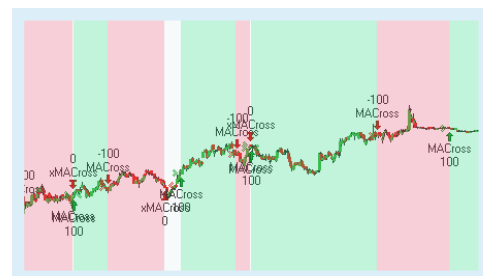Default: Green

ShortColor
Defines the color for the band.

Default: Red

FlatColor
Defines the color for the band.

Default: White

CALCULATION

The indicator checks the value of the Equilla function MarketPosition and adjusts the color of the band accordingly.
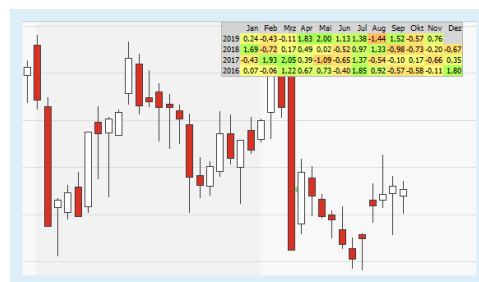
USAGE

The indicator is useful to identify the MarketPosition in the chart.

STRATEGY MONTHLY RETURNS GRID

Shortcode: none

DESCRIPTION

This indicator plots a heatmap of the monthly strategy returns. Years are displayed as rows, and months are displayed as columns.

PARAMETERS

StartYear
Bottom year in the grid. If fewer years are available from your data provider, only the available years will be displayed, e.g. the last four.

Default: 2000

TextSize
Set the text size within the grid.

Default: 9

Labels
Select which labels should be displayed: Both, Months, Years, None.

Default: Both

TextColor
The color for the text.

BorderColor
The color for the border around the grid.

BackColor
The background color for the row and column heading and for empty fields.

UpColor

The color for months on which returns went up.

DownColor
The color for months on which returns went down.

MidColor
The color for months where returns moved very little.

Graduation
The number that defines the level of color change on return differences. The smaller the number, the sharper the color differences.

Default: 5

CALCULATION

The percentage of change for monthly returns is calculated for each month over the years.

Change per month = (capital - startCapital) / startCapital * 100

USAGE

The indicator shows the monthly returns over the years, creating a heatmap that can be used for analyzing seasonal patterns.

STRATEGY PERIODIC RETURNS

Shortcode: PSRET

DESCRIPTION

This indicator plots the percent or absolute gain over a given calendar period.
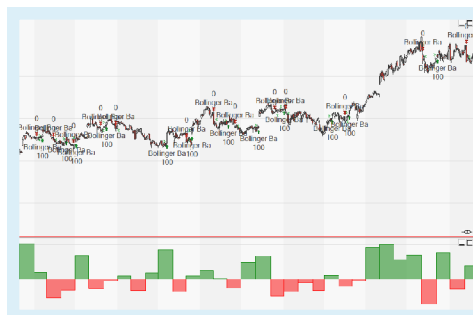

PARAMETERS

Period
The time period to use for the calculation: Yearly, Quarterly, Monthly, Weekly, Daily.

Default: Monthly

Value
Controls whether the absolute return or the percentage should be used.

Default: Percent

ColorUp
The color for months on which returns went up.

ColorDown
The color for months on which returns went down.

CALCULATION

The absolute return is calculated as

diff = capital - startCapital

The percent value as

diff = (capital - startCapital) / startCapital * 100

USAGE

This is an indicator that shows returns over a calender period, allowing e.g. for the analysis of seasonal changes. Multiple periodic returns of the same color signal stable trends.

STRATEGY PORTFOLIO REPORT

Shortcode: PREPORT

DESCRIPTION

This indicator behaves much like the "Strategy Report" on the next page but allows the data statistic set of a Portfolio to be viewed in the grid without the need to attach the indicator to a specific instrument.
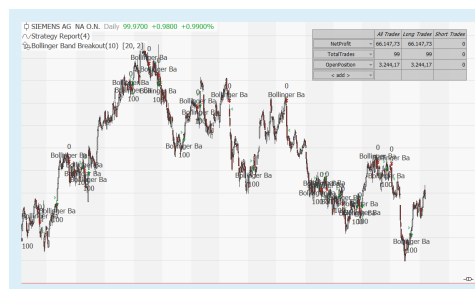
PARAMETERS

ShowLong
Select if long positions should be shown (True) or not (False).

Default: True

ShowShort
Select if short positions should be shown (True) or not (False).

Default: True

ShowTitles

Select if the table titles should be shown (True) or not (False).

Default: True

MaxDecimalPlaces
Select the maximal number of decimal places to be displayed.

Default: 5

TextSize
Select the text size.

Default: 12

CALCULATION

The Strategy Portfolio Report indicator doesn't calculate anything but displays data selected by the user.
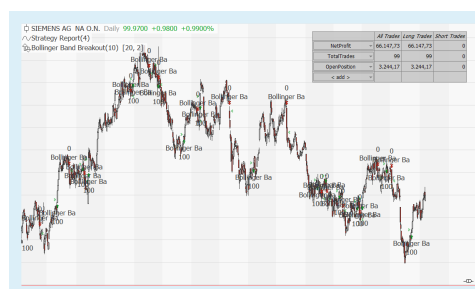
USAGE

Use the Strategy Portfolio Report indicator for an overview of the performance statistics of a Portfolio.

STRATEGY REPORT

Shortcode: REPORT

DESCRIPTION

This indicator shows a strategy performance statistics in a small grid within the chart. Statistics may be added or removed as required.

PARAMETERS

UseAllData
Select if all data should be used (True) or not (False).

Default: True

ShowLong
Select if long positions should be shown (True) or not (False).

Default: True

ShowShort

Select if short positions should be shown (True) or not (False).

Default: True

ShowTitles

Select if the table titles should be shown (True) or not (False).

Default: True

MaxDecimalPlaces

Select the maximal number of decimal places to be displayed.

Default: 5

TextSize

Select the text size.

Default: 12

CALCULATION

The Strategy Report indicator doesn't calculate anything but displays data selected by the user.

USAGE

Use the Strategy Report indicator for an overview of the performance statistics.

STRATEGY SYMBOL RANKING

Shortcode: RANKSS

DESCRIPTION

This indicator lists the top symbols in the portfolio ranked according to a strategy statistic.
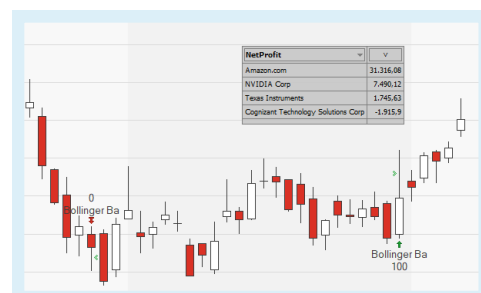

PARAMETERS

Count

Set the number of symbols displayed in the ranking.

Default: 5

MaxDecimalPlaces

Set the maximal number of decimal places to be displayed.

Default: 5

TextSize
Enter a text size.

TextColor
Enter a color for the text.

Default: Black

GridColor
Enter a color for the grid lines.

Default: Dark Gray

BackColor
Enter a color for the background.

Default: Light gray

CALCULATION

The calculation depends on the displayed values. Select the output from the drop-down list in the window.

It offers all values that are available in the "Performance Report" on page 287.

USAGE

This indicator returns a dynamic list of the top or bottom performing stocks in your portfolio, based on criteria defined by you.

TARGET RETURN PORTFOLIO STRATEGY

This strategy is a relative return based portfolio trading strategy. The strategy will calculate the lowest risk portfolio for the specified annual target return rate (based on the 'Efficient Frontier' concept).

It can only be applied to portfolios in which all stocks have the same currency.

PARAMETERS

TargetAnnualReturn
The target annual return in percent.

Default: 5

ReturnMode
Should the target be seen as exact value or as minimum?

Default: Exact

ReturnPeriod
How many bars should be used to calculate the ex post returns?

Default: 24

RebalancePeriod
How often the investments should be rebalanced (each day, week, month, quarterly or yearly)?

Default: Monthly

CALCULATION

The efficient frontier offers the highest expected return for a defined level of risk. The risk is defined as the standard deviation of a security. Ideally, a portfolio should have securities with a lower standard deviation than the standard deviation of the industry sector, while still having higher returns.

The efficient frontier is curved - the less synchronized the securities / the higher the diversification, the lower the standard deviation, and the better the risk/return profile. Portfolios below the efficient frontier have less return for the same risk; portfolios to the right of the efficient frontier have higher risk for the same return.

USAGE

The automatic allocation of the Target Return strategy aims for a sensible annual return (e.g. 5% above inflation) with the least possible risk necessary to achieve this number. The target return is independent of market returns, focusing on preserving the purchasing power of the portfolio. It is a long-term strategy: it is possible that quarters may not yield the desired target value, but the average of returns over time will allow approaching the annual target.

TIMED EXIT STRATEGY

This strategy will exit a position at a certain time of the day.

PARAMETERS

CloseTime

Set the time when the position should be closed.

Default: 1900

Mode

Select which mode should be used for exiting the position: ThisBar (the trade is executed immediately), NextBar (the trade is executed at the next bar's opening price).

Default: NextBar

USAGE

Close open positions at a certain time, e.g. at the end of the work day at 1800 hours.

TIMED EXIT (BARS) STRATEGY

This strategy will exit a position at a certain time, based on bars.

PARAMETERS

Bars

Define the number of bars to be considered.

Default: 5

Mode

Select which mode should be used for exiting the position: ThisBar (the trade is executed immediately), NextBar (the trade is executed at the next bar's opening price).

Default: NextBar

USAGE

Close open positions at a certain point of the trading day, e.g. at the end of the day (bar).

TOP DOGS PORTFOLIO STRATEGY

This strategy is a generic implementation of the Dogs of the Dow trading system (see "Dogs of the Dow Strategy" on page 663). Once per year, find the best performers and invest equally in each. It uses the lowest rate of change as the performance measure.

It can only be applied to portfolios in which all stocks have the same currency.

PARAMETERS

Period
The number of bars to be used for calculating the rate of change (volatility).

Default: 10

DogCount
In how many top performers should be invested?

Default: 10

TradeMonth
Select at the end of which month in each year the highest dividend yield should be calculated.

Default: Jan

USAGE

The Top Dogs strategy is a long-term strategy that combines the Dogs of the Dow highest dividend yield approach with the rate of change as volatility measure. Once per year the top stocks with the highest dividend yield at the lowest risk are found and the capital is rebalanced towards these top performers. Then for another year, no trades take place (saving on tradings costs). The DogCount ensures a lower portfolio volatility compared to investing in only 1-2 top performers.

TOOL ALERTS

Shortcode: none

DESCRIPTION

This indicator adds a window to the chart that shows a ticker of the most recent tool alerts that have occurred since the indicator was added (or modified). It works like a live ticker - if the chart is redrawn, the ticker is reset.
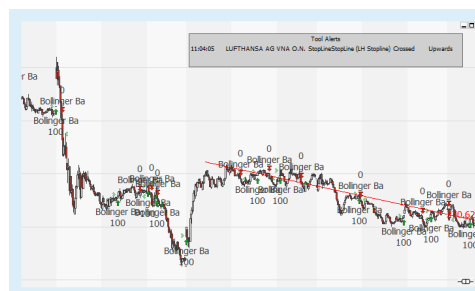
For this indicator to work, you need to add e.g. drawing elements and enable their alert function.

This indicator is mainly included as a demonstration of intercepting tool alerts from Equilla.

PARAMETERS

Items
Number of alerts to be displayed.

TextSize
Enter a text size.

CALCULATION

The listener waits for an alert. On alert, it will write a new line in the Tool Alerts output window.

USAGE

Use this indicator to see the latest tool alerts.

TRADE DEPTH

This indicator plots histograms of bid/ask trades by volume for each candle.

PARAMETERS

Columns
The number of indicator bars to be displayed.

Default: 30

ColorUp

Controls the color of the indicator bars for increasing volume.

ColorDn

Controls the color of the indicator bars for decreasing volume.

CALCULATION

The indicator assigns the trading volume to up and down intrabar moments respectively. It displays a histogram of market volume levels within each bar distributed according to the respective price levels. The volume is split up between Bid and Ask volume.

USAGE

The indicator is like a "Price Volume Profile" on page 741 and splits the volume into bid and ask volume for each bar. The general opinion is that on the put side of resistance lines the volume should be higher than on the call side, and that on the call side of support lines the volume should be higher than on the put side. The analysis facilitated by this indicator allows for predictions regarding the sustainability of chart marks.
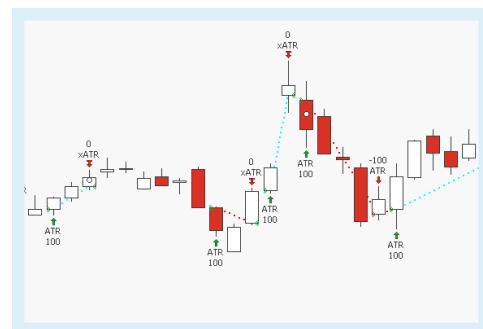
TRADE SPAN

Shortcode: TSPAN

DESCRIPTION

This indicator draws a line between the entry and exit of a trade.

CALCULATION

The indicator draws a line between the entry and the exit of a trade. The color of the line depends on the result of the trade (win, loss, breakeven).

USAGE

Use this indicator to visualize trades and theirs results as a line in the chart directly.

TRADE VOLUME MAGNITUDE

DESCRIPTION

This indicator plots the trade volume via circles on a given bar and indicates via the color of the circles if the trades were made on Bid or Ask side.

PARAMETERS

AvgPeriod
Defines the average period for the Moving Average Exponential

Default: 20

AvgWidth
Defines the average width of the circles

Default: 8

CALCULATION

The indicator plots the two circles in different colors. The radius of the circles is based on a "Moving Average Exponential" on page 699. The Moving Average Exponential uses the input AvgPeriod for the calculation.

The indicator needs access to the field SIDE via Joule.

USAGE

The indicator can be helpful to identify buying or selling pressure. The color and the radius of the circles indicate on which side the most trades occurred. The greener the radius is, the more trades were on the ask side. On the opposite, the more red the radius, the more trades were on the bid side.

The meaningfulness of this indicator is higher on intraday chart.

TREND CHANNELS

Shortcode: CHAN

DESCRIPTION

This indicator plots trend channels based on high and low swings of a specified strength. It works similarly to the indicator "Trend Lines" on the next page but draws parallel lines like a corridor.

The Trend Channels indicator only works on charts with a fixed bar width.

PARAMETERS

HighSwingStrength
A measure for how "far" the algorithm should look for highs.

Default: 14

LowSwingStrength
A measure for how "far" the algorithm should look for lows.

Default: 14

MinExtend
How many bars at least to look ahead of the pivot point for the next pivot point.

Default: 5

MaxPivots
How many pivot points at most to be used for calculating the trend.

Default: 3

Alerts
Should leaving the trend channel cause an alert: Off, OncePerBar, Always

Default: Off

CALCULATION

Based on the pivot points and the given variables, the trend channels are calculated.

The highest high and lowest low define the channel.

The granularity of the trend channels is defined by swing strength and the minimum extend value.

USAGE

The trend channel is used as a predictive indicator. If the following day's market price falls below the trend channel, it may be used as a new resistance level. Conversely, if the market price rises above the trend channel, it may act as the new support level.

TREND LINES

Shortcode: LINE

DESCRIPTION

This indicator plots trend lines onto a chart based on high and low swings of a specified strength, i.e. the pivot points (see also the indicator "Pivot Points Analysis" on page 737).

The Trend Line indicator only works on charts with a fixed bar width.

PARAMETERS

HighSwingStrength
A measure for how "far" the algorithm should look for highs.

Default: 14

LowSwingStrength
A measure for how "far" the algorithm should look for lows.

Default: 14

MinExtend
How many bars at least to look ahead of the pivot point for the next pivot point.

Default: 5

MaxPivots
How many pivot points at most to be used for calculating the trend.

Default: 3

Alerts

Should crossing the trend line cause an alert: Off, OncePerBar, Always.

Default: Off

CALCULATION

Based on the pivot points and the given variables, the trend lines are calculated.

The granularity of the trend lines is defined by swing strength and the minimum extend value.

USAGE

The trend line is used as a predictive indicator. If the following day's market price falls below the trend line, it may be used as a new resistance level. Conversely, if the market price rises above the trend line, it may act as the new support level.

VALUE AT RISK

Shortcode: VAR

DESCRIPTION

This indicator calculates the theoretical maximum loss generated by a strategy over the holding period based on a defined confidence level. Conditional Value at Risk is also plotted to show the mean average of all strategy equity changes exceeding the Value at Risk.

PARAMETERS

Period

The holding period (in bars) for which to calculate the value at risk.

Default: 1

ObservationPeriod

The number of bars over which to calculate the value at risk.

Default: 30

Confidence

The probability with which the value at risk calculated will not be exceeded.

Default: 95

CALCULATION

Value at Risk calculates the potential loss based on strategy equity changes over a prior observation period. For the calculation the Variance-Covariance Method is used, which assumes that stock returns are normally distributed. Hence, two factors are taken into account: an expected (or average) return and a standard deviation. The Conditional Value at Risk calculates the average of the losses that occur beyond the Value at Risk cutoff point in the distribution.

USAGE

The information generated by this indicator can be used to assess potential losses generated by a strategy. Exceedance of the Value at Risk may indicate that a modification of the strategy currently applied is required. For example, the indicator can be used to determine position sizes in order to minimize losses when trading shares or contracts. The Conditional Value at Risk provides insight into particularly adverse market situations in which the Value at Risk will be exceeded. It calculates the average of the losses to be expected in those situations.
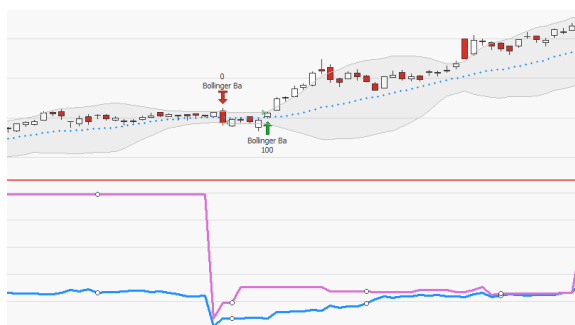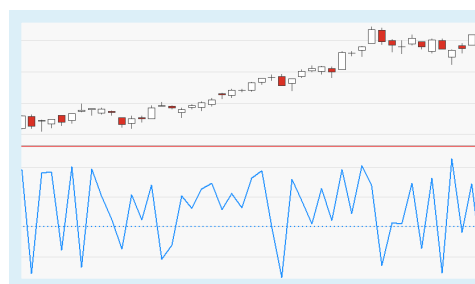

↑ THE INDICATOR, APPLIED TO THE BOLLINGER BANDS BREAKOUT STRATEGY.

VOLUME ACCUMULATED

Shortcode: VAC

DESCRIPTION

This indicator confirms or disproves trends by putting the daily momentum into relation to the trading volume. It determines whether a price move has been confirmed by the correspondent volume.

CALCULATION

The indicator multiplies the daily momentum with the trading volume. To calculate the daily momentum the indicator determines the difference between closing price and daily low as well as the difference between closing price and daily high. It then divides the difference between these two partial results by the trading range. It then multiplies the this result by the daily trading volume.

USAGE

The indicator shows whether a price movement has been confirmed by the trading volume. The daily momentum, i.e. the ratio between trading range and actual price movement, allows for analysis of market movements. High indicator values indicate trading days with strong positive price movement accompanied by high volume. Low indicator values indicate strong negative price movement accompanied by high volume.

↑ PRICE MOVEMENTS CONFIRMED BY
THE TRADING VOLUME.

VOLUME MARKET

Shortcode: MAV

DESCRIPTION

This indicator analyzes the relationship between Volume and Open Interest. It can only be applied to futures for which Open Interest data is available.

CALCULATION

The indicator is calculated by dividing Volume by Open Interest.

USAGE

The relationship between Volume and Open Interest indicates whether money is moving into the market or subtracted.

VOLUME PRICE TREND

Shortcode: VPT

DESCRIPTION

This indicator combines the price momentum of a security with its trading volume. It analyzes the strength of a trend and points to possible weaknesses of a price movement. In contrast to other price-volume indicators it is based not on absolute price changes but on percentage change.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

CALCULATION

On an up day, the volume is multiplied by the percentage price increase between the current close and the previous bar's close. This value is then added to the previous bar's indicator value.

On a down day, the volume is multiplied by the percentage price decrease between the current close and the previous bar's close. This value is then added to the previous bar's indicator value.

By adding together the individual results over the set period a smoothed indicator value is created which is drawn as a line on the chart.

USAGE

→ Increasing price accompanied by an indicator line moving upwards confirms the upwards price trend; decreasing price accompanied by an indicator line moving downwards confirms the downwards price trend.

→ Increasing price accompanied by an indicator line moving downwards or sideways is a divergence and may suggest that the upwards price movement is weak and lacking strength;

decreasing price accompanied by an indicator line moving upwards is a divergence and may suggest that the downwards price movement is weak and lacking strength.

→ Crossings of the indicator line with the zero line can be interpreted as trading signals; divergences between indicator and underlying instrument are regarded as warnings against a possible trend change.
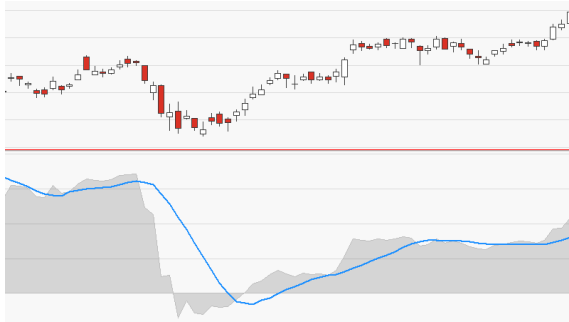
↑ INTERSECTIONS OF A SIMPLE MOVING AVERAGE AND THE INDICATOR LINE CAN ALSO BE INTERPRETED AS TRADING SIGNALS

VOLUME PRICE BREAKOUT - ENTRY STRATEGY

DESCRIPTION

The strategy uses the relation as well within the current candle as well as between the volume and the "Moving Average Simple" on page 705 to generate trading signals. For Exit signals with the same trigger, please use the "Volume Price Breakout - Exit Strategy" on the next page.

PARAMETERS

Period
The number of bars used to calculate

Default: 10

ExitMethod
Defines what kind of orders are placed.

Default: Both

CALCULATION

For the strategy is a simple moving average with the input Period calculated. This simple moving average, the volume and the current candle are used for trading signals. For the calculation of the indicator itself, see "Moving Average Simple" on page 705.

↑ STRATEGY BEFORE AND AFTER OPTIMIZER

The strategy generates a long entry signal when the volume crosses over a simple moving average and the close is greater than the open. The other way round, a short entry signal is generated when the volume crosses over a simple moving average and the close is less than the open.

USAGE

For Entry signals with the same trigger, please use the "Volume Price Breakout - Entry Strategy" on the previous page.

Strategies which are using an average of historical data like price for trading signals are always depending on delay, noise and trend. Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. The influence of all three factors can be reduced by choosing the right values for the input. The optimizer in Tradesignal is very useful to find the right settings.

VOLUME PRICE BREAKOUT - EXIT STRATEGY

DESCRIPTION

The strategy uses the relation as well within the current candle as well as between the volume and the "Moving Average Simple" on page 705 to generate trading signals. For Entry signals with the same trigger, please use the "Volume Price Breakout - Entry Strategy" on the previous page.

PARAMETERS

Period
The number of bars used to calculate

Default: 10

ExitMethod

Defines what kind of orders are placed.

Default: Both

CALCULATION

For the strategy is a simple moving average with the input Period calculated. This simple moving average, the volume and the current candle are used for trading signals. For the calculation of the indicator itself, see "Moving Average Simple" on page 705

↑ STRATEGY BEFORE AND AFTER OPTIMIZER

The strategy generates a long exit signal when the volume crosses under a simple moving average or the close is less than the open. The other way round, a short exit signal is generated when the volume crosses under the simple moving average and the close is greater than the open.

USAGE

Strategies which are using an average of historical data like price for trading signals are always depending on delay, noise and trend. Due to the Moving Average Simple used, the strategy cannot predict trends and trend reversal, but is reacting to the ongoing trend with a delay. The influence of all three factors can be reduced by choosing the right values for the input. The optimizer in Tradesignal is very useful to find the right settings.

VOLUME RATIO

Shortcode: VRAT

DESCRIPTION

This indicator compares buying pressure to selling pressure using volume as a measure of strength. It compares the volume on days with increasing price to the volume on days with decreasing price over a defined number of bars. It identifies divergences between price trend and volume.

PARAMETERS

Price

The data field from the parent instrument (or indicator) on which to calculate this indicator.

Default: Volume

VolSeries
The data field from the parent instrument (or indicator) on which to calculate the volume sums.

Default: Volume

Period
The number of bars used to calculate the volume summation.

Default: Period

CALCULATION

Over the base period, the trading volume is distributed over three values; the volume on days with increasing closing price, decreasing closing price and unchanged closing price respectively. The indicator is calculated by setting the individual sums into proportion to each other.

USAGE

In a strong trend the volume should be high and increase when prices increase. Divergences between price development and volume development may point to an imbalance of market forces. The relationship between days with increasing price and days with decreasing price should be in accord with the prevailing price trend. Divergences may point to a weakness of the trend.

VOLUME WEIGHTED AVERAGE PRICE

Shortcode: VWAP

DESCRIPTION

Volume-weighted average price (VWAP) is a ratio used by investors to make trades without disturbing the market with large orders. This indicator plots the VWAP value of the parent security for its current period.

PARAMETERS

Mins

The underlying granularity of data (in minutes) from which to calculate the VWAP on each bar (0 for tick data).

Default: 1

CALCULATION

Volume-weighted average price is the average price of a security weighted against its trading volume over a given time frame. When using non-tick data to calculate the VWAP (i.e. when setting Mins to a non-zero value), the volume will distributed over the four price values of each underlying bar.

USAGE

VWAP is a price source that reduces market noise. It generally does not provide entry signals, stop loss levels or target prices.

When the price is below the VWAP, the trend is likely down or there is a downward bias to the period.

When the price is above the VWAP, the trend is likely up or there is an upward bias to the period.

WATERMARK LOGO

DESCRIPTION

This indicator displays the Tradesignal logo as a watermark behind the chart. Custom images can be inserted from the Equilla editor.

USAGE

The Watermark Logo allows you to display a custom image as a watermark behind the chart, e.g. the logo of your organization. This is a useful feature when using charts in publications or presentations.

WATERMARK TICKER

DESCRIPTION

This indicator displays the symbol and/or name of the underlying instrument as a watermark behind the chart.

USAGE

Displaying the symbol and/or name of the underlying instrument behind the chart is useful when using charts in publications or presentations, especially in cases where the chart legend is hidden.

ZIGZAG

Shortcode: ZIG

DESCRIPTION

This indicator indicates trends by drawing lines between turning points in a chart. It filters out changes in an underlying security that are less than a set trigger value. The ZigZag has no predictive power due to its lagging nature. It helps to identify significant changes in price by eliminating the noise of everyday market conditions.

PARAMETERS

Price
The data field from the parent instrument (or indicator) on which to calculate this indicator.

Mode
The method to be used for filtering out price movements, either absolute or percent.

Default: Percent

Trigger
The sensitivity of the indicator. A higher value will result in a greater amount of the price action being filtered.

Default: 5

ShowReversalLevel

Sets the visibility of a marker which indicates the price that has to be exceeded to reverse the current trend.

Default: Yes

CALCULATION

The current segment of the zig zag line is drawn between the current price and the most recent turning point. This turning point is subtracted from today's closing price. Then, the difference is divided by the most recent turning point and multiplied by 100. Please note the following:

→ A turning point is generated only if the trigger value has been reached and a change of direction occurs.

→ A turning point is permanent only if a subsequent turning point has been generated and the subsequent price movement reaches the trigger value.

→ A turning point is removed if the price changes direction and continues its original movement before reaching the trigger value. In this case, the most recent Zig Zag line is removed and will continue from the previous turning point.

USAGE

The Zig Zag may be used to confirm the direction of a trend or trend reversals, or to highlight important patterns. Please note that the ZigZag cannot be used as a trading strategy due to its „lagging" nature.

↑　THE ZIGZAG SET TO 5 PERCENT.

↑ THE ZIGZAG SET TO 10 PERCENT. A
GREATER AMOUNT OF THE PRICE
ACTION HAS BEEN FILTERED.