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ASPIC MP

An open and revolutionary SCADA HMI application

Trend Guide

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Graph

Graph in ASPIC MP enables to display courses of datapoints depending on time.

Graph uses two data sources of items:

- **RealTime source of current values of items.** Graph stores current values into the memory; data older than specific time interval are lost (buffer storage RealTime data source is time limited). This interval is set by property **TimeAxis.Length** of the TimeGraph object.
- **Historical source of items' values.** Only a datapoint serves in the AspicMP system as a historical source of items' values - it means that object property does not have history. Historical channel of datapoint is set by connection with archiving item **HDA_ITEM_OPc** (do not forget to set **Dearch** property of archiving item to the **true** value).

Graph enables:

- Shows max. 255 trends in one graph
- Move separate courses horizontally independently
- Show datapoint details in a course overview
- Enable or disable display of selected course in a graph
- Show time cursor of the graph
- Work with more time cursors of one graph
- Compare individual courses
- Zoom vertical/horizontal area of a graph
- Work with multiple-value axis
- Work with groups of courses
- Separate, group, collective axis (Y) for trends
- On/Off trend
- Up to 10 different work spaces in one graph

Difference between Window Graph and Page Graph

Graph is either inserted into the visualization page (object TimeGraph) – so-called **Page Graph**, or it can be created during the project visualization in the Client as so-called **Window Graph**.

Both graphs look very similar so further chapters are the same for them.

Table shows difference between Window Graph and Page Graph:

Page Graph	Window Graph
Is created in the Editor.	Is created by user during the project visualization in the Client.
Properties are defined in the Editor.	Properties are selected by user in the Client.
Object is a part of visualization page with defined position.	Graph is an individual window which can be moved or can be set as a part of Client's window.
Displays values of connected datapoints.	Displays values of connected datapoints and properties of visual objects.

Page Graph	Window Graph
<p>Allows to change settings from the math module (through the ServerControl property).</p> <p>Warning: Application, which is used by several at the same time, can behave “unexpectedly”. If one user change graph settings on the server (e.g. switch language or switch to another page), the same change is displayed also at another users!!!</p>	Graph settings are individual for each Client application.

Creating a Graph in the Client

Graph creation:

1. Click the **Graph** button  or select the **New Graph** option in the **Project** menu. The **Graph** dialog with a tree structure of datapoints and properties of visual objects appears.
2. Select a datapoint or property you want to display in a graph by double-clicking on its name or press the **Add** button.
3. In the right part of dialog you can change a properties of course:
 - **Caption** – description text in the Listview
 - **Line, Width, Mark and Color** – course appearance
4. In the **Graph window** field select a graph name which is displayed in the window heading and press the **Create** button to open a widow of graph.

➤ Graph editing:

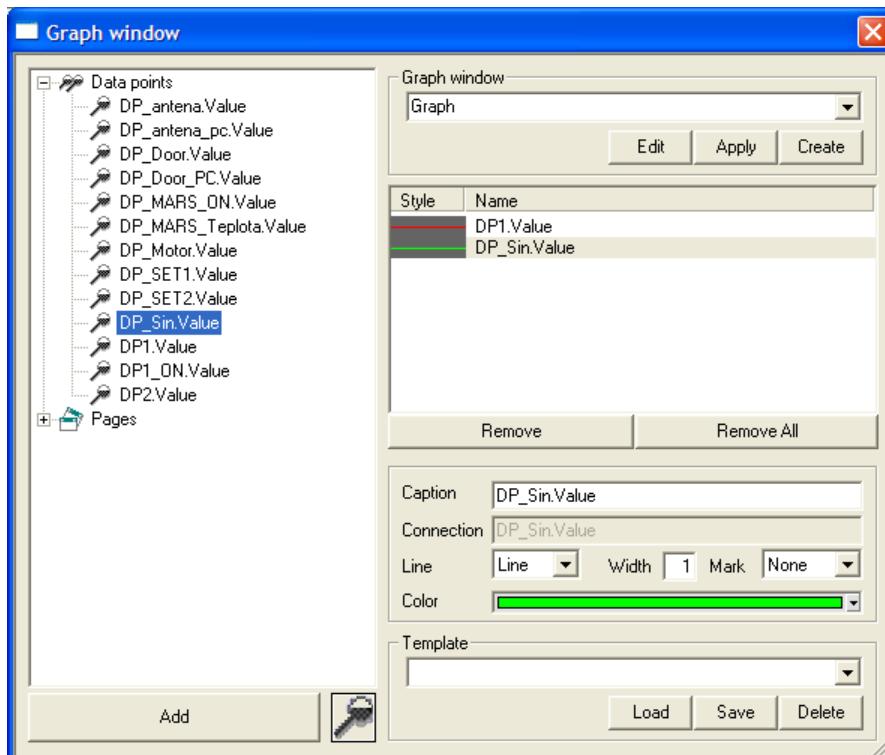
In the **Graph window** field select a graph which properties you want to change. Press the **Edit** button to load its courses into the list window in the right part of dialog. Select course and edit its properties or remove it, event. add new course and press the **Apply** button to use changed graph.

➤ Graph template:

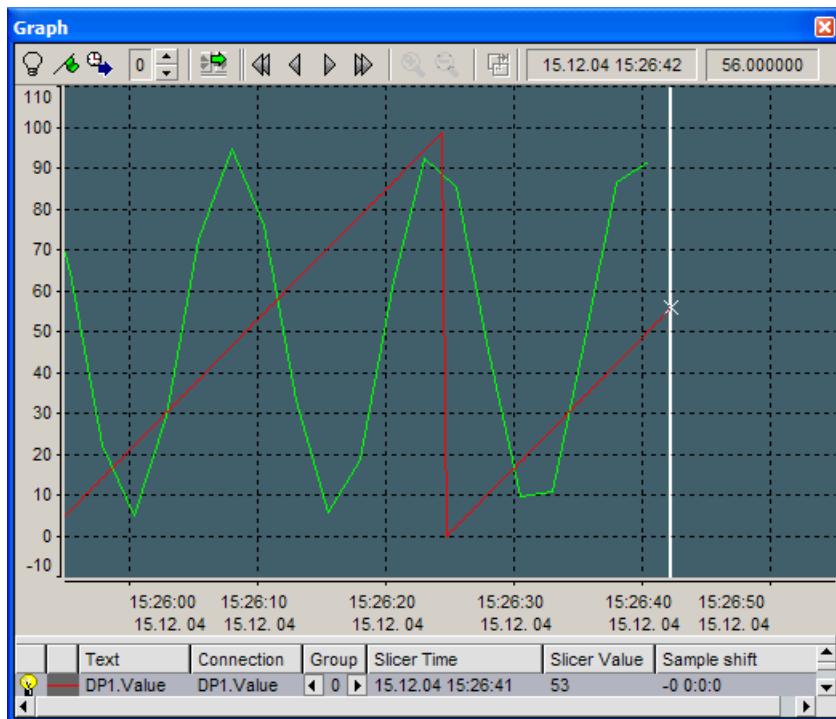
You can store all settings of window graph for further work (but only during the time of project running) using a **Template** part of dialog.

Predefined courses can be added to the graph settings (new or existing) using the **Load** button.

Tip: A graph is created as part of the Client window, which may sometimes be undesirable. Drag the graph with mouse by its header (double line with the graph's ordinal number) to either the middle of the area, where it will form a separate window, or to the Client window's other edge, where it gets attached automatically.



Graph dialog box



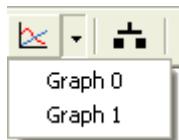
Graph window

Functions of Buttons on Graph Toolbar

Button	Description
	"Shining" bulb signify state when historical data are loaded from database.
	Enables or disables automatic offset of viewed graph section in time (it regards a course in current time).
	Moves viewed part of graph to show current time and values.
	Enables movement between work spaces and shows number of current space.
	Switches between toolbars 1 and 2.
Toolbar 1	
	Moves viewed part of graph by a page left.
	Moves viewed part of graph by time mark length left.
	Moves viewed part of graph by time mark length right.
	Moves viewed part of graph by a page right.
	Enlarges selected area.
	Reduces selected area to previous setting.
	Returns courses into the original timing arrangement (from time shifts of each course), that is, it undoes shifts of courses in time.
Toolbar 2	
	Opens the Time Selection dialog box to select the time range on the viewed area.
	Switches between the part of the area selection mode for detailed view and the shift mode of selected course.
	Switches between one graph cursor for all courses and independent cursors for each course.
	Enables or disables displaying of a list of courses (Listview) at the bottom of the graph.
	Enables or disables displaying of value axis.
	Switches between one common value axis for all courses view and view of separate axes, one for each course group.
	Mouse cursor position value and time readings are shown in two boxes in the right top corner of the graph.

Display / Hide Graph

You can control the graph window in a same way as a common window, i.e. there are buttons in the upper-left corner for its minimizing or closing. You can display the minimized graph if you select its name in the combo-box close to the graph button in the **Project toolbar**.



Work with Graph

Course Listview within Graph

➤ Displaying Information in Course Listview

At the bottom of the graph window is displayed a list of courses and their properties.

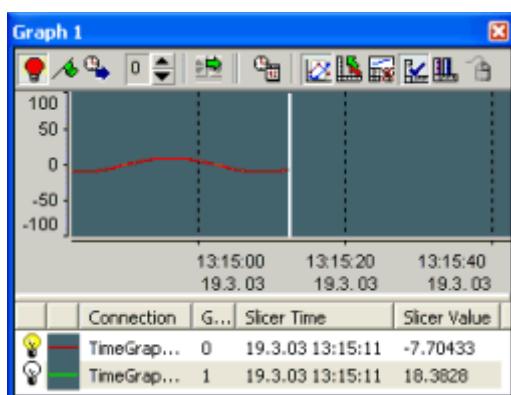
The meaning of each column is described in the chapter TimeGraph, section [Listview](#).

	Text	Connection	Group	Slicer Time	Slicer Value	Sample Shift
	sin1	sin1.Value	0	14.10.03 14:45:52	-22.5392	-0 0:0:0
	sin2	sin2.Value	1	14.10.03 14:45:52	17.5139	-0 0:0:0
	sin3	sin3.Value	2	14.10.03 14:45:52	-10.4883	-0 0:0:0

➤ Enabling and Disabling Display of Selected Course within Graph

In the course listview, click on the appropriate course's light bulb icon. The light bulb will go out and the course will stop being displayed in the graph.

Clicking on the light bulb icon again will redisplay the course (indicated by relighting the light bulb .



Example of enabled and disabled display of course

Graph Time Cursor

➤ Enabling Graph Time Cursor

No time cursor is displayed on the graph area at the moment of starting a client or opening a window graph. Therefore the boxes for cursor position value readings (on the right of toolbar and in the Listview) are blank.

A cursor shows up on mouse clicking on the graph at the click spot. While a cursor located in the history of a course stays at the same time position, a cursor located at the current time moves along with new values to keep displaying the current status.

➤ Operating Multiple Graph Cursors

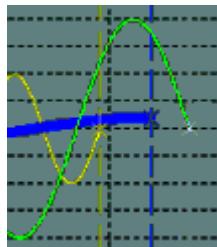
In common work with multiple courses in one graph you use a single time cursor for all courses. That one shows values of the active course that is the one selected and thus highlighted in the Listview, on the toolbar's right.

If you need to determine values for each course separately, employ the feature of enabling independent cursors for each course.

1. Press the button on the toolbar.

2. First select each course in the Listview and then click on the graph area at the spot where the cursor should be located.

A course, which is not active, shows its cursor as a thin dashed line of the same color as the graph course.



To return to one common cursor for all courses press the button.

Moving Around in Graph Area

An area within a graph can be moved along the time axis forward or backward to display courses in the time section desired.

➤ **A) Usage of Buttons on Graph Toolbar:**



Moves viewed part of graph to show current time and values.



Moves viewed part of graph by a page left.



Moves viewed part of graph by time mark length left.



Moves viewed part of graph by time mark length right.



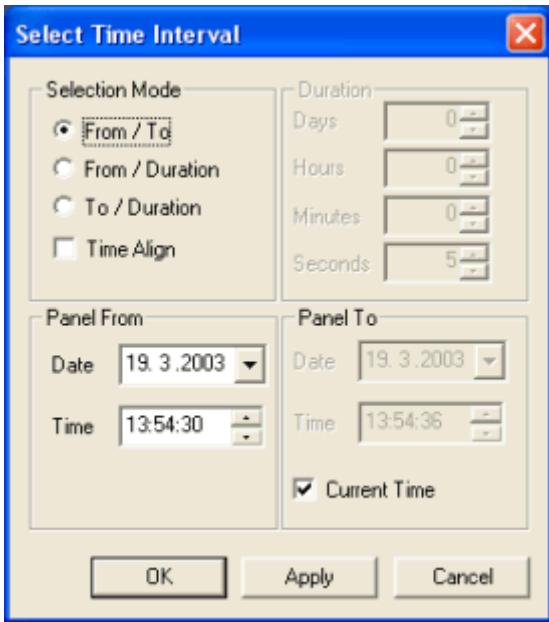
Moves viewed part of graph by a page right.

➤ **B) Moving Viewed Part of Graph Using Mouse:**

1. Press the button on the toolbar.
2. While simultaneously holding down the **CTRL** key and the mouse's left button, move the mouse in the direction you want the viewed area (with all the courses) to be shifted.

➤ **C) Selecting Time Range within Viewed Area:**

1. Press the button on the graph toolbar.
2. **Time Selection** dialog box opens where you select the time range to move to.



Comparing Courses

➤ One Course Movement

The simplest way of comparing two or more courses with each other is moving them so that they are superposed or have some points in common. It is actually analogical to moving a viewed part of graph using mouse:

1. Press the  button on the toolbar.
2. While simultaneously holding down the **SHIFT** key and the mouse's left button, move the mouse in the direction you want the active course (the one selected in Listview) to be shifted.

➤ Movement of Courses' Group

In a similar way you can move a whole group of courses against the other courses. In order to do that you need to press the **CTRL** key together with **SHIFT**.

➤ Removing of Courses to Original Arrangement

You can return the courses to their original timing arrangement by pressing of the  button.

Selection in Viewed Part of Graph

If you need to zoom in on a section of a course, you can do it by following way:

1. Press the  button on the toolbar.

2. While simultaneously holding down a key from the following list and the mouse's left button, move the mouse around to select the area desired.

SHIFT key - selection takes place on the time axis (mouse moved horizontally).

CTRL key - selection takes place on the value axis (mouse moved vertically).

CTRL + SHIFT keys - selection takes place on both axes (cutout of window).

The area selected is displayed in a different color. If you release the key before the mouse button, the selection will not take place and it will be canceled. You can cancel the area selection by pressing the **CTRL** and **SHIFT** keys and left-clicking on the graph area at a time.

3. To view a part selected in the entire graph area, press the  button.

Tip: If precise selection of the cutout edges is required, first press the  button to get to the mode of value and time reading from the mouse position.

To return from area selection view to normal view, use the  button.

Using Multiple Graph Work Spaces

If you adjust a graph area as you require, but you still need to view the same courses in yet another way, you do not have to create a new graph and add all courses again, but you can use an additional work space.



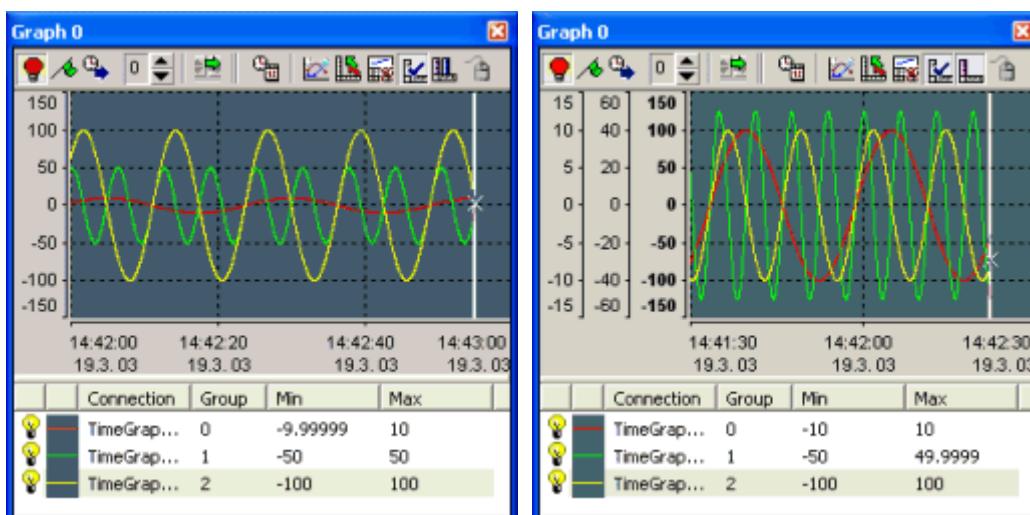
Using the button you switch between the spaces. You can use up to 10 spaces.

A graph area keeps most of its properties, such as time offset, course grouping, course visibility (dark or bright light bulb), minimum and maximum settings.

Using Multiple Value Axis

In a graph with multiple courses, the range of values shown (thus the value axis as well) is determined from the active course. Each course is displayed using the same scale. This method, however, is only convenient (and recommended) for items of the same type.

There is also the option of showing each course with its own value axes that is also at its own scale. You can enable multiple value axis view by pressing the  button.



Example of graph with common value axis and graph with multiple value axis

Note: The active course axis is always highlighted with bold typeface description.

Using Course Groups

You can group courses using Listview where you click on the **Group** column of the course selected and set a group number, which the course is to belong to.

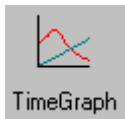


Courses that are in the same group show analogous behavior when viewed in a graph. They share the value axis (even in the **Multiple Value Axis** mode) and that is why they are always displayed at the same scale. Maximum and minimum are automatically chosen from common highest and lowest values, respectively.

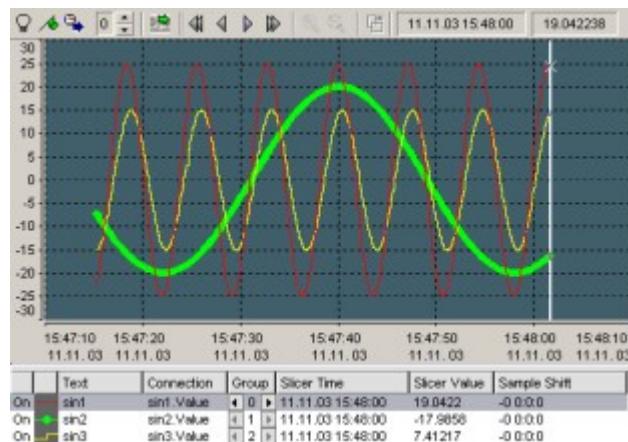
You can also move the whole group of courses against the other courses. Press the  button on the toolbar, afterward press the **SHIFT** and **CTRL** keys and while holding down the mouse left button, move the mouse where the group of courses is to go.

The courses thus shifted can be returned to their original arrangement by pressing the  button.

Visual Object TimeGraph



TimeGraph object is used to show time courses of data points.



Properties:

Color

Sets colors of following graph parts:

- Active graph cursor (**ActiveSlicer**)
- All graph's **axis**
- Graph's **background** (neighbourhood of panel)
- **Grid**
- **Panel**

Font

Specifies properties of text which is included in object:

- **Angle** of text
- **BackgroundColor** - a color of characters background (visible only for Transparent = false)
- **Bold** - possibility to select between Normal text and types of Bold text
- **Color** - color of characters
- **CharSet** - typeset of characters (Default, Symbol, ...)
- **Italic**
- **Name** - font of characters
- **Size** of font
- **StrikeOut** text
- **Transparent** of characters background
- **Underline** text

Listview

Columns	Determines, which information about course are displayed in bottom graph part: <ul style="list-style-type: none"> • Datapoint, which values are displayed (Connection) • Group to which course belongs • Sample of course marking (Mark) • Maximum value in selected area (Max) • Minimum value in selected area (Min) • A time interval by which each course is offset in the workspace (SampleShift) • Time, where a graph cursor is situated (SlicerTime) • Value, where a graph cursor is situated (SlicerValue) • Text, which describe course in Listview • Visibility of course (if is displayed)
DisableUserControl	Specifies if user can change size of Listview columns.
HeaderVisible	Specifies if header of Listview window is visible.
ItemsVisible	Number of rows, which are visible in the Listview window.
Orientation	Orientation of the Listview window.
Samples	Specifies number of courses in graph.
Sample_0	Settings for individual courses:
Connection	Name of datapoint, which values are displayed.
Course	Sets properties of course: <ul style="list-style-type: none"> • Color • Type of Marks for individual values (Circle, None, Square) • Style of displayed course (Hedge, Line, None) • Visibility • Width of course's line
Filter	Displayed data filter: <ul style="list-style-type: none"> • average over a time interval specified - AVG (d h:m:s) • logarithm - LOG() • differentiation - DERV() Multiple filtering is possible: for example $AVG(0\ 0:0:30) \mid LOG()$ <p>- will average the values over every 30 seconds and subsequently data logarithm is found.</p> <p>Attention: Filter of historical data is not working in this version!</p>
Group	Specifies a number of course's group. Total number of groups is limited by number of courses - e.g. for two courses are available group 0 and group 1. Both courses could be together in the same group or each could be in other group.
Levels	Specifies optical display of limits in the graph (serves for visual monitoring of course value): <ul style="list-style-type: none"> • Value of Low limit • Type of display – Both limits, only Low limit, None, only Upper limit • Value of Upper limit
Text	Contains text, which describe course in Listview.

ValueAxis	Sets properties of value axis: <ul style="list-style-type: none"> • Value axis title (Caption) • Enables or disables using of fixed limits (FixedMinMax) • Upper displayed limit (FixMax) • Lower displayed limit (FixMin) • Number of displayed decimal places (Precision)
ServerControl	Allows to change settings from the math module. If this property is set to the <i>true</i> value, graph reacts to the change of properties from the server. Warning: Application, which is used by several at the same time, can behave "unexpectedly". If one user change graph settings on the server (e.g. switch language or switch to another page), the same change is displayed also at another users!!!
TimeAxis	Specifies properties of time axis: <ul style="list-style-type: none"> • Begin of value axis – for zero value is not used • Format of axis units display • Length of displayed time interval
Toolbar	Specifies style of graph toolbar display (Big , None , Small)
ValueAxis	Enables or disables display of value axis (Visible), eventually display of one value axis for each group of courses (Multiple). Note: using of one axis for more courses is recommended only for data points of the same type.

Note: Description of other properties common to all Visual Objects can be found in the [Common Properties of Visual Objects](#) chapter.

Common Properties of Visual Objects

ObjectName

Name of visual object. This name is unique within a one objects' level – for example within the one page cannot be two objects with the same name and which parent is page. Objects with the same name are at creation automatically indexed.

Only characters from the ASCII table are valid (according to the same rules as in the C language).

Background

Sets object's background. The following parameters can be specified:

1. **Alpha:**
 - a) **Full** - filled with color or picture selected
 - b) **Glass** - overlaid objects shown through colored area (doesn't apply to picture)
 - c) **Transparent** - object completely transparent (doesn't apply to picture)
2. **Color** - sets object's background color
3. **Picture** - either none or selected from a list of pictures defined in Resources
4. **Style:**
 - a) Area filled with color or hachure with color set in BrushLinesColor (**Solid**, **BDiagonal**, **Cross**, **Diagonal Cross**, **FDiagonal**, **Horizontal**, **Vertical**)
 - b) Area filled with picture (**Picture: Fill**, **Picture: Stretch**, **Picture: LeftTop**, ...)

- c) Area filled with picture, which is transparent in parts with same color as object's background color (**Picture: [Fill]**, **Picture: [LeftTop]**,...)

Border

Sets object's margin (non)transparency.

BrushLinesColor

Sets object area hachure color.

Description

Text (description of visual object), which is displayed in the status bar of Editor and Client at moving of mouse pointer over this object. If any text is specified, an object name is displayed.

FlashSpeed

Specifies frequency of object's blinking per second.

Frame

Following parameters can be set to object frame:

1. **BevelSize** - of 3D frame
2. **DarkColor**, **LightColor** - 3D frame upper and lower margin shading color
3. **Line** - frame line style
4. **Round** - object frame arch size (does not apply to ellipse or rectangle)
5. **Size** - frame width
6. **Style** - frame style (**Ellipse**, **Polygon**, **Rectangle**, **Round rectangle** (rectangle with round corners), **Tank land** (tank in landscape position), **Tank port** (tank in portrait position))
7. **Slider** - slider upper and lower edge shading color (for **Slider** object only)
8. **Style3D** - 3D frame style (**Down**, **Downup** (lower bevel), **None**, **Shade**, **Up**, **Updown** (upper bevel))

Indent

Specifies indentation of object contents from object borders.

Position

Object dimensions and position on a page.

ReadOnly

Enables or disables possibility of writing values in object (for example from data point or Script Editor).

ShowFocus

Enables or disables frame display at time of object selecting (focus).

Visibility

Enables or disables object visibility.

Various Graph Examples

