

DIAMView

RealTimeChart/HistoryChart

Ruby

2020/05/01



Outline

- The concepts of chart
- RealtimeChart
 - Overview
 - Create a RealtimeChart
 - Properties
 - Toolbar Buttons
 - Scripts
- HistoryChart
 - Overview
 - Create a HistoryChart
 - Properties
 - Toolbar Buttons
 - Scripts

Purpose

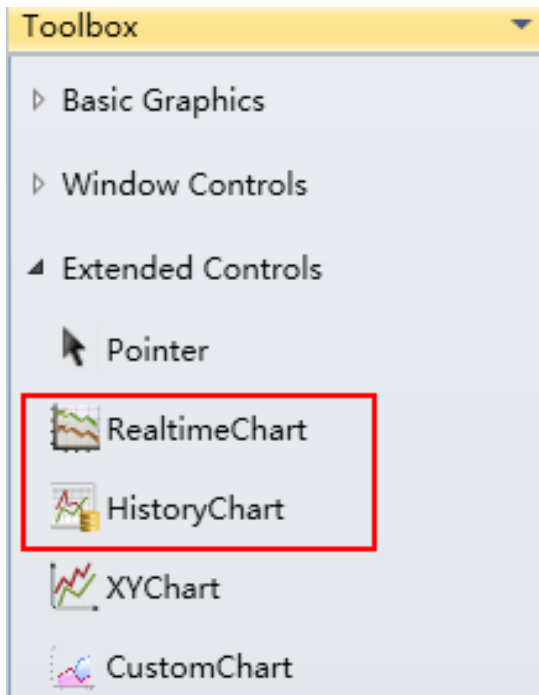
In this chapter, you will learn

- ... more about Realtime Chart
- ... more about Histoty Chart

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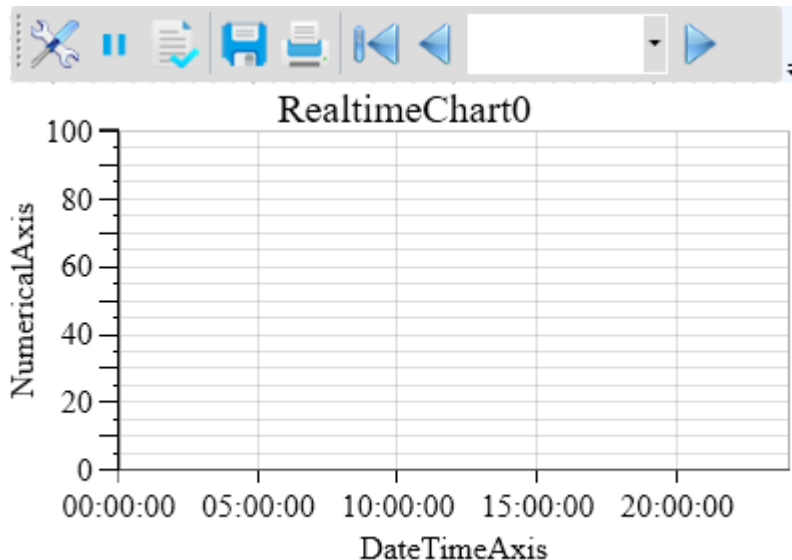
The curve that reflects the trend of data change with time, and is widely used in industry. For example, it displays the trend of environmental temperature, water temperature, production output and other changes with time, which is convenient for users to efficiently and quickly collect, analyze, and process various industrial data, thereby improving production efficiency. The DIAView software contains various chart controls. Here we introduce real-time chart and history chart.



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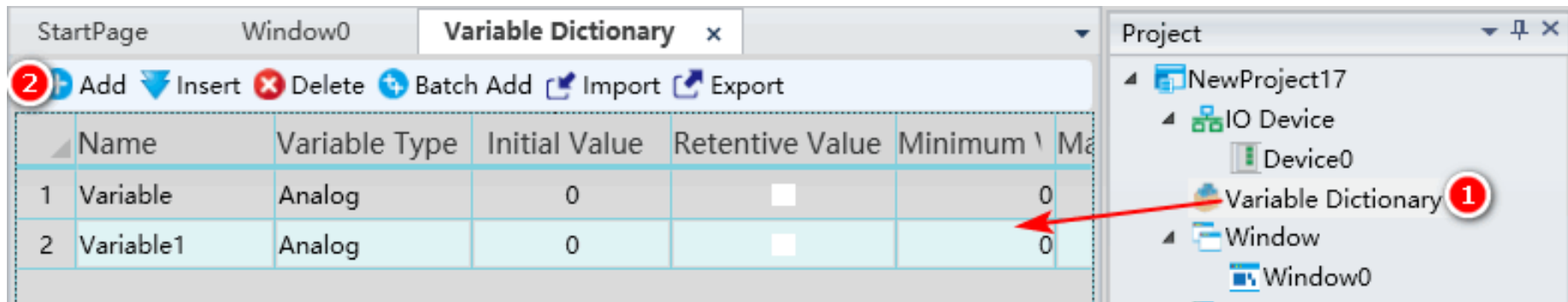
➤ Overview

The RealtimeChart is a graph of the value of the variables or expressions in a period of time, which changes with time. It is usually used in energy, medical and other industries. In order to facilitate user query, real-time trend can not only draw the curve of real-time data, but also provide special configuration types such as trend mode, trend time, curve, time axis, value axis, etc. Drawing and charting methods meet a variety of different needs.



➤ Create a RealtimeChart that refreshes the real-time data

(1) Create 2 variables :Variable, Variable1



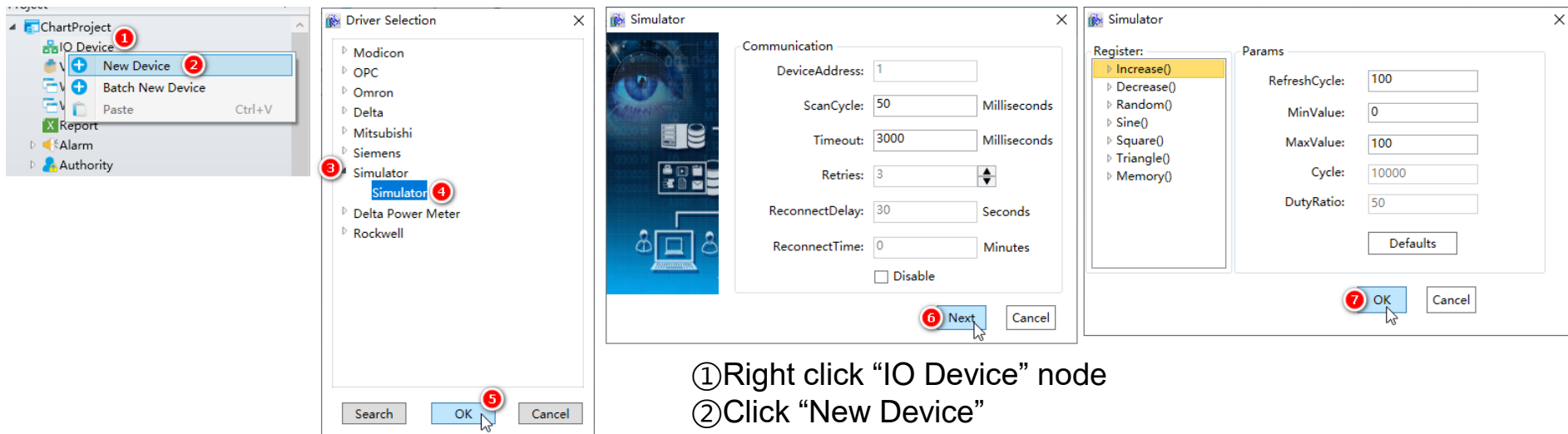
The screenshot displays the Delta PLC software interface. The main window is titled 'Variable Dictionary' and contains a table with the following data:

	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Ma
1	Variable	Analog	0	<input type="checkbox"/>	0	
2	Variable1	Analog	0	<input type="checkbox"/>	0	

Below the table is a toolbar with buttons: Add (circled in red with a '2'), Insert, Delete, Batch Add, Import, and Export. To the right, the 'Project' window shows a tree structure: NewProject17 > IO Device > Device0 > Variable Dictionary (circled in red with a '1'). A red arrow points from the 'Variable Dictionary' node in the project tree to the 'Variable Dictionary' window.

※Refer to the section "6.3 Variables" in user manual.

(2) Create a simulated device : Device0



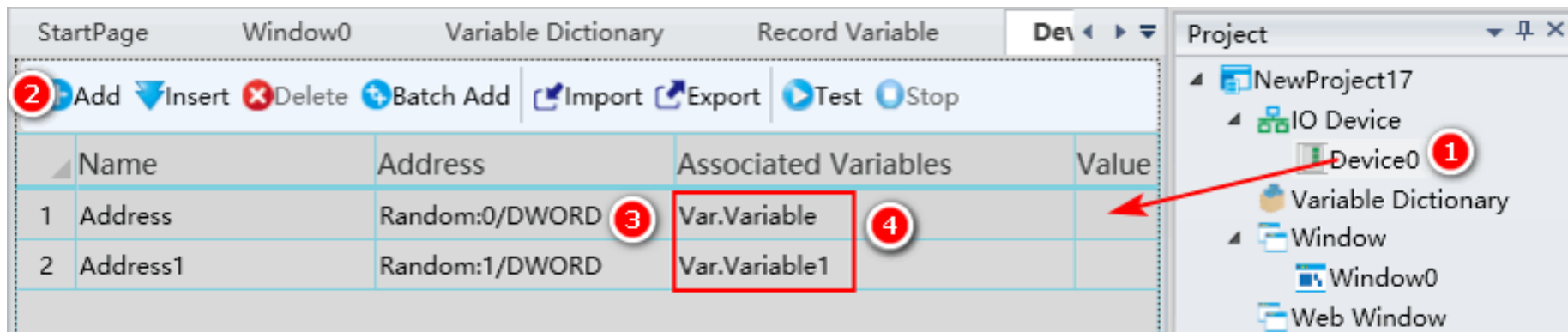
The screenshots illustrate the steps to create a simulated device:

- Right click "IO Device" node
- Click "New Device"
- Double click "Simulator"
- Click "Next"
- Click "OK"
- Click "Next"
- Click "OK"

- ①Right click "IO Device" node
- ②Click "New Device"
- ③④Double click "Simulator"

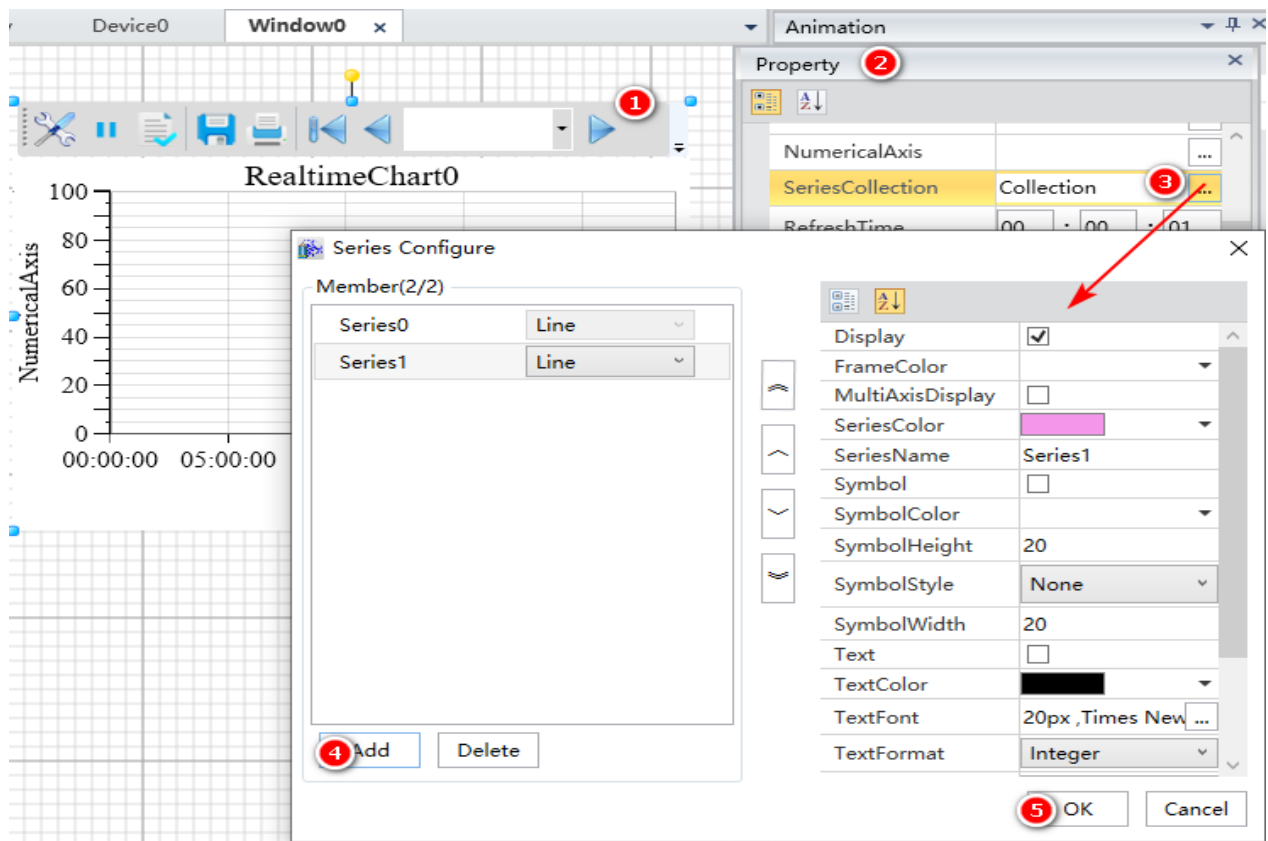
※Refer to the section "5.10.1 Simulator" in user manual.

(3) Create two simulation address in the Device0 that associated with Variable, Variable1 respectively

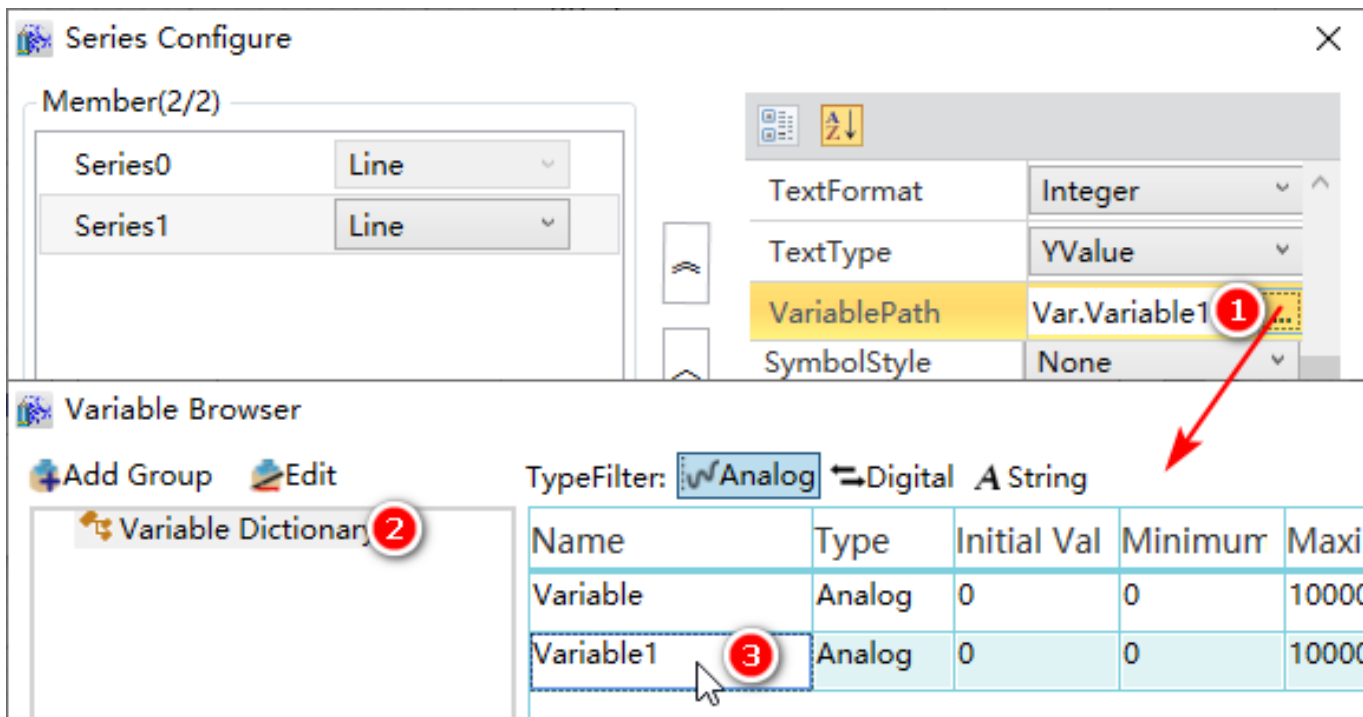


	Name	Address	Associated Variables	Value
1	Address	Random:0/DWORD	Var.Variable	
2	Address1	Random:1/DWORD	Var.Variable1	

(4) Create a RealtimeChart0 in the Window0, and add 2 curves in the RealtimeChart0



(5) Curves associated variables: Series0 associated Variable, Series1 associated Variable1



Series Configure

Member(2/2)

Series0	Line
Series1	Line

TextFormat: Integer
TextType: YValue
VariablePath: Var.Variable1
SymbolStyle: None

Variable Browser

Add Group Edit

Variable Dictionary

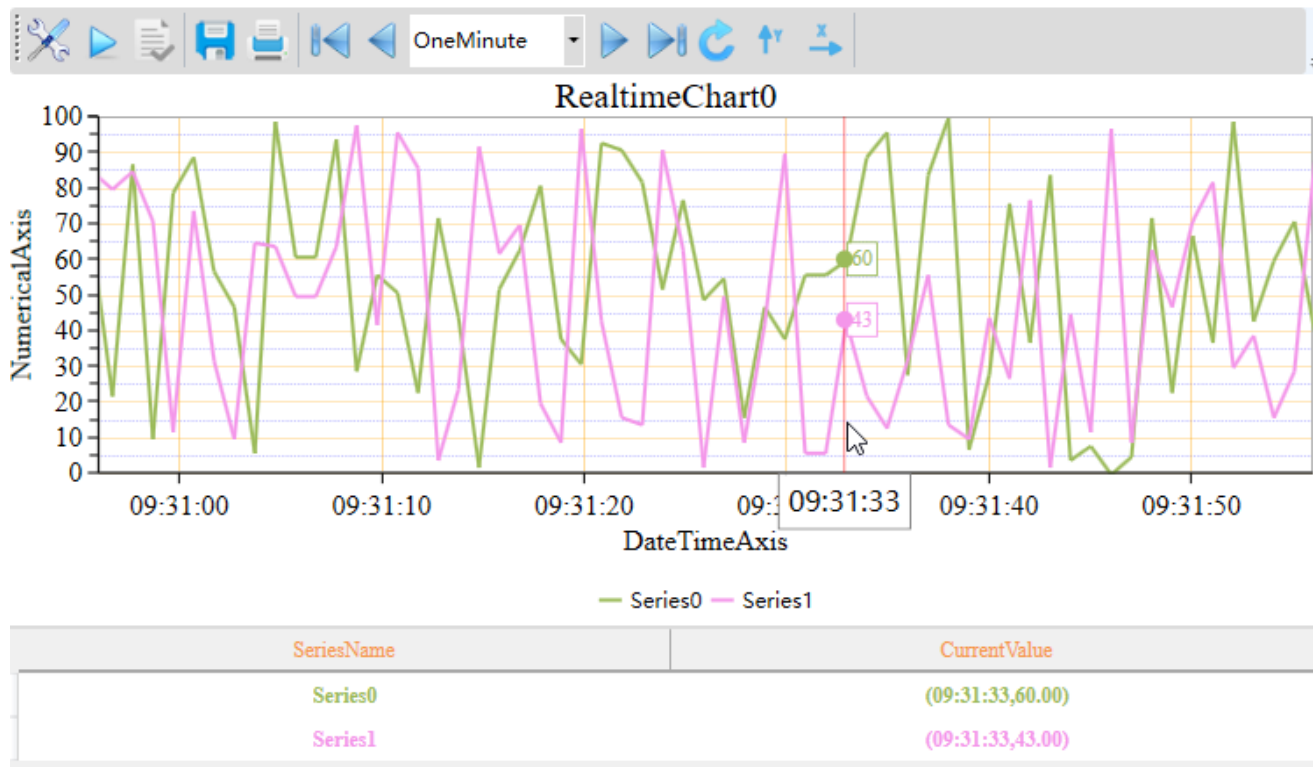
TypeFilter: Analog Digital String

Name	Type	Initial Val	Minimum	Maximum
Variable	Analog	0	0	10000
Variable1	Analog	0	0	10000

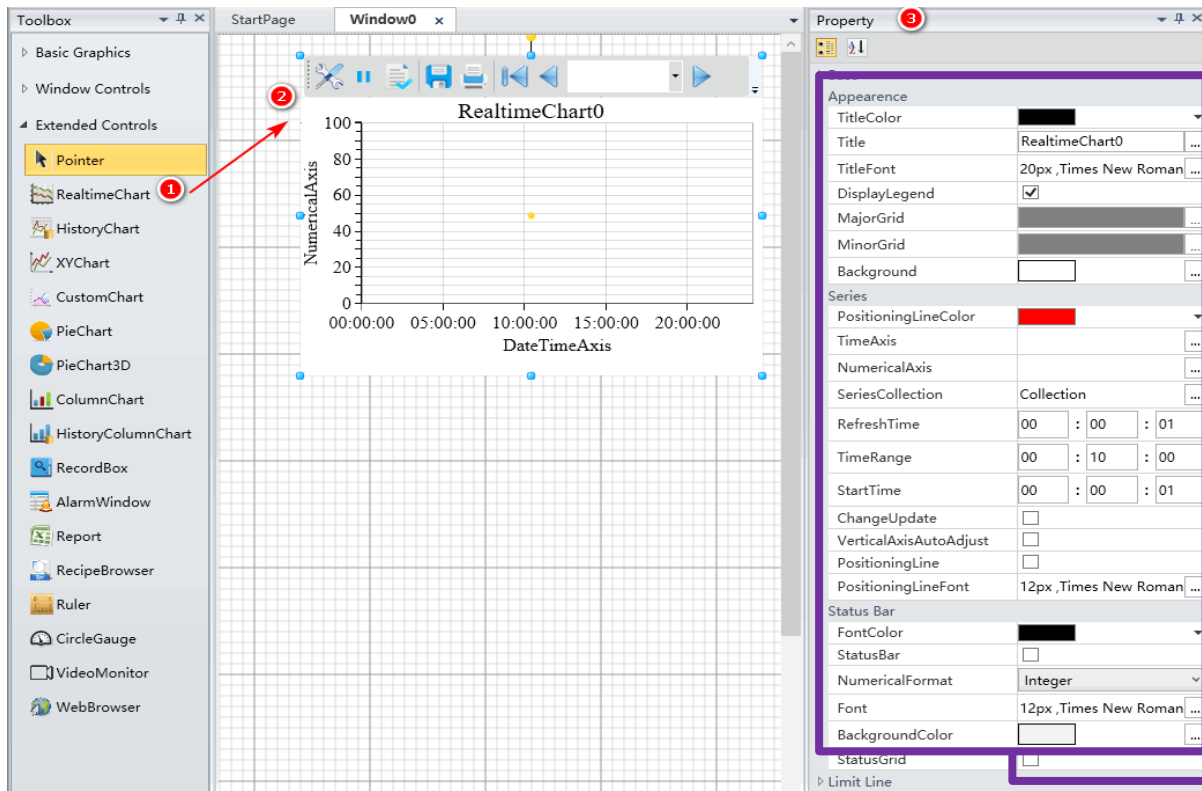
(6)Set some properties

Appearance	
TitleColor	<div></div>
Title	RealtimeChart0
TitleFont	20px ,Times New Roman
DisplayLegend	<input checked="" type="checkbox"/>
MajorGrid	<div></div>
MinorGrid	<div></div>
Background	<div></div>
Series	
PositioningLineColor	<div></div>
TimeAxis	
NumericalAxis	
SeriesCollection	Collection
RefreshTime	00 : 00 : 01
TimeRange	00 : 10 : 00
StartTime	00 : 00 : 01
ChangeUpdate	<input type="checkbox"/>
VerticalAxisAutoAdjust	<input type="checkbox"/>
PositioningLine	<input checked="" type="checkbox"/>
PositioningLineFont	12px ,Times New Roman
Status Bar	
FontColor	<div></div>
StatusBar	<input checked="" type="checkbox"/>
NumericalFormat	Double2
Font	12px ,Times New Roman
BackgroundColor	<div></div>
StatusGrid	<input type="checkbox"/>

(7)Run the Window0, The RealtimeChart0 refreshes data as follows

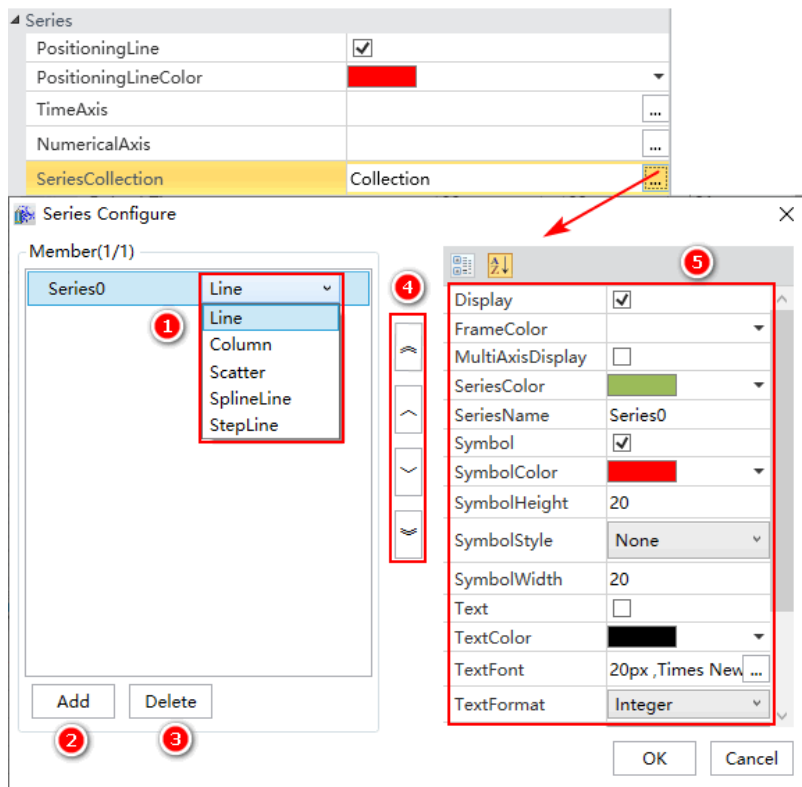


➤ Property window



- **TimesAxis:** Set properties of TimeAxis
- **NumericalAxis:** Set properties of NumericalAxis
- **SeriesCollection:** Add or delete series, set properties of series
- **ChangeUpdate:** Set whether to update data only when the value changes
- **VerticalAxisAutoChange:** Set whether to automatically adjust the maximum value of the vertical axis.
- **PositionLine:** Whether to display position line
- **PositionLineColor:** Set the color of position line
- **PositionLineFont:** Set the font format of the data on the position line
- **DisplayLegend:** Whether display legend of a chart.
- **MajorGrid:** Set major grid style
- **MinorGrid:** Set minor grid style

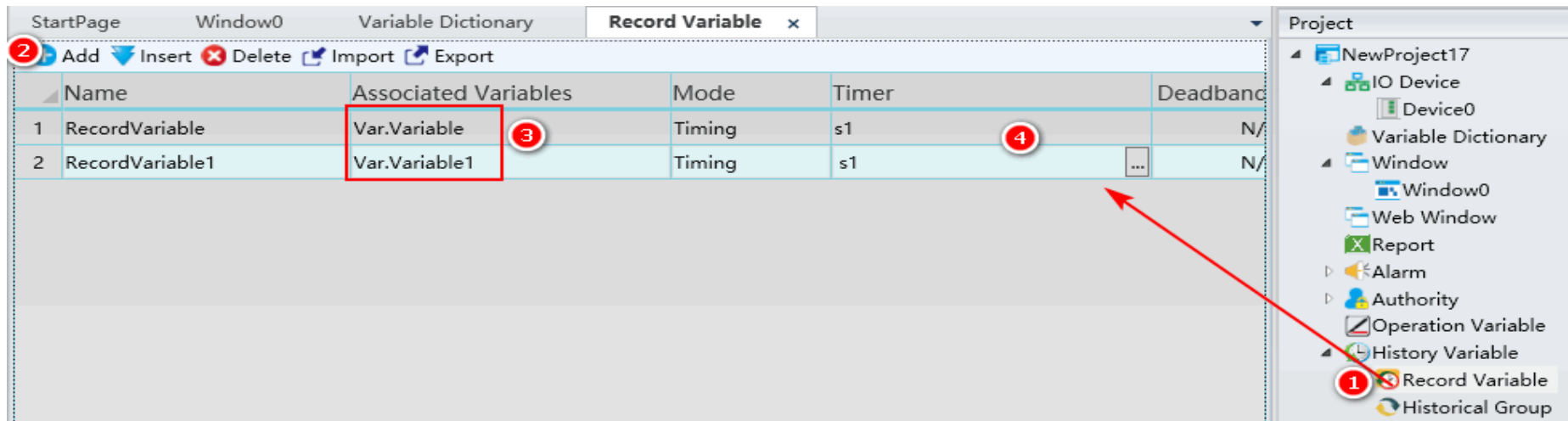
➤ SeriesCollection property



- ① SeriesType : Set the type of the series
- ② Add series in the RealtimeChart
- ③ Remove series from the RealtimeChart
- ④ Change the display order of series
- ⑤ Set properties of currently selected series

➤ TimeRange property example

(1) The variables associated with the curves in the series collection of RealtimeChart are also associated with the simulation device and historical variables

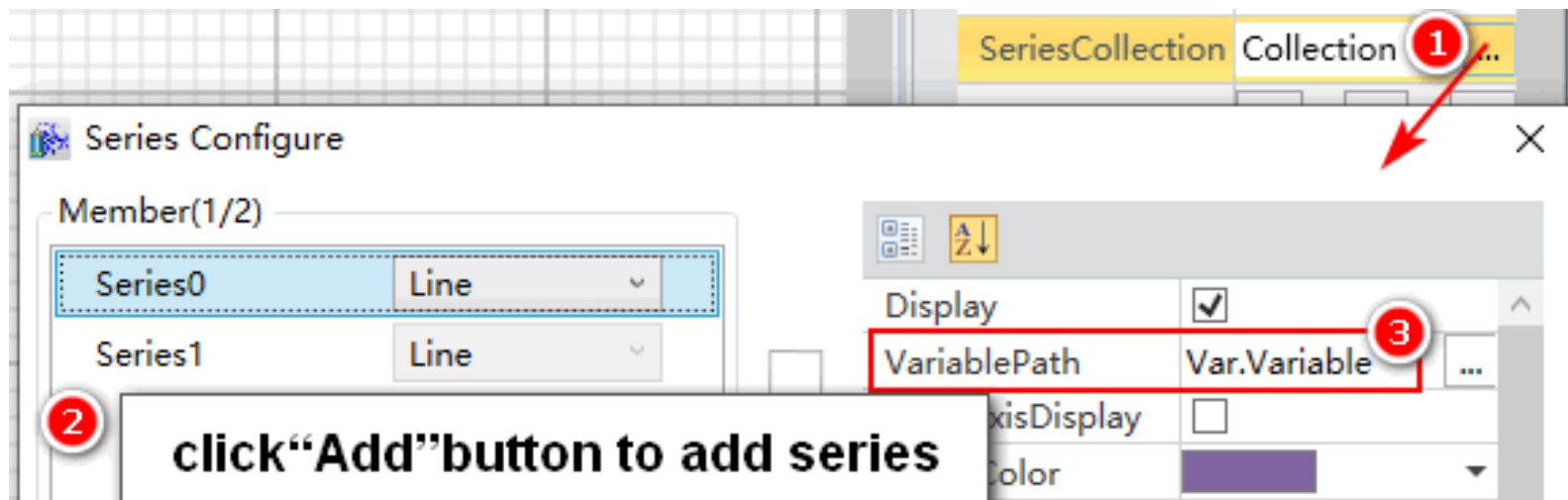


	Name	Associated Variables	Mode	Timer	Deadband
1	RecordVariable	Var.Variable	Timing	s1	N/
2	RecordVariable1	Var.Variable1	Timing	s1	N/

Project Tree:

- NewProject17
 - IO Device
 - Device0
 - Variable Dictionary
 - Window
 - Window0
 - Web Window
 - Report
 - Alarm
 - Authority
 - Operation Variable
 - History Variable
 - Record Variable
 - Historical Group

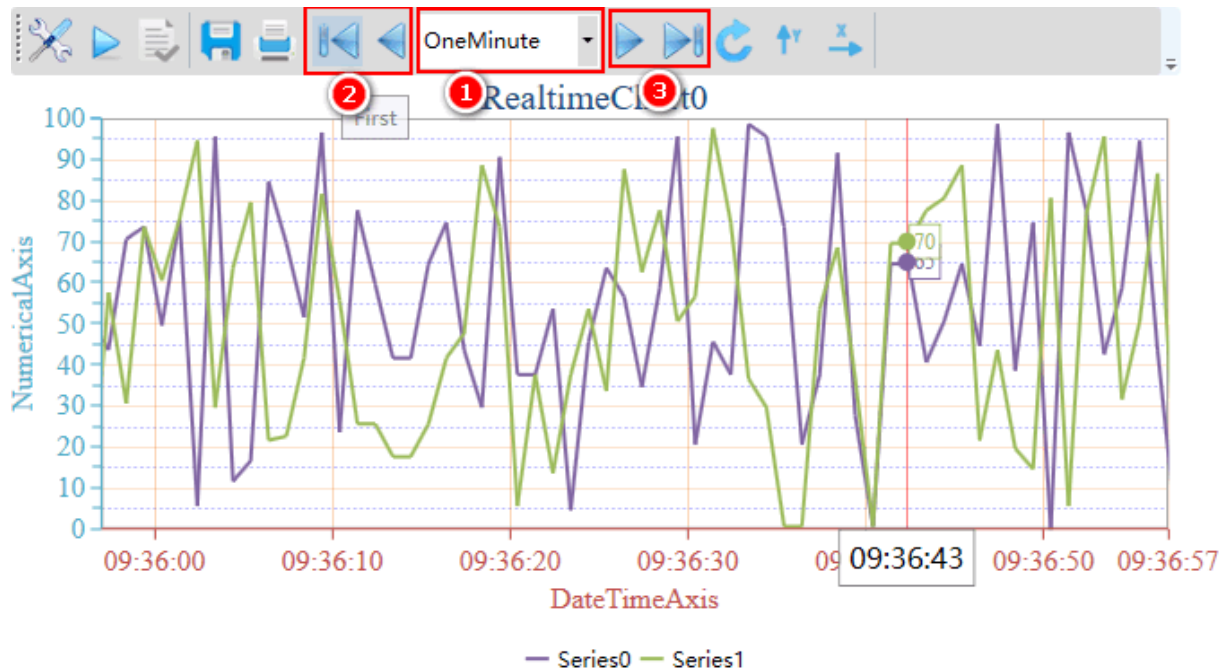
(2)Series0 associated Variable, Series1 associated Variable1



(3) Set TimeRange property to 10min

RefreshTime	00	:	00	:	01
TimeRange	00	:	10	:	00
StartTime	00	:	00	:	01

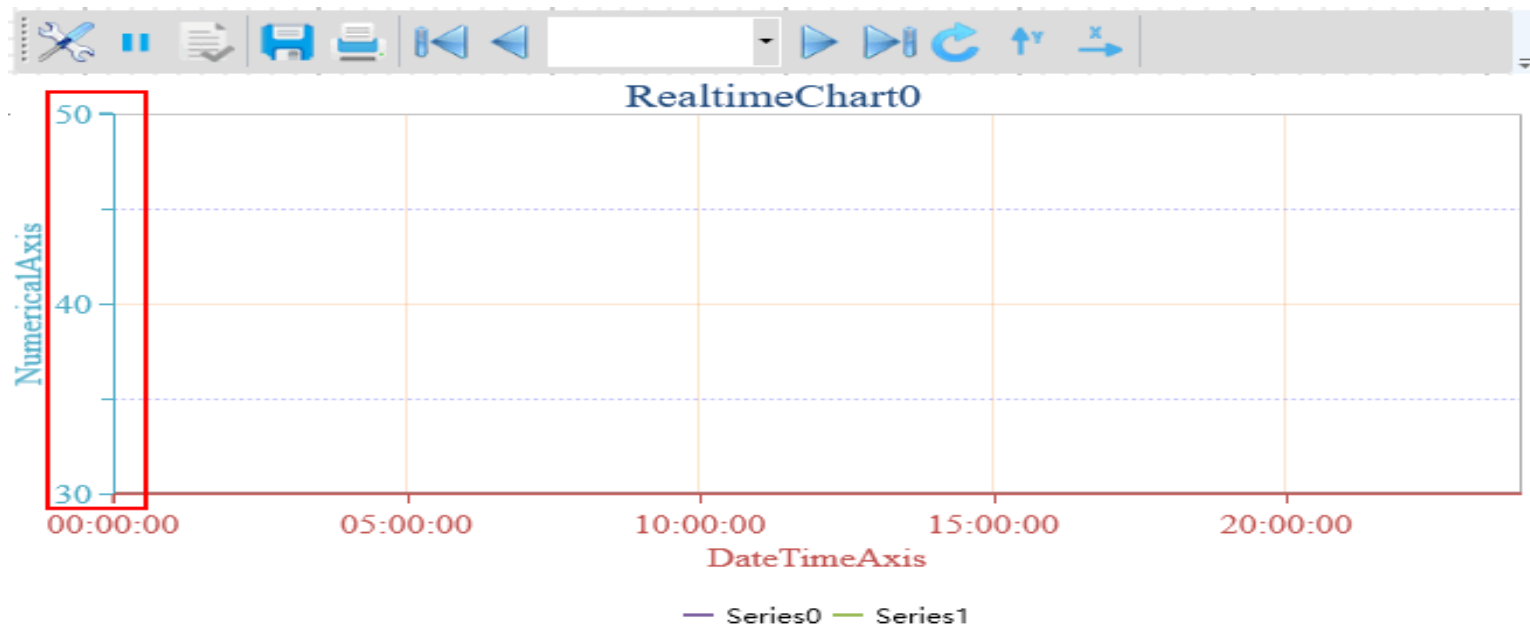
(4)Run the project



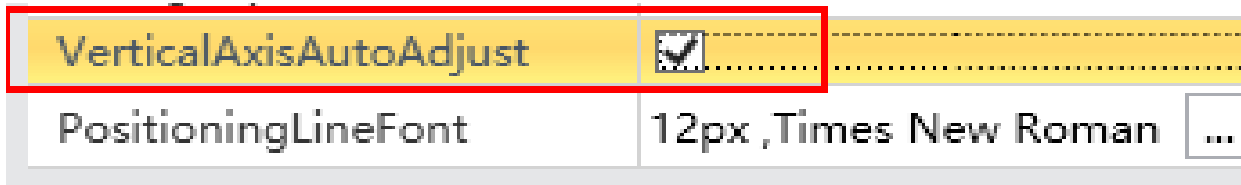
- ① Set Page Range to 1min
- ②③ Use the “First”, “Forward”, “Backward”, “Last” button to view the historical data (within 10min). In this configuration, up to 10 pages of data can be viewed

➤ VerticalAxisAutoAdjust property example

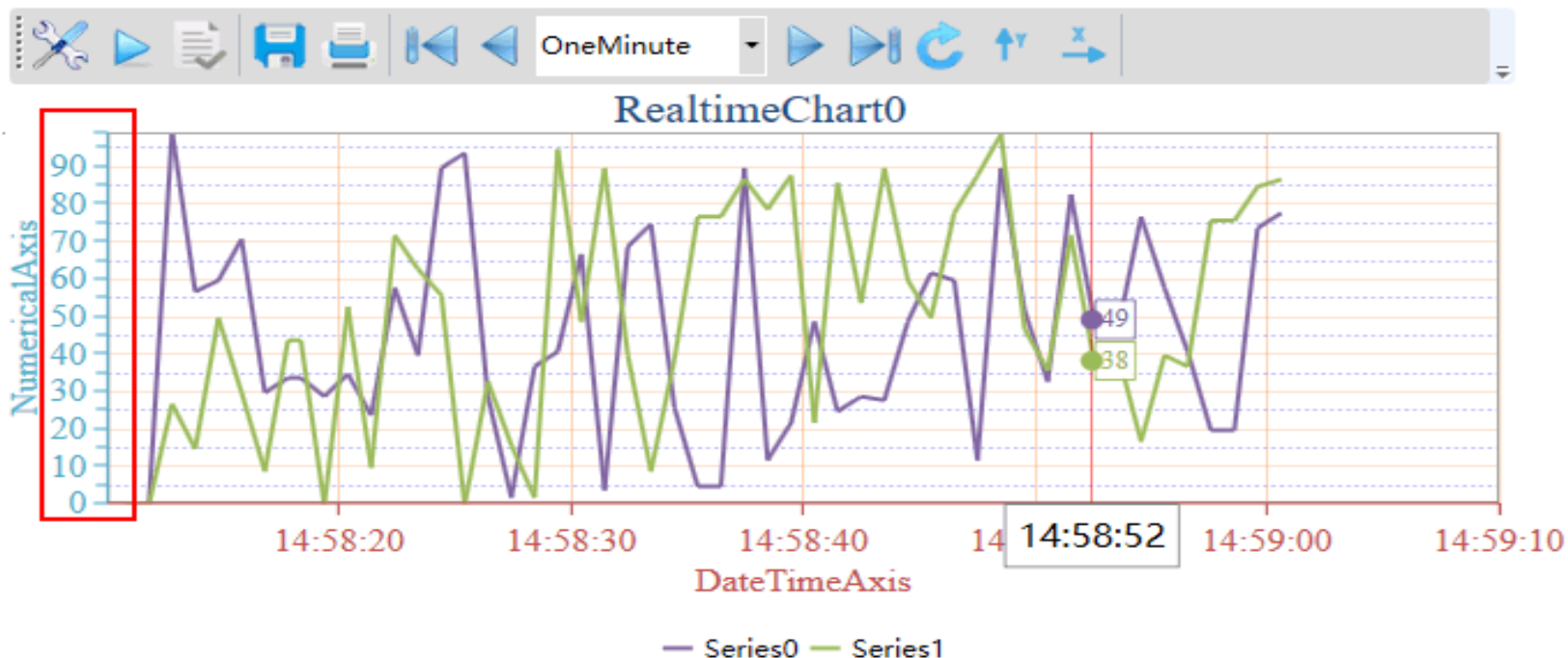
(1) Create a RealtimeChart0 and set the numerical axis range from 30 to 50, Series0,Series1 associated with the Variable0,Variable1 respectively(associated with Simulation Device) range from 0 to 100



(2) Check the VerticalAxisAutoAdjust property of RealtimeChart0

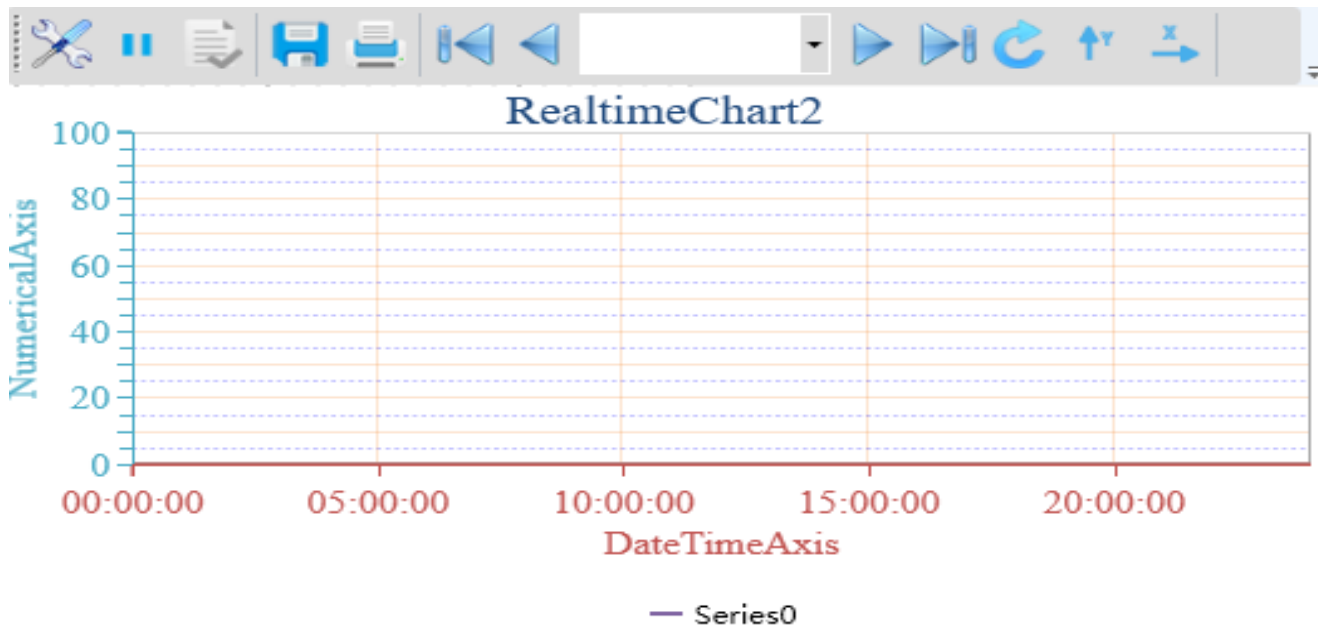


(3) Run the project, the range of the numerical axis is adjusted with the value of the data points



➤ ChangeUpdate property example

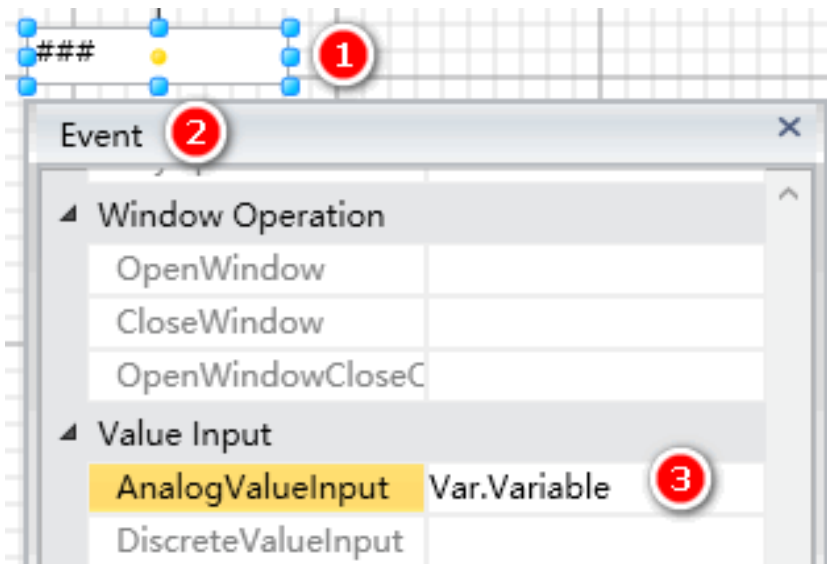
(1) Create a RealtimeChart1 , RealtimeChart2 in the Window0 and all add a Series0 who is associated with Variable4(not associated with any device) in the variable dictionary



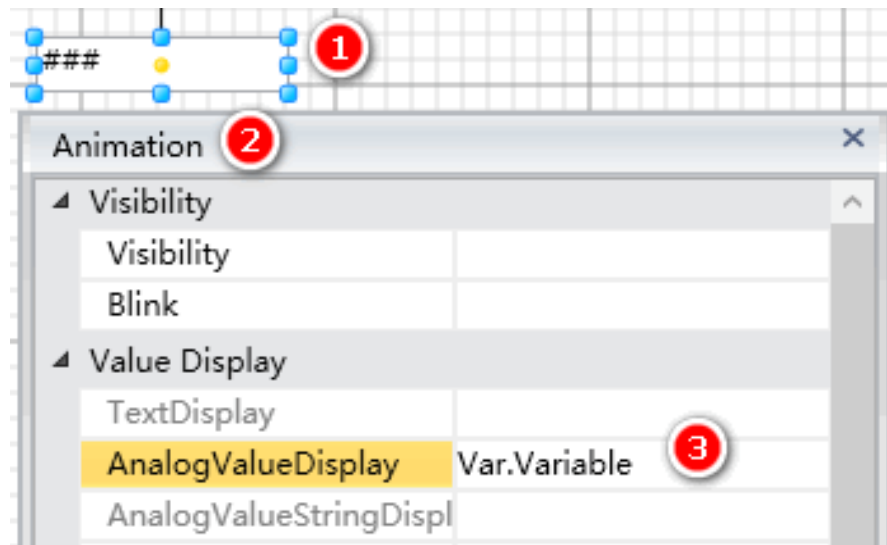
(2) Uncheck ChangeUpdate property of RealtimeChart1, Check the ChangeUpdate property of RealtimeChart2

ChangeUpdate	<input checked="" type="checkbox"/>
VerticalAxisAutoAdjust	<input type="checkbox"/>
PositioningLineFont	12px ,Times New Roman ...

(3) Create a TextBox0 in the Window0. Configure event and animation of the TextBox0

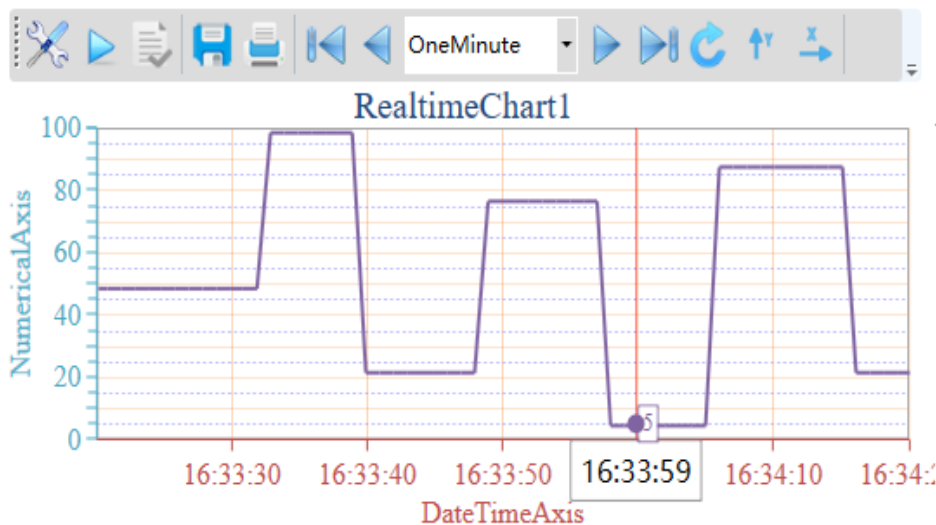


Analog Value Input Event

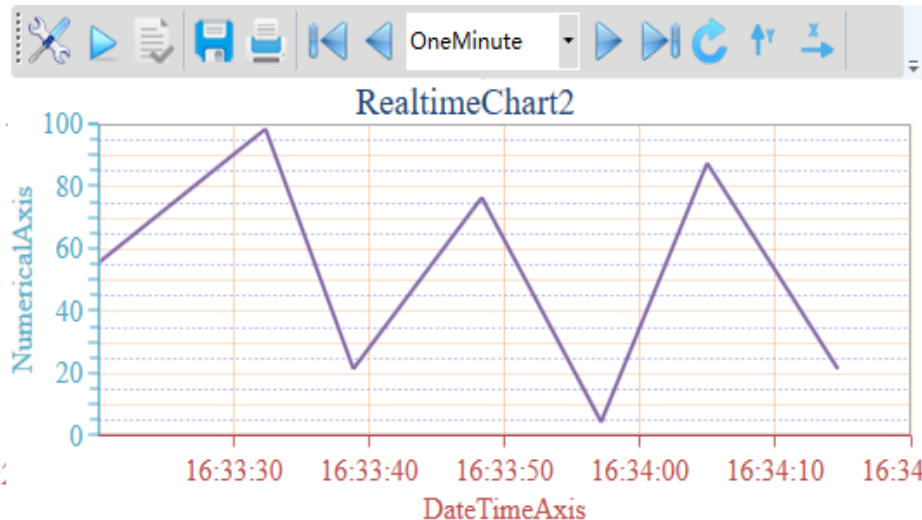


Analog Value Display Animation

(4) At run time, enter a data in TextBox0 every few seconds, the RealtimeChart1 and RealtimeChart2 refresh effect are as shown below



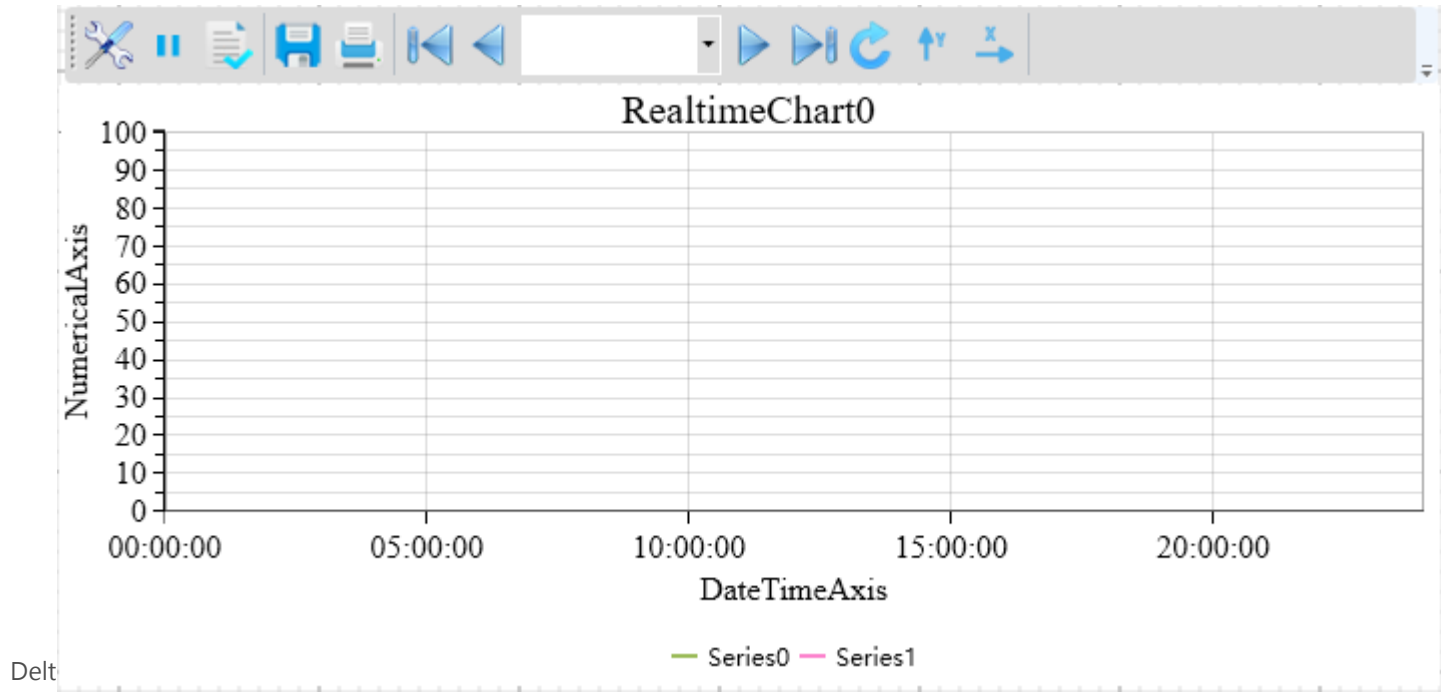
ChangeUpdate property is Unchecked



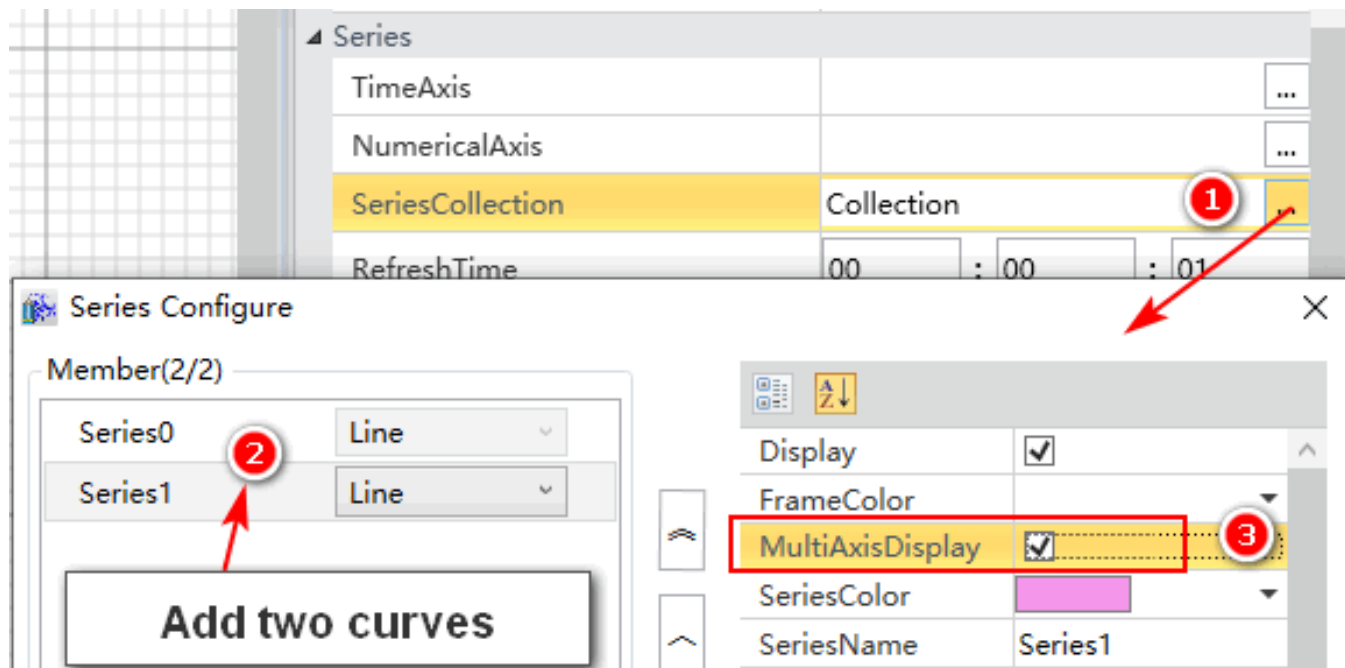
ChangeUpdate property is checked

➤ MultiAxisDisplay property example

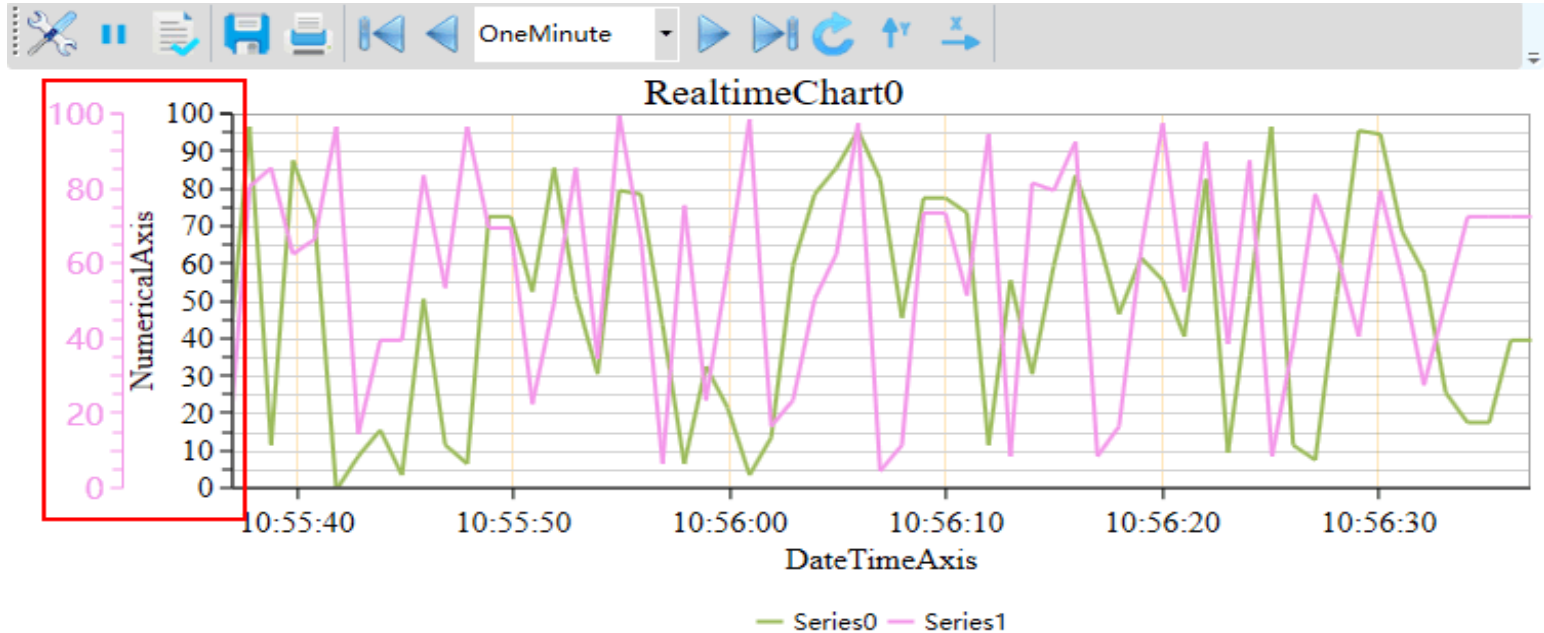
(1) Create a RealtimeChart0 and add two curves, Series0, Series1 associated with the Variable0, Variable1 respectively (associated with Simulation Device).



(2) Check the MultiAxisDisplay property of Series1 in the RealTimeChart0

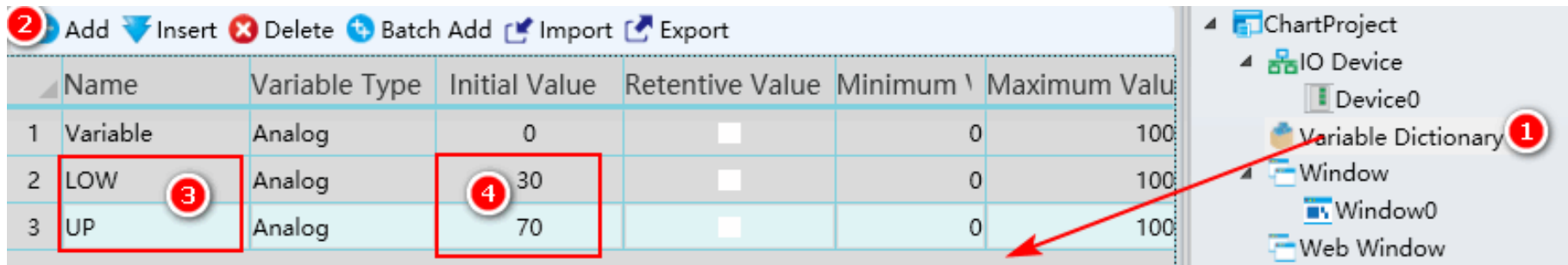


(3) Run the project, two numerical axis will be displayed on the RealtimeChart0



➤ Limit Line property example

(1) Create three variables : Variable,UP,LOW(Variable associated with Simulation Device).



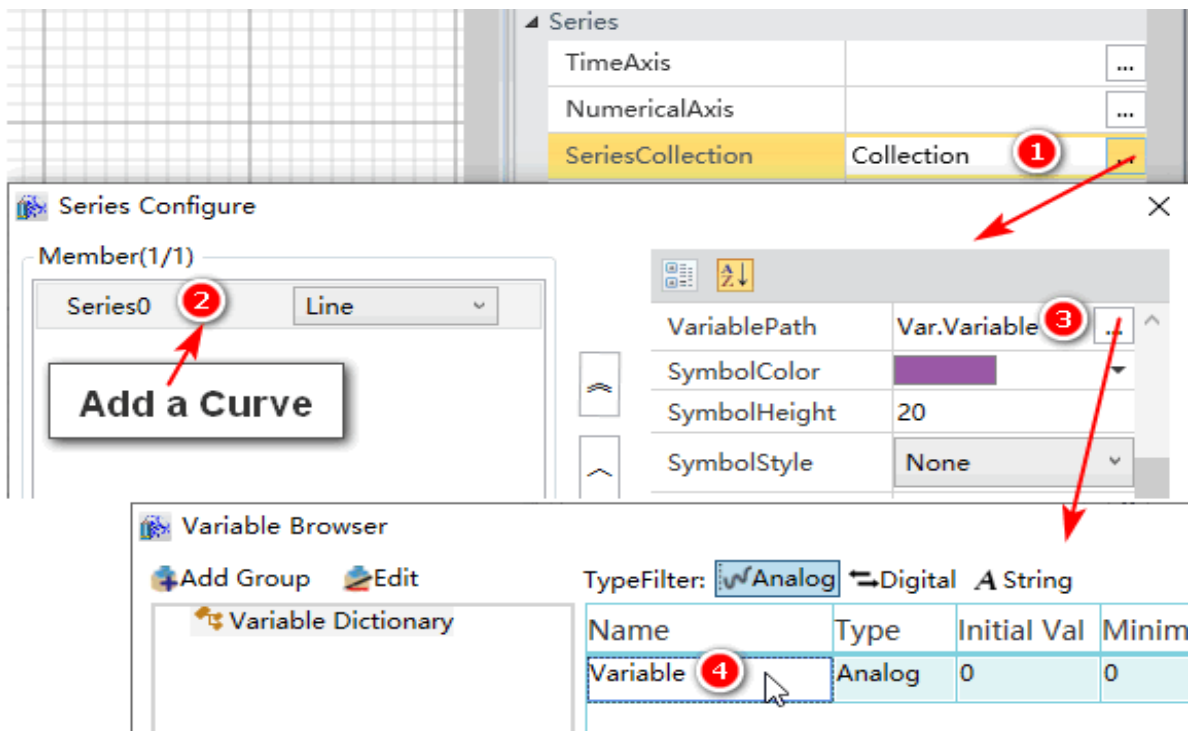
The screenshot displays the Delta Realtime Chart software interface. On the left, a table titled 'Variable Dictionary' lists three variables: 'Variable', 'LOW', and 'UP'. The 'LOW' and 'UP' rows are highlighted with red boxes, and the 'Initial Value' column for 'LOW' (30) and 'UP' (70) is also highlighted with red boxes. On the right, a project tree shows the hierarchy: 'ChartProject' > 'IO Device' > 'Device0' > 'Variable Dictionary' (circled in red with a '1'). A red arrow points from the 'Variable Dictionary' entry in the tree to the 'Variable Dictionary' table.

	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Maximum Value
1	Variable	Analog	0	<input type="checkbox"/>	0	100
2	LOW	Analog	30	<input type="checkbox"/>	0	100
3	UP	Analog	70	<input type="checkbox"/>	0	100

Project Tree:

- ChartProject
 - IO Device
 - Device0
 - Variable Dictionary (1)
 - Window
 - Window0
 - Web Window

(2) Create a RealtimeChart0 and add a Series0(SeriesType is Line),Series0 associated with the Variable



The screenshot illustrates the configuration steps for a Realtime Chart. It shows three main components: the Series Collection, the Series Configure dialog, and the Variable Browser.

Series Collection: A table listing the chart's components. The 'SeriesCollection' row is highlighted, and a red circle with the number '1' is placed over the '+' icon in its rightmost column.

Series	
TimeAxis	...
NumericalAxis	...
SeriesCollection	Collection 1

Series Configure: A dialog box for configuring the selected series. The 'Series0' tab is active, and the 'Line' series type is selected. A red circle with the number '2' is placed over the 'Series0' tab. A button labeled 'Add a Curve' is visible. To the right, a table lists the series properties.



Property	Value
VariablePath	Var.Variable 3
SymbolColor	Purple
SymbolHeight	20
SymbolStyle	None

Variable Browser: A window for selecting variables. The 'TypeFilter' is set to 'Analog'. A table lists the available variables. A red circle with the number '4' is placed over the 'Variable' row in the table.

Name	Type	Initial Val	Minim
Variable 4	Analog	0	0

(3) Set limit line property of the RealtimeChart0

Limit Line

Thickness	1.00	①
LimitLineMaximum	Var.UP	④
LimitLineMinimum	Var.LOW	⑤
UpperAndLowerDisplay	<input checked="" type="checkbox"/>	②
UpperLimitLineColor		③
LowerLimitLineColor		

- ① Set the thickness of the limit line
- ② Checked the UpperAndLowerDisplay property
- ③ Set the color of the limit line
- ④ ⑤ Set the associated variable of the limit line

Variable Browser

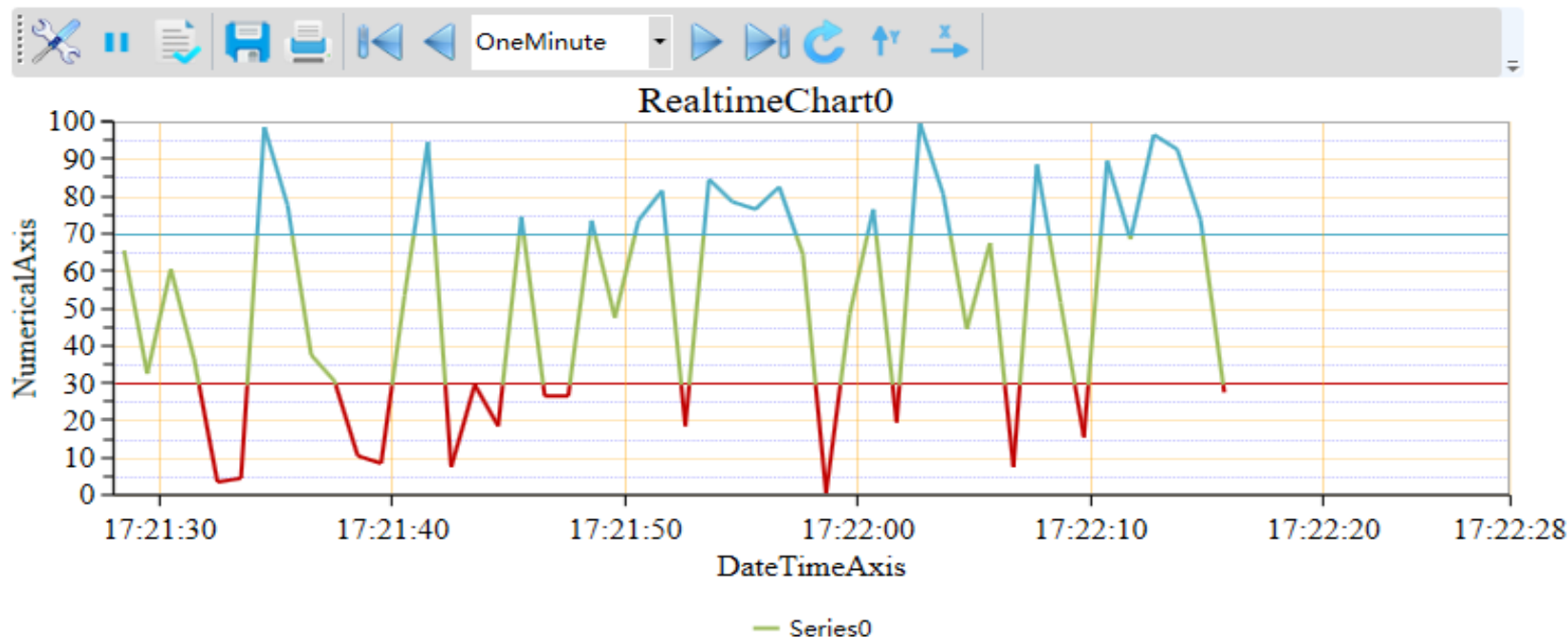
Add Group Edit

Variable Dictionary

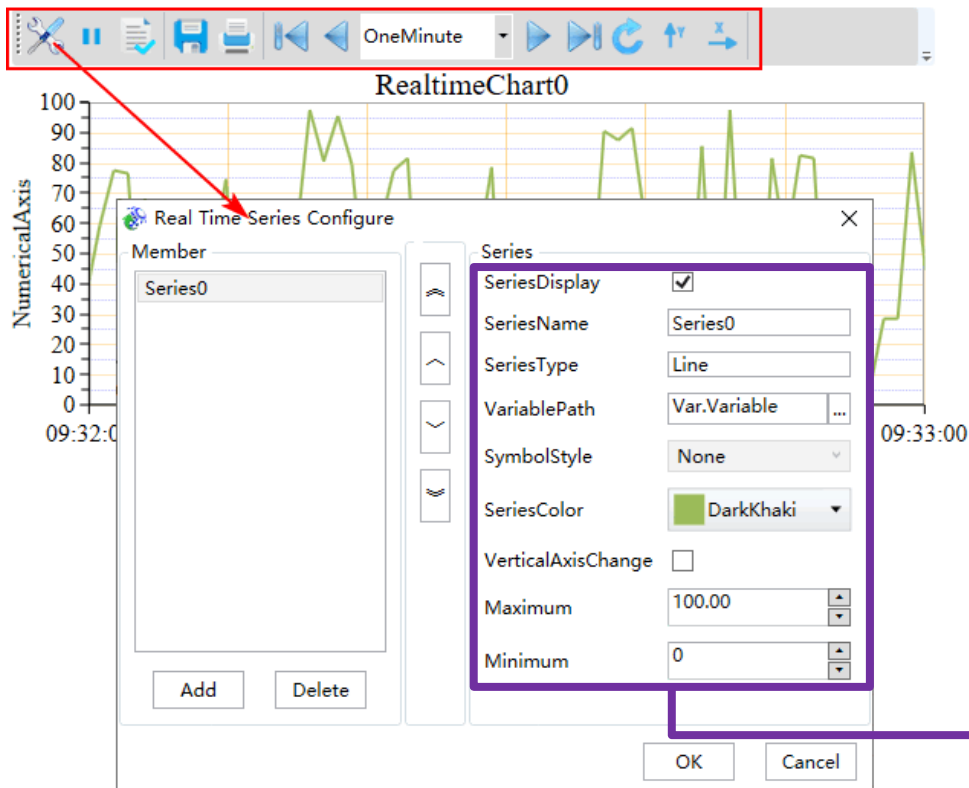
TypeFilter: ☒ Analog ☐ Digital ☐ String

Name	Type	Initial Val	Minimum	Maximum	De
Variable	Analog	0	0	10000	
LOW	Analog	30	0	10000	
UP	Analog	70	0	10000	

(4) Run the Window0, limit line display



➤ The usage of the toolbar of RealtimeChart



Real Time Series Configure (Modify properties of series at run time) :

- **SeriesDisplay** : Whether to display the series
- **SeriesName** : Change the name of the series
- **SeriesType** : Display the type of series
- **VariablePath** : Set the variable path of the series
- **SymbolStyle**: Set symbol style of the series
- **SeriesColor**: Set the color of the series
- **VerticalAxisChange**: Set whether to adjust the range of the vertical axis according to the value of the data point.(Check the "VerticalAxisAutoChange" property during development, this property is valid)
- **Maximum**: Set the maximum of the vertical axis
- **Minimum**: Set the minimum of the vertical axis

➤ The scripts of RealtimeChart

For the usage of scripts of RealtimeChart, please refer to the section “20.3 Script grammar and function” → “Programming model” → “Picture” → “Extended controls” → “HMIRRealTimeChart object” in the user manual

Methods list

	Name	Description
🔗	AddNewLimitLine	Add a new limit line
🔗	ArrayToString	Image array translate into string
🔗	DeletevalueAll	Delete all data points
🔗	Export	Export data
🔗	ExportRealData	Export excel
🔗	FindAnimation	Look for animation to modify the associated variables of the animation
🔗	HiddenSeries	Hidden curve
🔗	OpenShowFileDialog	Get saved path selected by dialog box
🔗	Print	Print
🔗	RemoveAllLimitLine	Remove all the limit line
🔗	Save	Save
🔗	Save	Save as pictures
🔗	SetSeriesVariablePath	Curve correlation variable substitution
🔗	SetTimeRangeWithRefresh	Set the time interval and refresh interval
🔗	StartTimer	Start timer
🔗	StopTimer	Stop timer
🔗	VisiableSeries	Display curves

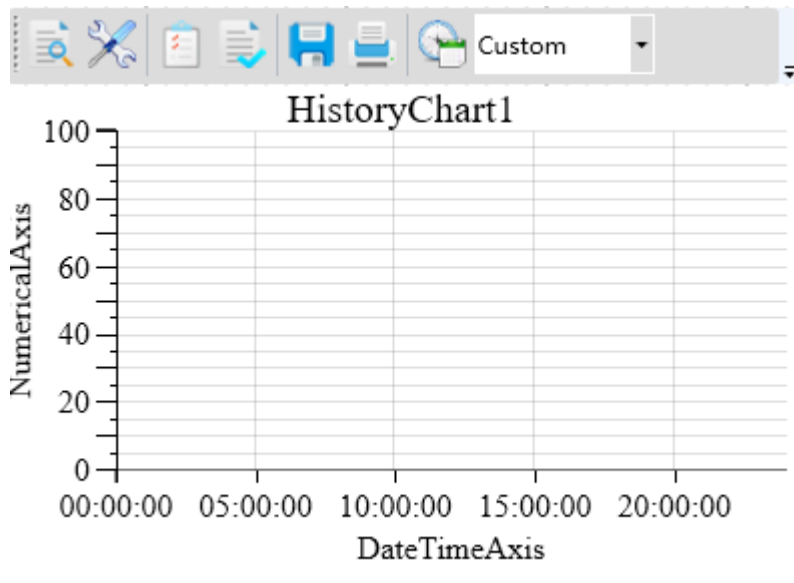
Property list

	Name	Description
🔗	Height	Height
🔗	IsShow	Whether display specified object
🔗	IsShowBtnCrossLine	Whether display the positioning line button
🔗	IsShowBtnLeftMost	Whether display the most left button
🔗	IsShowBtnLeftShift	Whether display the left shift button
🔗	IsShowBtnReSet	Whether display the reset button
🔗	IsShowBtnRightMost	Whether display the most right button
🔗	IsShowBtnRigthShift	Whether display the right shift button
🔗	IsShowRealBtnConfig	Whether display the curve configuration button
🔗	IsShowRealBtnPrint	Whether display the print button
🔗	IsShowRealBtnSave	Whether display the save button
🔗	IsShowRealBtnStop	Whether display the began or pause button
🔗	IsShowStopTime	Whether display the pause time button
🔗	Left	The left coordinate
🔗	Name	Name
🔗	NumberInterval	Get or set the maximum scale of numerical axis
🔗	NumberSmallInterval	Get or set the minimum scale of numerical axis
🔗	NumericalAxisMaximum	Get or set the maximum scale of numerical axis
🔗	NumericalAxisMinimum	Get or set the minimum scale of numerical axis
🔗	ToolTip	Tooltip text
🔗	Top	The top coordinate
🔗	Width	Width
🔗	ZIndex	Layer index

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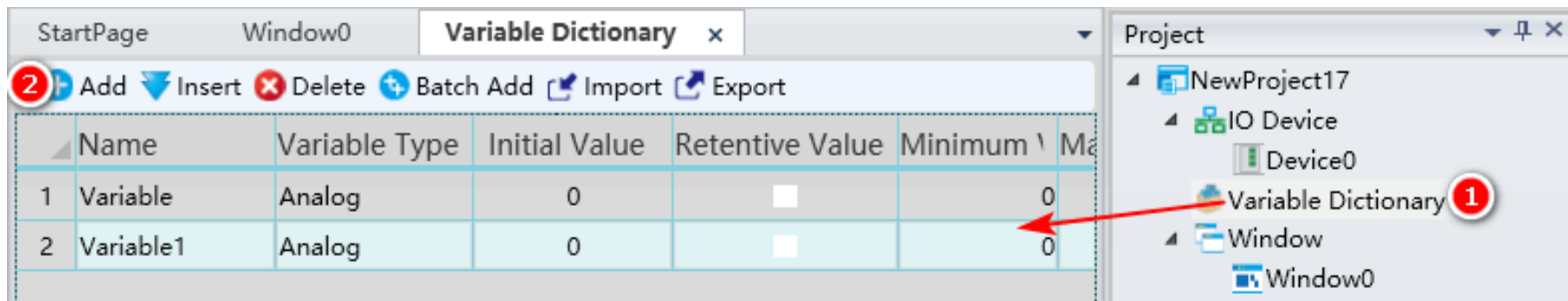
➤ Overview

The HistoryChart is a graph reflecting the historical change process of the historical variable value. The historical chart is mainly used for accident analysis and operation performance analysis to provide corresponding basis for optimizing the system. The history curve contains the main attributes such as curve set, coordinate axis, toolbar, status bar and so on. The historical curve is related to the variable of the configuration history record, and the data change of the variable in different time periods can be read.



➤ Create a HistoryChart that query historical data

(1) Create 2 variables : Variable , Variable1



The screenshot displays the Delta PLC software interface. The main window is titled "Variable Dictionary" and contains a table with the following data:

	Name	Variable Type	Initial Value	Retentive Value	Minimum Value	Maximum Value
1	Variable	Analog	0	<input type="checkbox"/>	0	
2	Variable1	Analog	0	<input type="checkbox"/>	0	

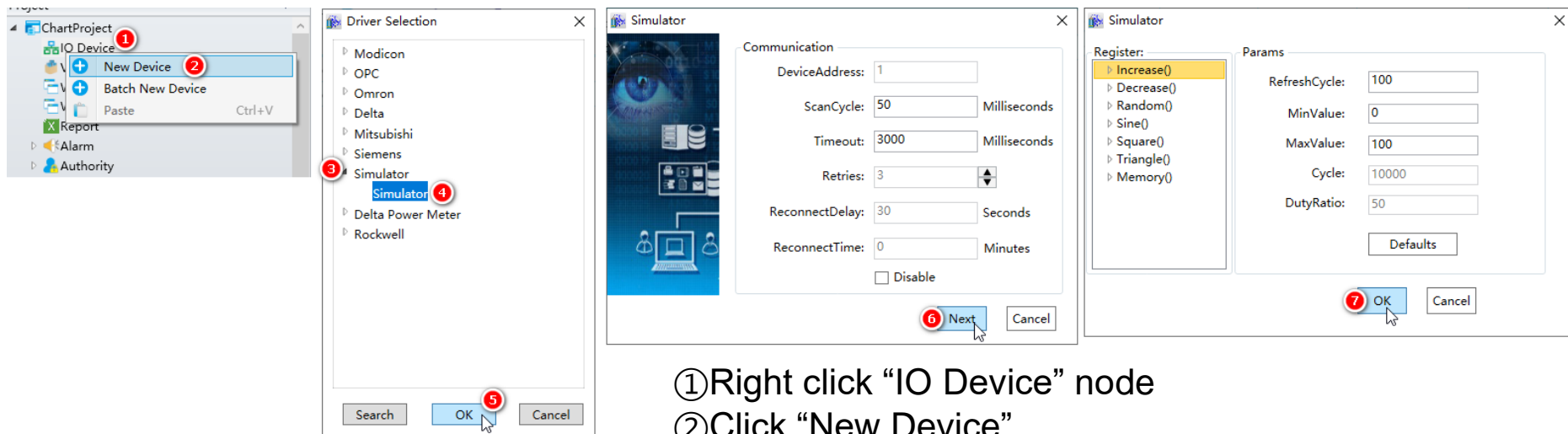
Below the table are buttons for "Add", "Insert", "Delete", "Batch Add", "Import", and "Export". The "Add" button is highlighted with a red circle and the number 2. To the right, the "Project" window shows a tree view with the following structure:

- NewProject17
 - IO Device
 - Device0
 - Variable Dictionary (highlighted with a red circle and the number 1)
 - Window
 - Window0

A red arrow points from the "Variable Dictionary" entry in the Project Explorer to the "Variable1" row in the Variable Dictionary table.

※Refer to the section "6.3 Variables" in user manual.

(2) Create a simulated device : Device0



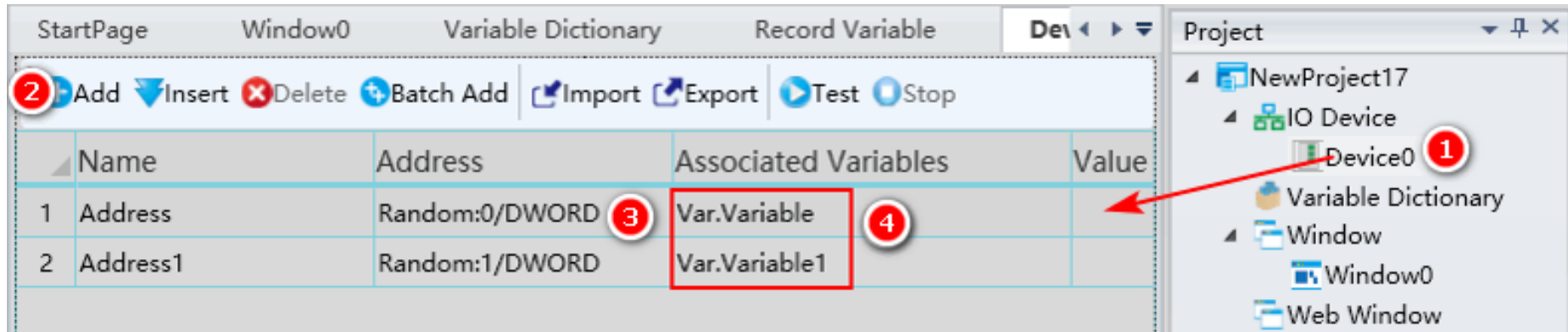
①Right click "IO Device" node

②Click "New Device"

③④Double click "Simulator"

※Refer to the section "5.10.1 Simulator" in user manual.

(3) Create two simulation address in the Device0 that associated with Variable, Variable1 respectively



The screenshot displays the Delta simulation software interface. The main window is titled "Variable Dictionary" and contains a table with the following data:

	Name	Address	Associated Variables	Value
1	Address	Random:0/DWORD	Var.Variable	
2	Address1	Random:1/DWORD	Var.Variable1	

The "Associated Variables" column for the two rows is highlighted with a red box. The "Device0" entry in the Project panel is also highlighted with a red circle and a red arrow pointing to the "Associated Variables" column.

The Project panel on the right shows the following structure:

- NewProject17
 - IO Device
 - Device0
 - Variable Dictionary
 - Window
 - Window0
 - Web Window

(4) Create two historical variables in the Record Variable that associated with Variable, Variable1 respectively

2 Add Insert Delete Import Export

	Name	Associated Variables	Mode	Timer	Deadband	D
1	RecordVariable	Var.Variable 3	Timing	s1 4	N/A	
2	RecordVariable1	Var.Variable1	Timing	s1	N/A	

Timer Browser

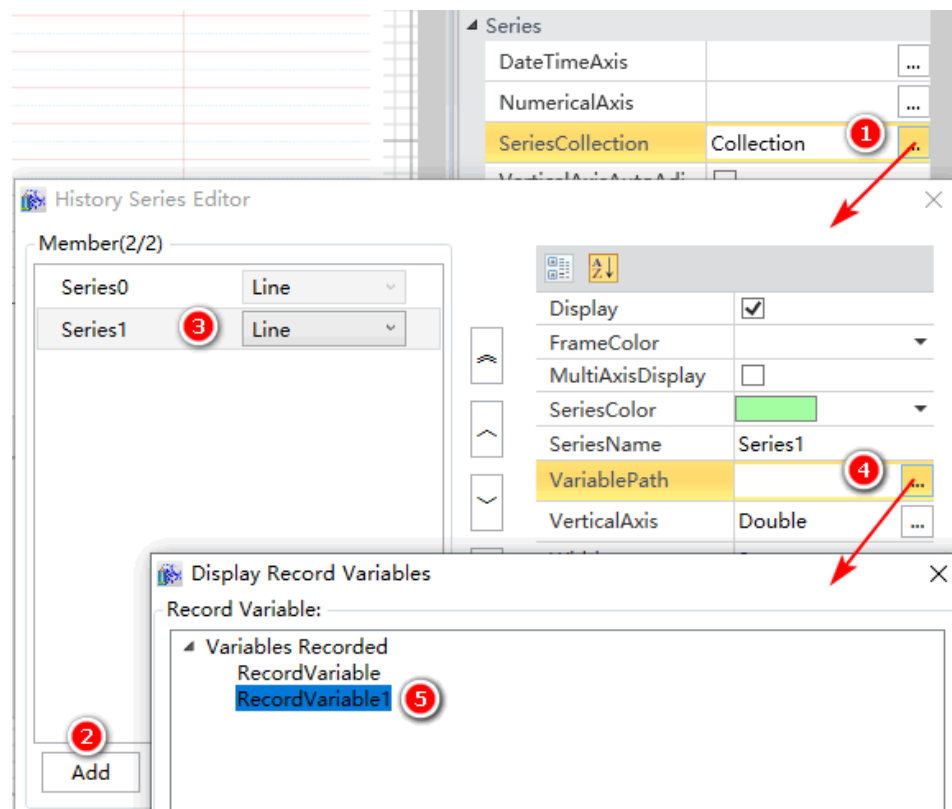
	IsEnable	Name	Timer Unit	Timer Coefficient	Relative Time	Description
1 5	<input checked="" type="checkbox"/>	s1	Second	1	0001-01-01 00:00:00	Triggers every second
2	<input type="checkbox"/>	s10	Second	10	0001-01-01 00:00:00	Triggers every 10 seconds
3	<input type="checkbox"/>	s30	Second	30	0001-01-01 00:00:00	Triggers every 30 seconds
4	<input type="checkbox"/>	m1	Minute	1	0001-01-01 00:00:00	Triggers every minute
5	<input type="checkbox"/>	m30	Minute	30	0001-01-01 00:00:00	Triggers every 30 minutes

ChartProject

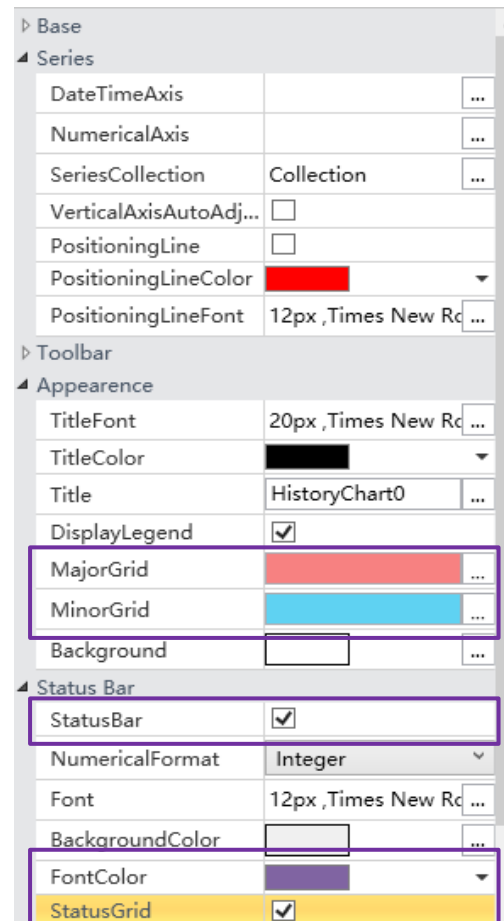
- IO Device
 - Device0
- Variable Dictionary
- Window
 - Window0
 - Window1
- Web Window
- Report
- Alarm
- Authority
- Operation Variable
- History Variable 1
 - Record Variable
 - Historical Group

※Refer to the section "14.2 Setting history record variable" in user manual.

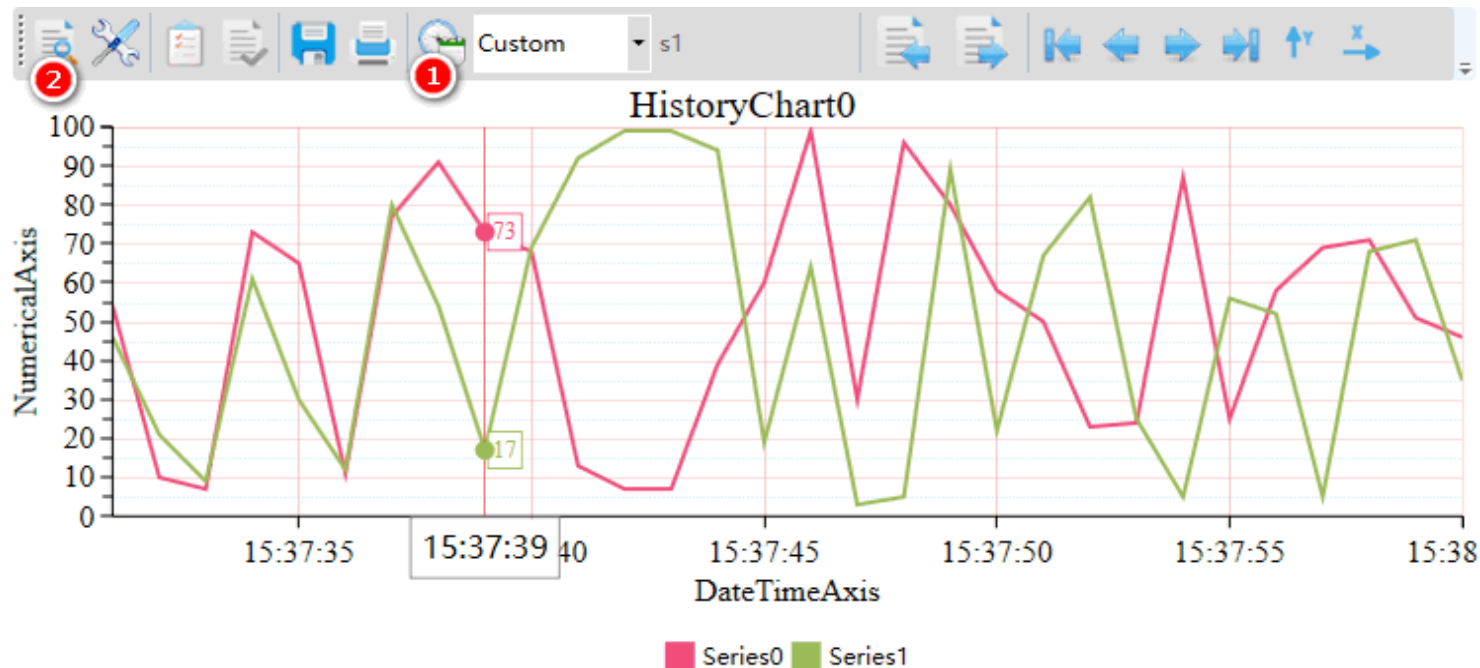
(5) Create a HistoryChart0 in the Window0, and add 2 curves in the HistoryChart0, Series0 associated RecordVariable, Series1 associated RecordVariable1



(6) Set some properties of the HistoryChart0

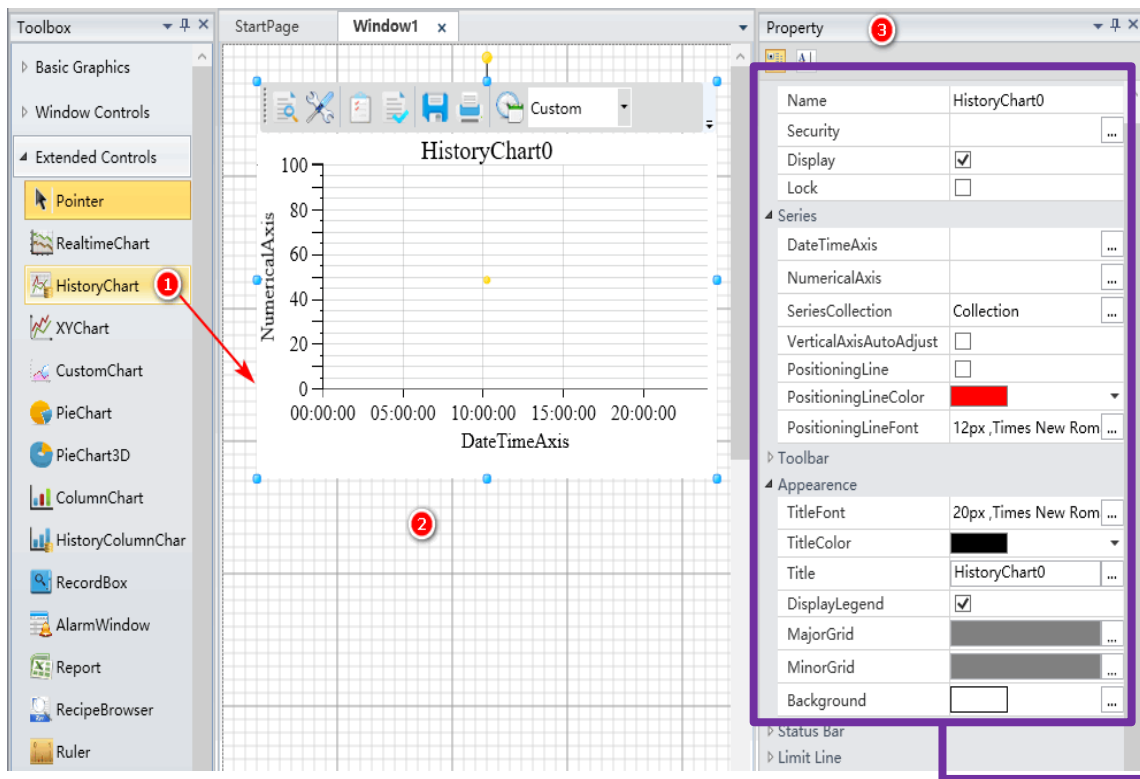


(7) Run the Window0, query historical data



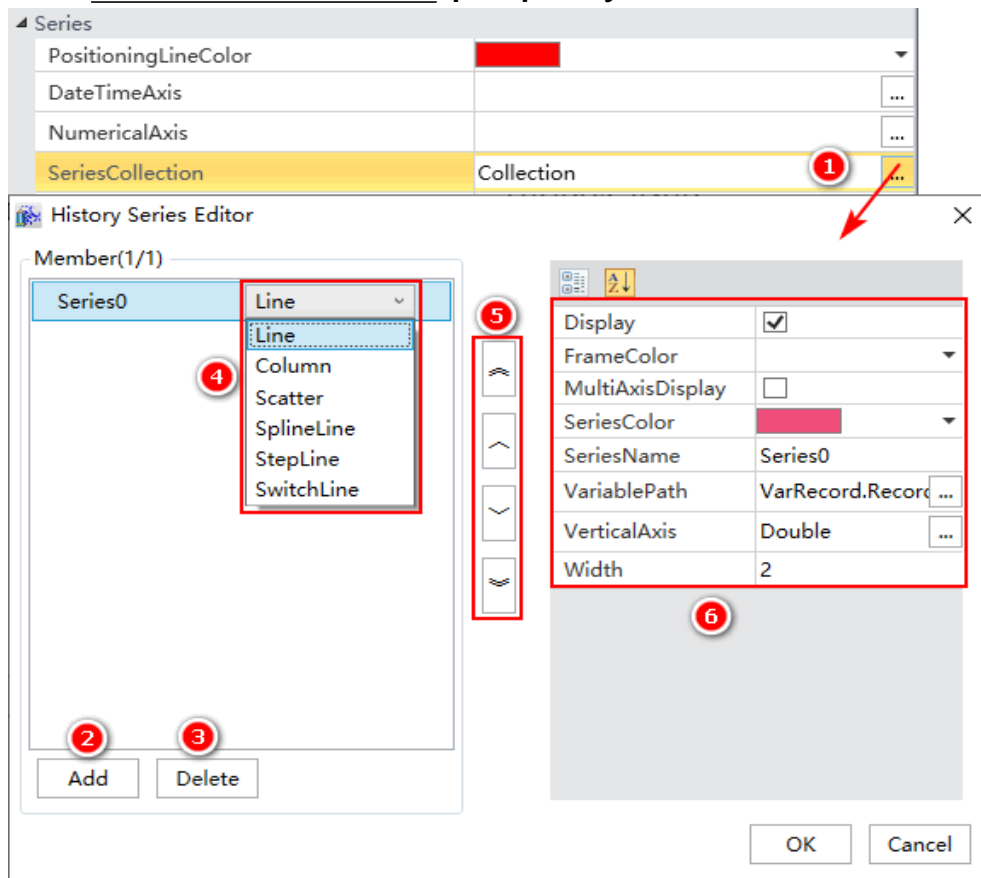
SeriesName	Minimum	Maximum	Average	Sum	Count	CurrentValue
Series0	7	99	51	1522	30	(15:37:39,73)
Series1	3	99	48	1451	30	(15:37:39,17)

➤ Property window



- **DateTimeAxis:** Set properties of DateTimeAxis
- **NumericalAxis:** Set properties of NumericalAxis
- **SeriesCollection:** Add or delete series, set properties of series
- **VerticalAxisAutoChange:** Set whether to adjust the range of the vertical axis according to the value of the data point
- **PositionLine:** Whether to display position line
- **PositionLineColor:** Set the color of position line
- **PositionLineFont:** Set the font style of the text on the position line
- **TitleFont:** Set font style of the title
- **TitleColor:** Set color of the title
- **Title:** Set content of the title
- **DisplayLegend:** Set whether to display legend
- **MajorGrid:** Set the property of major grid
- **MinorGrid:** Set the property of minor grid

➤ SeriesCollection property



The screenshot shows the 'Series' property window and the 'History Series Editor' dialog. The 'SeriesCollection' property is highlighted in yellow in the 'Series' window, with a red circle and arrow pointing to it. The 'History Series Editor' dialog is open, showing the 'Member(1/1)' section with 'Series0' selected. A red box highlights the 'Line' dropdown menu, which is open, showing options: 'Line', 'Column', 'Scatter', 'SplineLine', 'StepLine', and 'SwitchLine'. A red circle and arrow point to the 'Line' option. The 'Add' button is highlighted with a red circle. The 'Delete' button is also visible. The 'Properties' section on the right shows various settings for 'Series0', including 'Display' (checked), 'FrameColor', 'MultiAxisDisplay', 'SeriesColor' (pink), 'SeriesName' (Series0), 'VariablePath' (VarRecord.Record), 'VerticalAxis' (Double), and 'Width' (2). A red box highlights the 'Properties' section, with a red circle and arrow pointing to it. The 'OK' and 'Cancel' buttons are at the bottom.

- ②Add series in the RealtimeChart
- ③Remove series from the RealtimeChart
- ④SeriesType : Set the type of the series
- ⑤Change the display order of series
- ⑥Set properties of currently selected series

➤ VerticalAxisAutoAdjust property example

(1) Create 1 variable : Variable



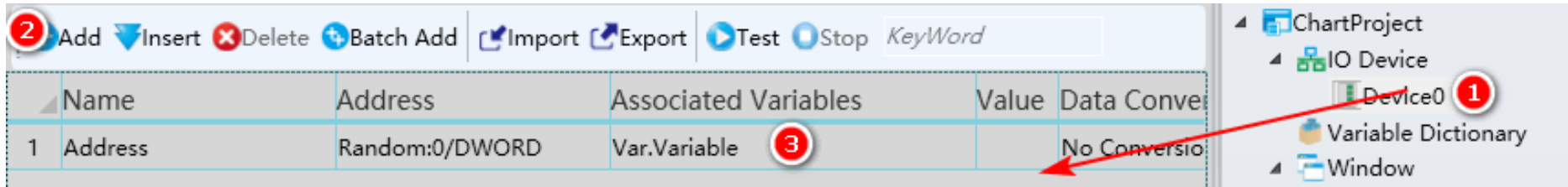
The screenshot shows the Delta ChartProject software interface. On the right, the Variable Dictionary is expanded, showing a tree structure with 'ChartProject' at the top, followed by 'IO Device', 'Device0', and 'Variable Dictionary' (highlighted with a red circle and arrow). On the left, a table lists the variables:

	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Maximum Value	De
1	Variable	Analog	0		0	10000	

Buttons at the top of the table include: Add (with a red circle and arrow), Insert, Delete, Batch Add, Import, and Export.

※Refer to the section "6.3 Variables" in user manual.

(2) Create a address(the range is 0 to 100) in the simulation device(Device0) that associated with Variable

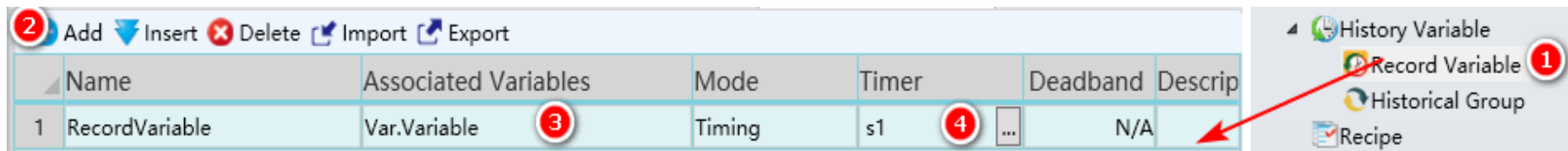


The screenshot displays the Delta simulation software interface. On the left, a toolbar contains buttons for 'Add' (circled with a red '2'), 'Insert', 'Delete', 'Batch Add', 'Import', 'Export', 'Test', and 'Stop'. Below the toolbar is a table with the following columns: 'Name', 'Address', 'Associated Variables', 'Value', and 'Data Conversion'. The table contains one row with the following data: '1', 'Address', 'Random:0/DWORD', 'Var.Variable' (circled with a red '3'), and 'No Conversion'. On the right, a tree view shows the project structure: 'ChartProject' (expanded) contains 'IO Device' (expanded), which contains 'Device0' (circled with a red '1'), 'Variable Dictionary', and 'Window'. A red arrow points from the 'Device0' node in the tree view to the 'Var.Variable' cell in the table.

	Name	Address	Associated Variables	Value	Data Conversion
1	Address	Random:0/DWORD	Var.Variable		No Conversion

※Refer to the section "5.10.1 Simulator" in user manual.

(3) Create a historical variable in the Record Variable that associated with Variable



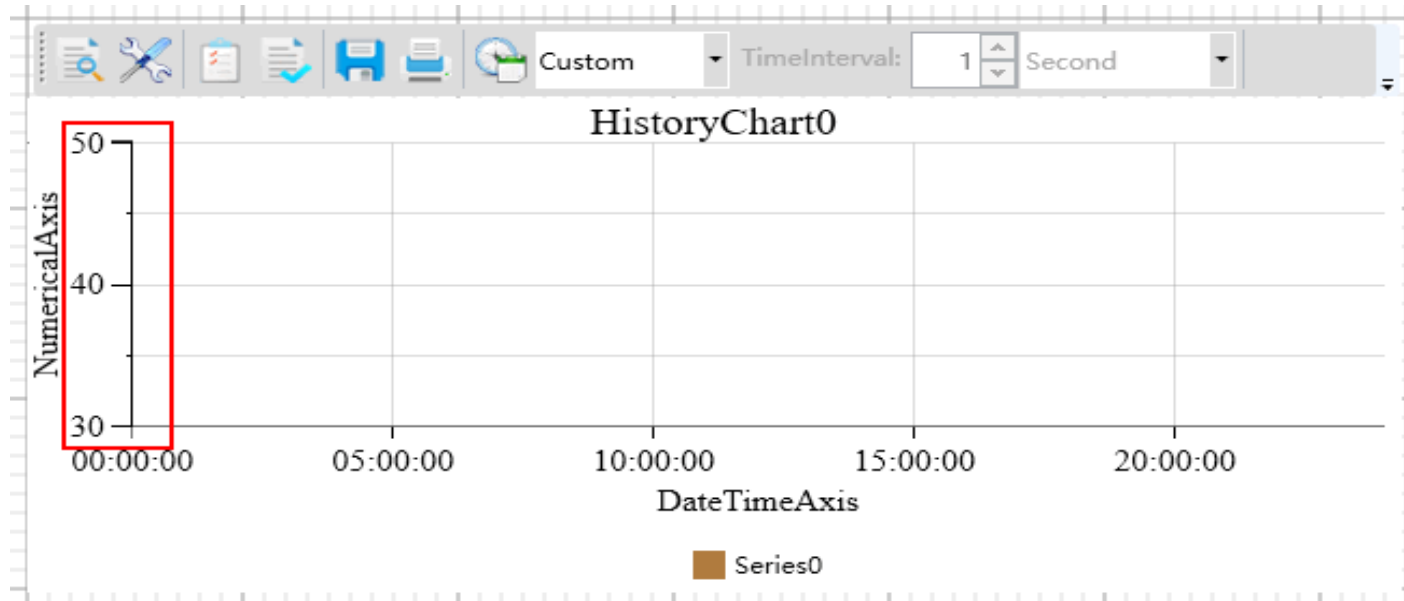
The screenshot displays the 'Record Variable' configuration interface. At the top, there is a toolbar with buttons: Add (2), Insert, Delete, Import, and Export. Below this is a table with the following columns: Name, Associated Variables, Mode, Timer, Deadband, and Descrip. The table contains one row with the following data: Name: RecordVariable, Associated Variables: Var.Variable (3), Mode: Timing, Timer: s1 (4), Deadband: N/A, and Descrip: (empty). To the right of the table is a sidebar menu with the following items: History Variable, Record Variable (1), Historical Group, and Recipe. A red arrow points from the 'Record Variable' item in the sidebar to the 'RecordVariable' row in the table.

	Name	Associated Variables	Mode	Timer	Deadband	Descrip
1	RecordVariable	Var.Variable (3)	Timing	s1 (4)	N/A	

History Variable
Record Variable (1)
Historical Group
Recipe

※Refer to the section "14.2 Setting history record variable" in user manual.

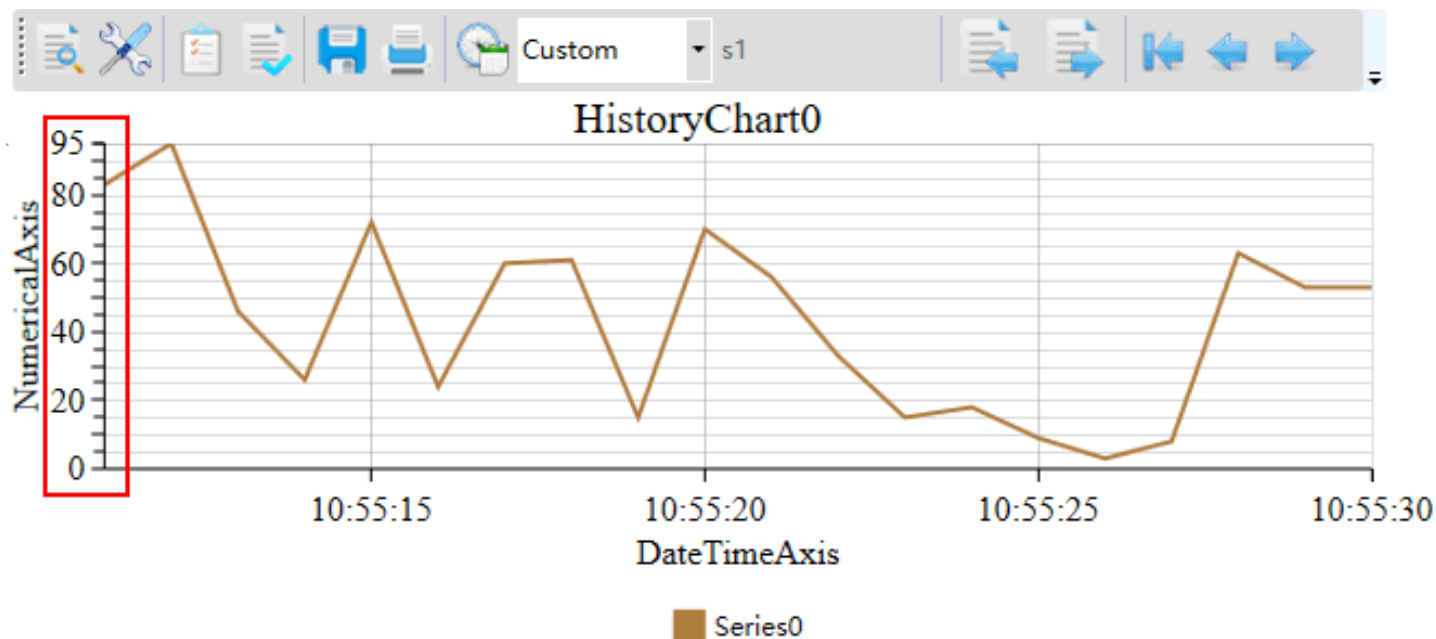
(4) Create a HistoryChart0 and set the numerical axis range from 30 to 50, add a Series0 in the HistoryChart0 that associated with the historical variable(RecordVariable) in the Record Variable



(5) Check the VerticalAxisAutoAdjust property of HistoryChart0

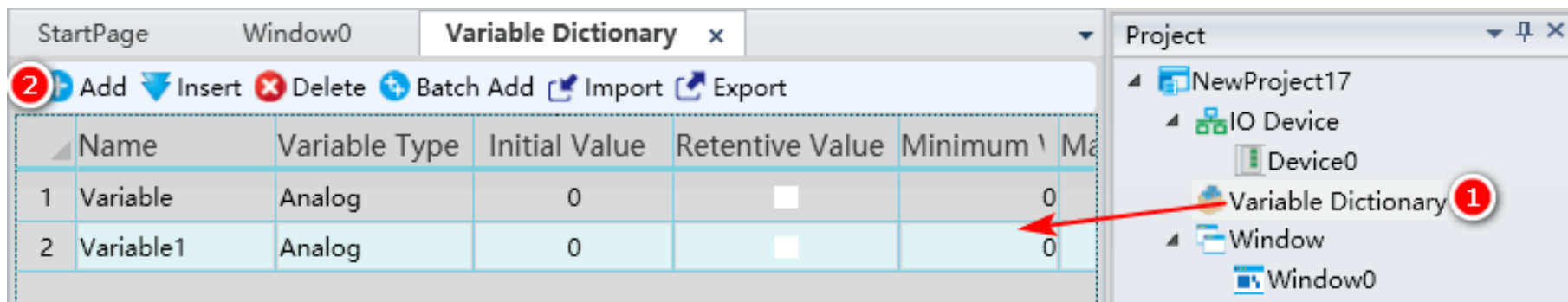
VerticalAxisAutoAdjust	<input checked="" type="checkbox"/>
PositioningLine	<input type="checkbox"/>

(6) At run time, the range of the numerical axis is adjusted with the value of the history data value.



➤ MultiAxisDisplay property example

(1) Create 2 variables : Variable , Variable1



StartPage Window0 Variable Dictionary x

2 Add Insert Delete Batch Add Import Export

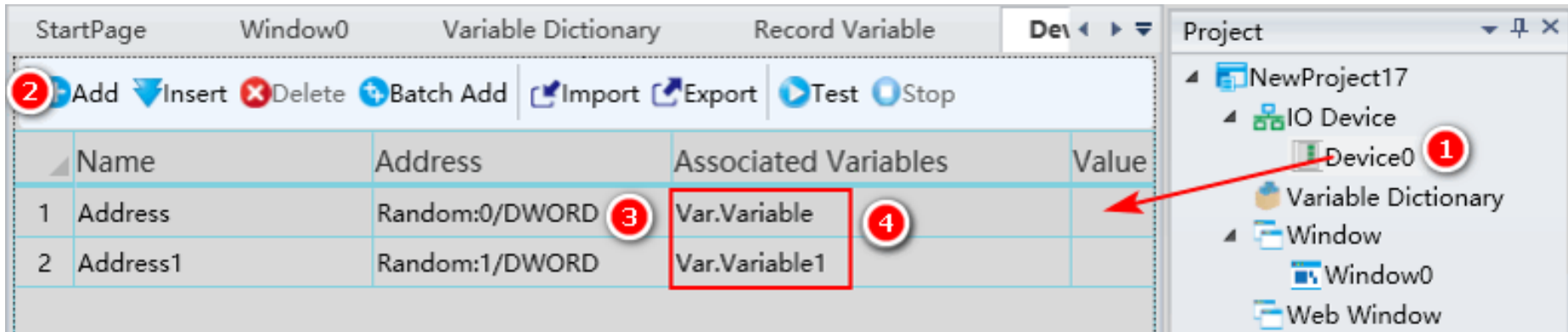
	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Ma
1	Variable	Analog	0	<input type="checkbox"/>	0	
2	Variable1	Analog	0	<input type="checkbox"/>	0	

Project

- NewProject17
 - IO Device
 - Device0
 - Variable Dictionary 1
 - Window
 - Window0

※Refer to the section "6.3 Variables" in user manual.

(2) Create two simulation address in the Device0 that associated with Variable, Variable1 respectively



The screenshot displays the Delta simulation software interface. The main window is titled "Variable Dictionary" and contains a table with the following data:

	Name	Address	Associated Variables	Value
1	Address	Random:0/DWORD	Var.Variable	
2	Address1	Random:1/DWORD	Var.Variable1	

The "Associated Variables" column for the two rows is highlighted with a red box. The "Add" button in the toolbar is marked with a red circle labeled "2". The "Device0" entry in the Project panel is marked with a red circle labeled "1". The "Var.Variable" and "Var.Variable1" entries in the "Associated Variables" column are marked with red circles labeled "3" and "4" respectively. A red arrow points from the "Device0" entry in the Project panel to the "Var.Variable" entry in the "Associated Variables" column.

(3) Create two historical variables(RecordVariable0,RecordVariable1) in the Record Variable that associated with Variable, Variable1 respectively

2 Add Insert Delete Import Export

	Name	Associated Variables	Mode	Timer	Deadband
1	RecordVariable	Var.Variable 3	Timing	s1 4	N/A
2	RecordVariable1	Var.Variable1	Timing	s1	N/A

Timer Browser

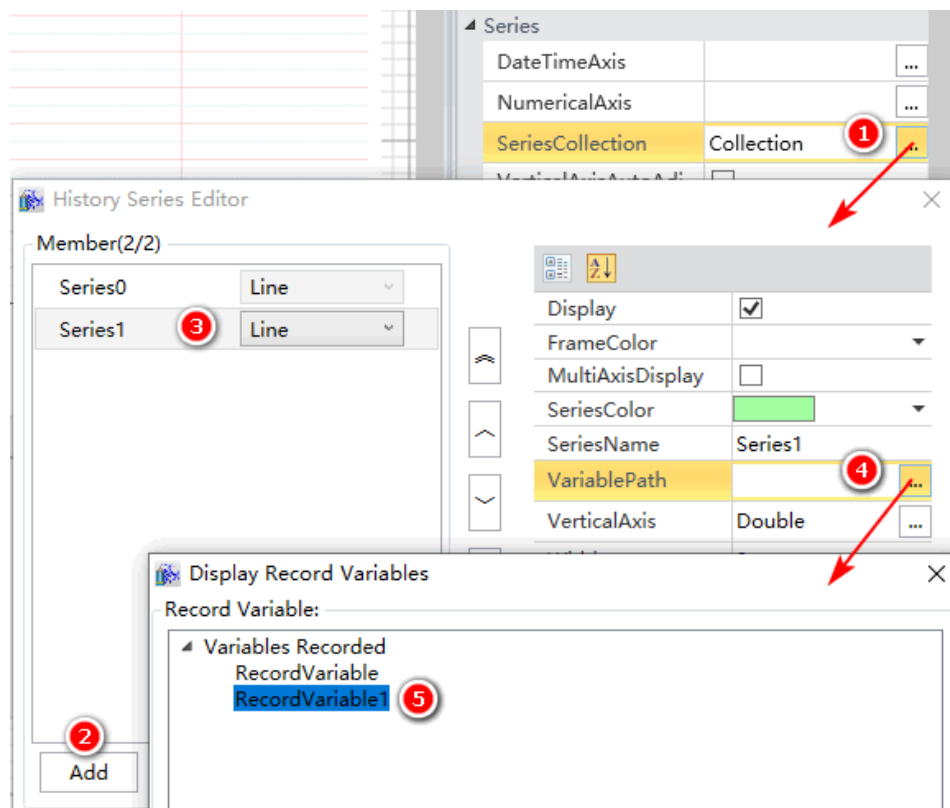
	IsEnable	Name	Timer Unit	Timer Coefficient	Relative Time	Description
1 5	<input checked="" type="checkbox"/>	s1	Second	1	0001-01-01 00:00:00	Triggers every second
2	<input type="checkbox"/>	s10	Second	10	0001-01-01 00:00:00	Triggers every 10 seconds
3	<input type="checkbox"/>	s30	Second	30	0001-01-01 00:00:00	Triggers every 30 seconds
4	<input type="checkbox"/>	m1	Minute	1	0001-01-01 00:00:00	Triggers every minute
5	<input type="checkbox"/>	m30	Minute	30	0001-01-01 00:00:00	Triggers every 30 minutes

ChartProject

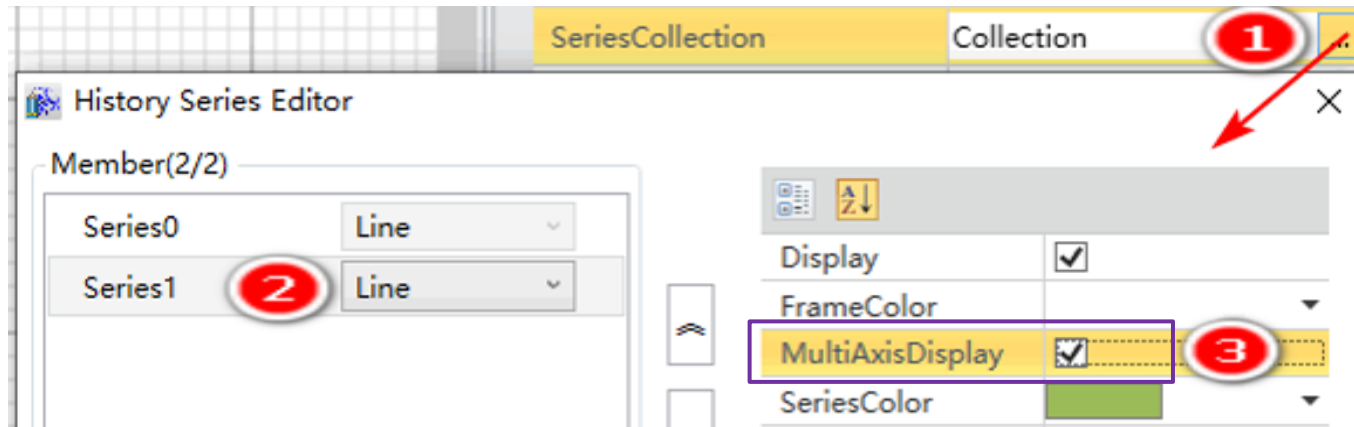
- IO Device
 - Device0
- Variable Dictionary
- Window
 - Window0
 - Window1
- Web Window
- Report
- Alarm
- Authority
- Operation Variable
- History Variable 1
 - Record Variable
 - Historical Group

※Refer to the section "14.2 Setting history record variable" in user manual.

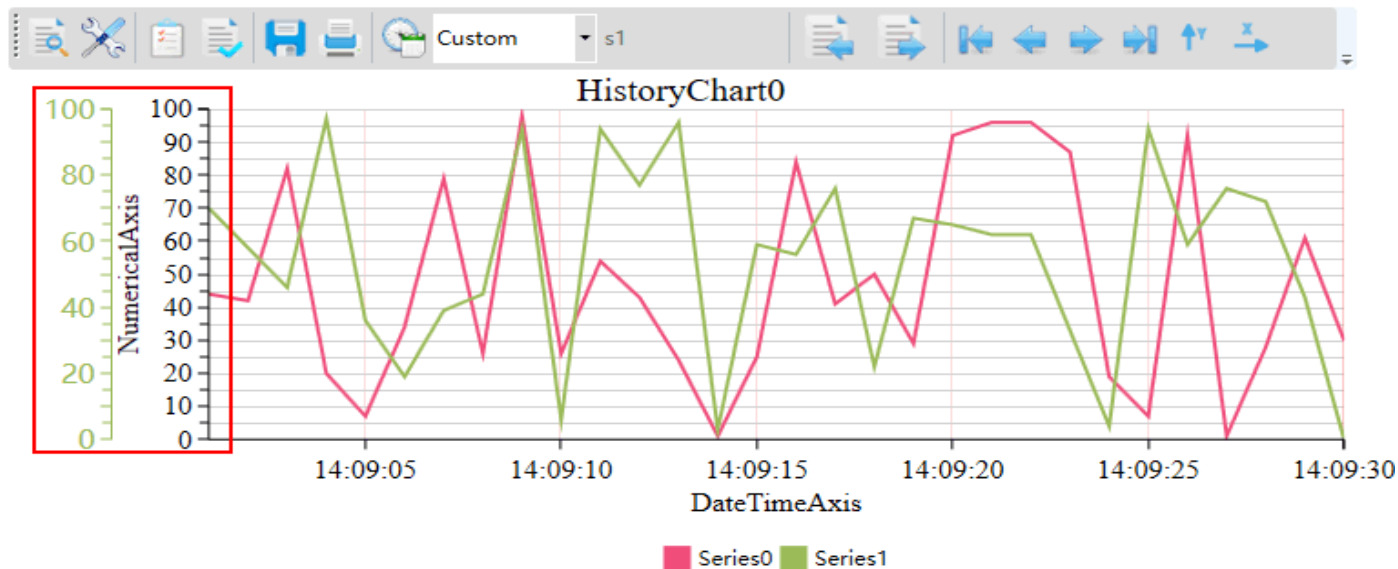
(4) Create a HistoryChart0 in the Window0, and add 2 curves in the HistoryChart0, Series0 associated RecordVariable, Series1 associated RecordVariable1



(5) Check the MultiAxisDisplay property of Series1 in the HistoryChart0

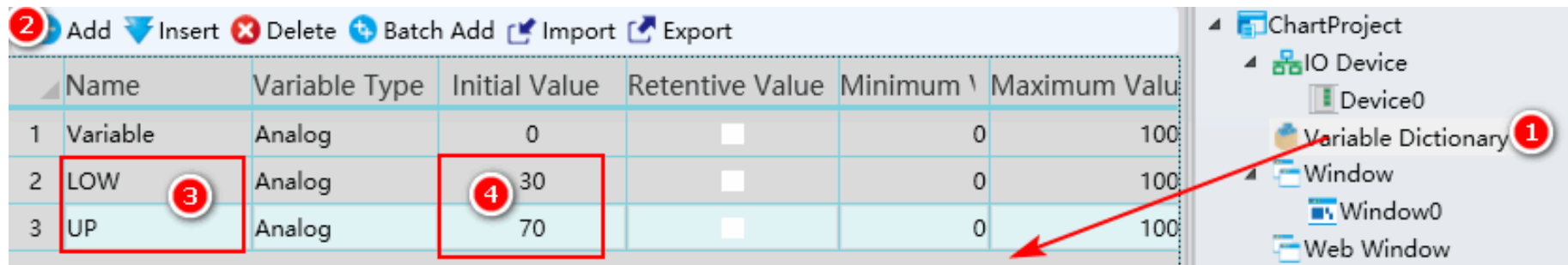


(6) Run the project, two numerical axis will be displayed on the HistoryChart0



➤ Limit Line property example

(1) Create three variables: Variable, LOW, UP

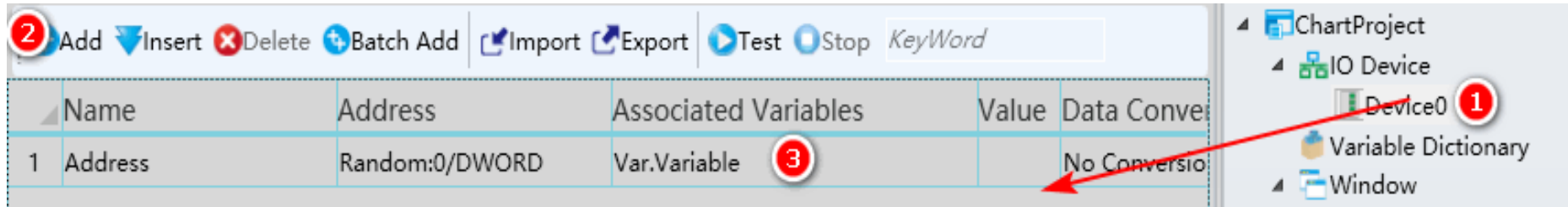


The screenshot displays the Delta HMI software interface. On the right, the 'Variable Dictionary' is expanded, showing a tree structure with 'IO Device', 'Device0', 'Variable Dictionary' (highlighted with a red circle 1), 'Window', 'Window0', and 'Web Window'. A red arrow points from the 'Variable Dictionary' to the table below. The table has columns: Name, Variable Type, Initial Value, Retentive Value, Minimum Value, and Maximum Value. It lists three variables: 'Variable' (Initial Value 0), 'LOW' (Initial Value 30, highlighted with a red box and red circle 3), and 'UP' (Initial Value 70, highlighted with a red box and red circle 4). The table also shows 'Retentive Value' as a checkbox, and 'Minimum Value' and 'Maximum Value' as numerical values (0 and 100 respectively).

	Name	Variable Type	Initial Value	Retentive Value	Minimum Value	Maximum Value
1	Variable	Analog	0	<input type="checkbox"/>	0	100
2	LOW	Analog	30	<input type="checkbox"/>	0	100
3	UP	Analog	70	<input type="checkbox"/>	0	100

※Refer to the section "6.3 Variables" in user manual.

(2) Create a address(the range is 0 to 100) in the simulation device(Device0) that associated with Variable

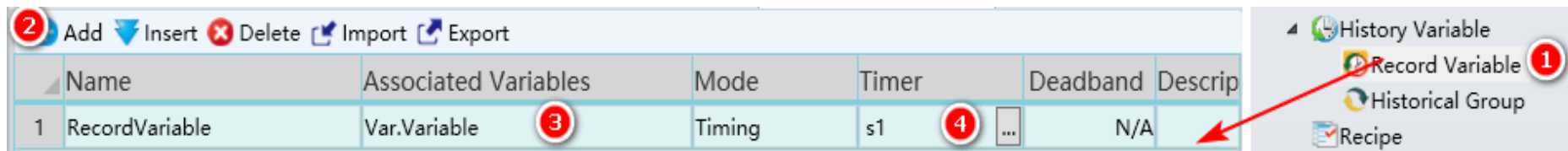


The screenshot shows the Delta simulation software interface. On the left, a toolbar contains buttons for 'Add' (2), 'Insert', 'Delete', 'Batch Add', 'Import', 'Export', 'Test', and 'Stop'. Below the toolbar is a table with the following columns: Name, Address, Associated Variables, Value, and Data Conversion. The table has one row with the following data: Name: Address, Address: Random:0/DWORD, Associated Variables: Var.Variable (3), Value: (empty), and Data Conversion: No Conversion. On the right, a tree view shows the project structure: ChartProject, IO Device, Device0 (1), Variable Dictionary, and Window. A red arrow points from the 'Device0' entry in the tree view to the 'Var.Variable' entry in the table.

	Name	Address	Associated Variables	Value	Data Conversion
1	Address	Random:0/DWORD	Var.Variable (3)		No Conversion

※Refer to the section "5.10.1 Simulator" in user manual.

(3) Create a historical variable in the Record Variable that associated with Variable



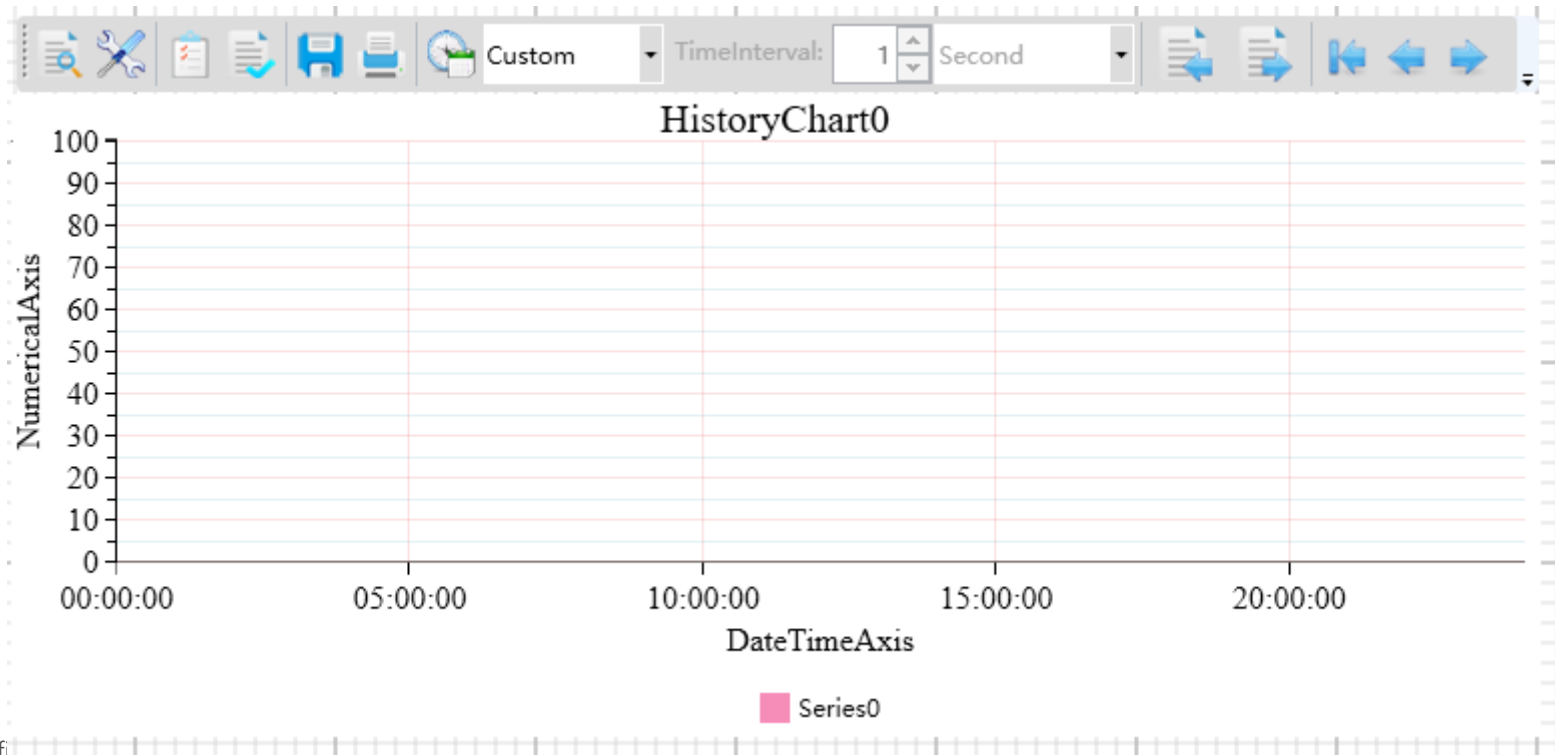
The screenshot displays the 'Record Variable' configuration interface. At the top, there is a toolbar with buttons: Add (2), Insert, Delete, Import, and Export. Below this is a table with the following columns: Name, Associated Variables, Mode, Timer, Deadband, and Descrip. The table contains one row with the following data: Name: RecordVariable, Associated Variables: Var.Variable (3), Mode: Timing, Timer: s1 (4), Deadband: N/A, and Descrip: (empty). To the right of the table is a sidebar menu with the following items: History Variable, Record Variable (1), Historical Group, and Recipe. A red arrow points from the 'Record Variable' item in the sidebar to the 'RecordVariable' row in the table.

	Name	Associated Variables	Mode	Timer	Deadband	Descrip
1	RecordVariable	Var.Variable (3)	Timing	s1 (4)	N/A	

History Variable
Record Variable (1)
Historical Group
Recipe

※Refer to the section "14.2 Setting history record variable" in user manual.

(4) Create a HistoryChart0 and add a Series0(SeriesType is Line),Series0 associated with the hisrotrical variable(RecordVariable)



(5) Set limit line property of the HistoryChart0

Limit Line

Thickness	1.00	①
LimitLineMaximum	Var.UP	④
LimitLineMinimum	Var.LOW	④
UpperAndLowerDisplay	<input checked="" type="checkbox"/>	②
UpperLimitLineColor		③
LowerLimitLineColor		③

- ① Set the thickness of the limit line
- ② Checked the UpperAndLowerDisplay property
- ③ Set the color of the limit line
- ④⑤ Set the associated variable of the limit line

Variable Browser

Add Group Edit

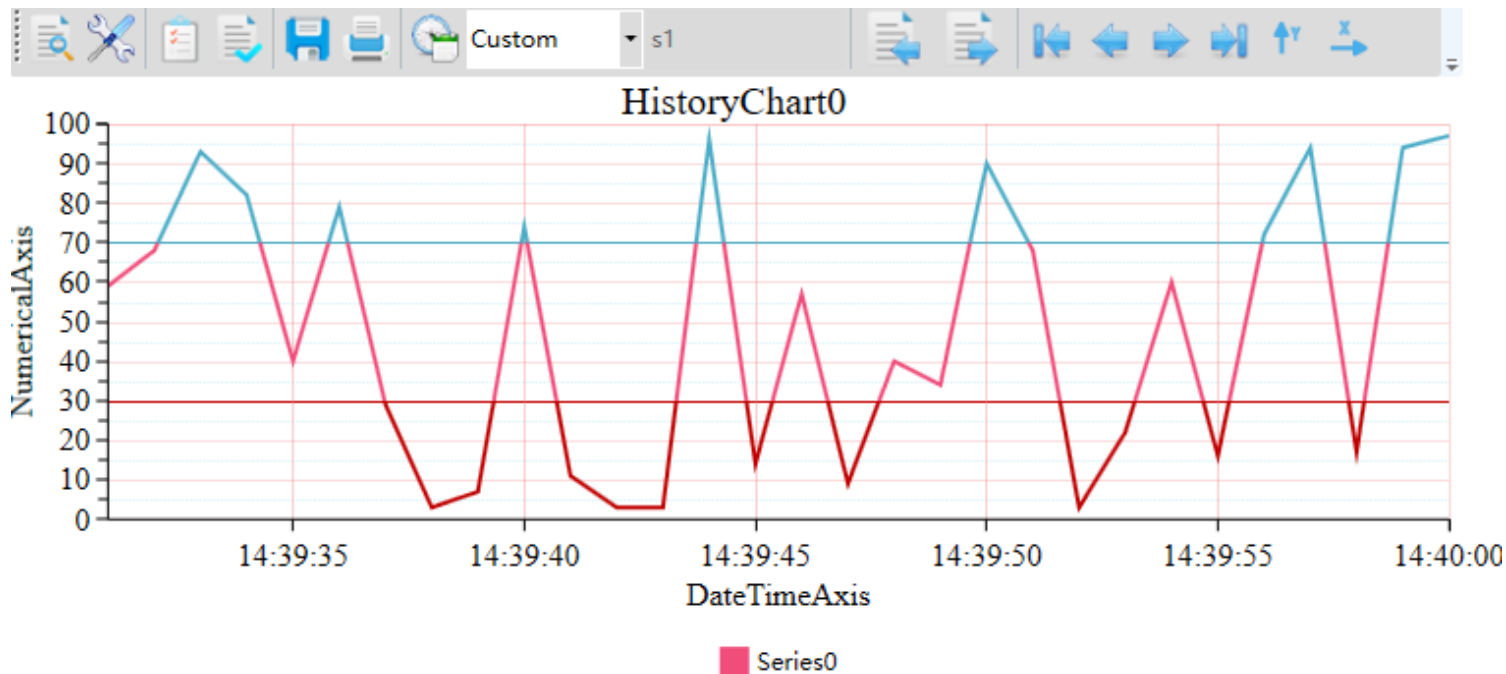
Variable Dictionary

TypeFilter: ☒ Analog ☐ Digital ☐ String

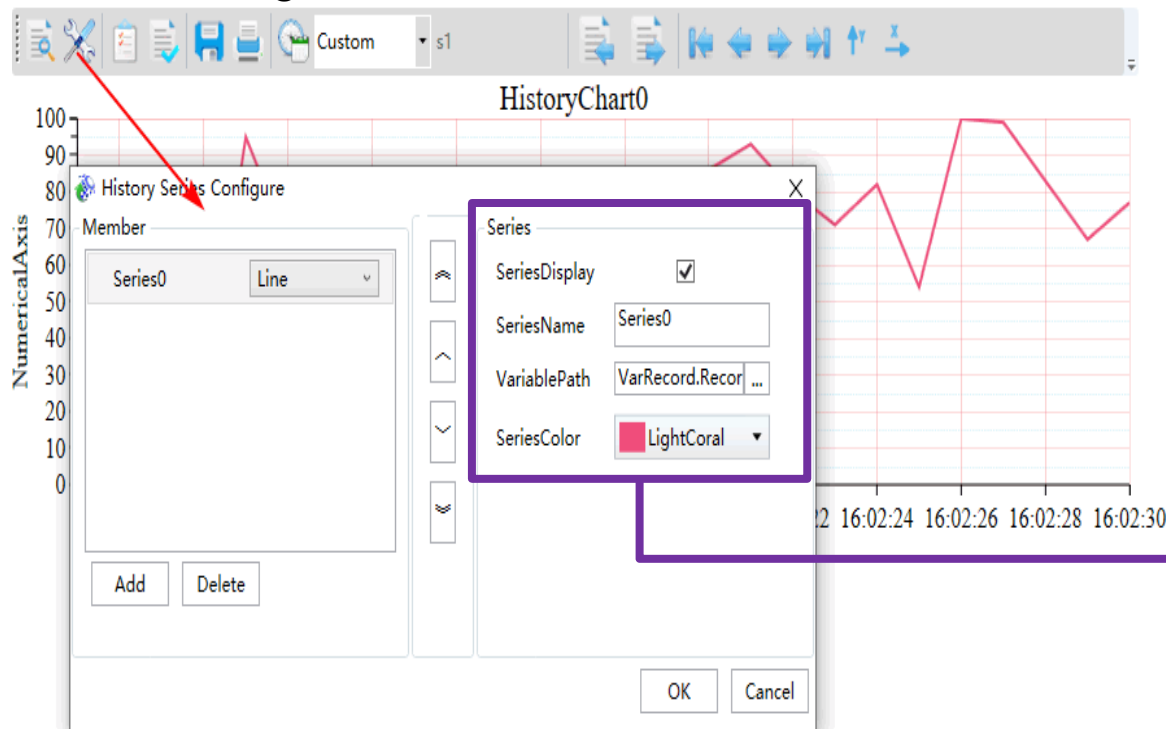
Name	Type	Initial Val	Minimum	Maximum	De
Variable	Analog	0	0	10000	
LOW	Analog	30	0	10000	
UP	Analog	70	0	10000	

⑤

(6) Run the Window0, limit line display

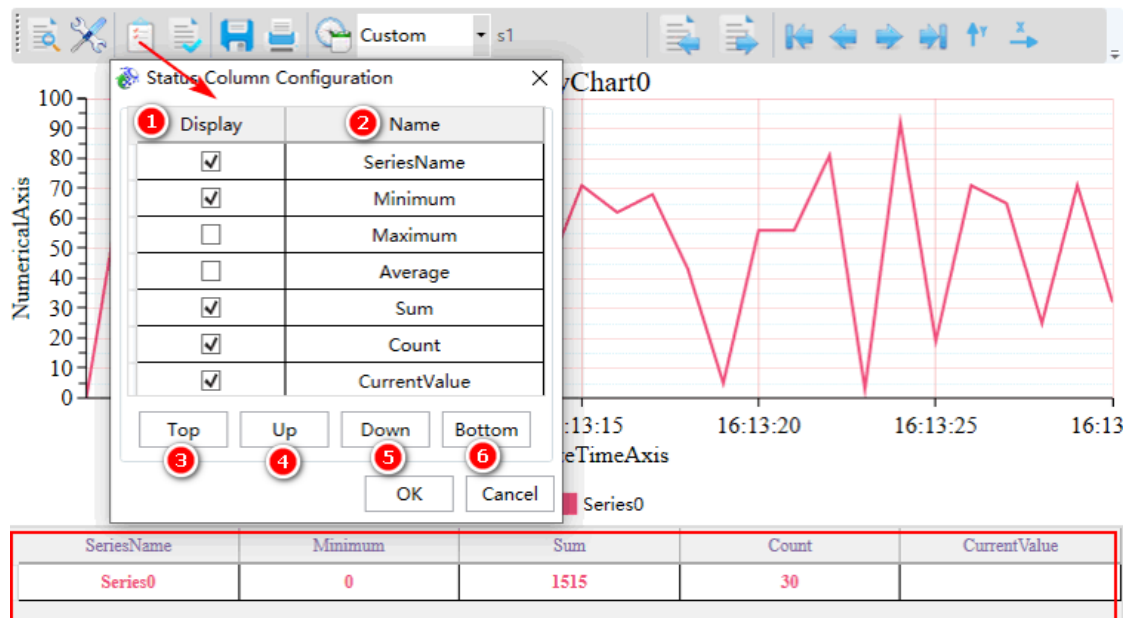


➤ The usage of the toolbar buttons



- **History Series Configure (Modify the properties of series at run time):**
SeriesDisplay: Whether to display the series
- **SeriesName**: Change the name of the series
- **VariablePath**: Set the variable path of the series
- **SeriesColor**: Set the color of the series

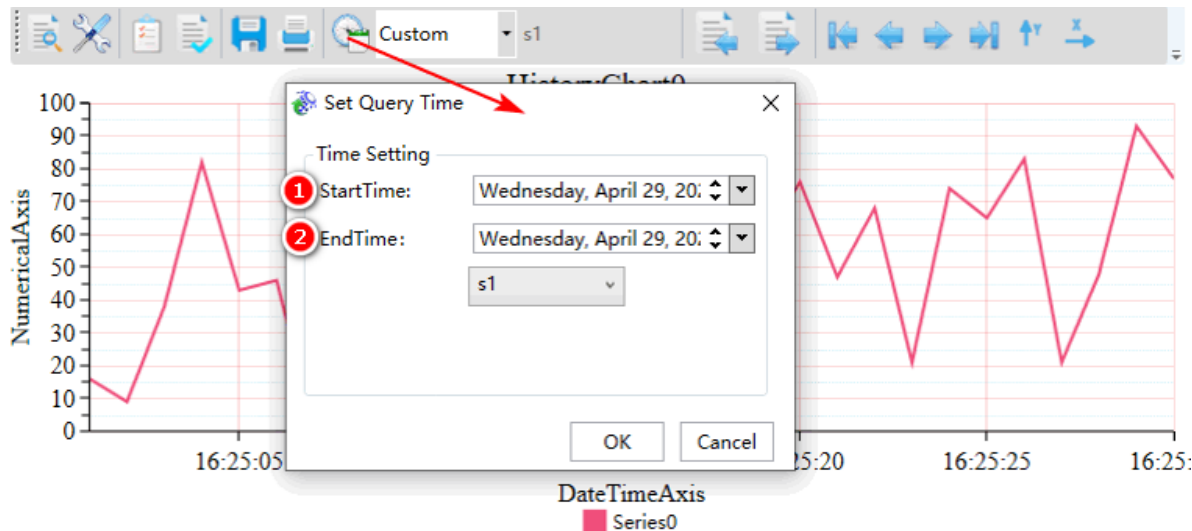
➤ The usage of the toolbar buttons



Status Column Configuration window:

- ① **Display:** Check means display, Uncheck means hide this column
- ② **Name:** The name of column in the status
- ③ **Top:** Move to top
- ④ **Up:** Move forward
- ⑤ **Down:** Move backward
- ⑥ **Bottom:** Move to bottom

➤ The usage of the toolbar buttons



Set Query Time window:

① **StartTime**: Set query start time




















② **EndTime**: Set query end time

Rule: Set query rule























➤ The scripts of HistoryChart

For the usage of scripts of HistoryChart, please refer to the section “20.3 Script grammar and function” → “Programming model” → “Picture” → “Extended controls” → “HMIHistoryChart object” in the user manual

Methods list

Name	Description
 AddNewLimitLine	Add new limit line
 ArrayToString	Image array translate into string
 Export	Export data
 Export	Export excel
 FindAnimation	Look for animation to modify the associated variables of the animation
 FirstAction	The most left
 GetDataTable	Store data to data table
 HiddenSeries	Hidden curve
 Import	Import excel
 LastAction	The most right
 NextAction	Right shift
 OpenShowFileDialog	Get the path of save dialog select
 PreAction	Left shift
 Print	Print
 QueryEndTime	Set the end time of the query data
 QueryHistoryDate	Query of the historical data
 QueryHistoryDate	Query of the historical data(with parameters)
 QueryInverval	Set the query interval
 QueryStartTime	Set the start time of the query data
 QueryUnit	Set the query unit
 RemoveAllLimitLine	Remove all the limit line
 Save	Save
 Save	Save as pictures
 SetSeriesVariablePath	Curve correlation variable substitution
 SetVarRecordRulerName	Set the name of query rule
VisiableSeries	Display curve

Property list

Name	Description
 Height	Height
 IsShow	Whether display the specified object
 IsShowBtnConfig	Whether display the curve configuration button
 IsShowBtnCrossLine	Whether display the positioning line
 IsShowBtnMenu	Whether display the import and export button
 IsShowBtnPrint	Whether display the print button
 IsShowBtnSave	Whether display the save button
 IsShowBtnUpdate	Whether display the query button
 IsShowCbTime	Whether display the quick time setting button
 IsShowSetTime	Whether display the time setting button
 IsShowStatusBar	Whether display the status column
 IsShowToolBar	Whether display the tools column
 Left	The left coordinate
 Name	Name
 NumberAxisMaximum	Get or set the maximum value of numerical axis
 NumberAxisMinimum	Get or set the minimum value of numerical axis
 NumberInterval	Get or set the maximum scale of numerical axis
 NumberSmallInterval	Get or set the minimum scale of numerical axis
 ToolTip	Tooltip text
 Top	The top coordinate
 Width	Width
 ZIndex	Layer index

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