

DIView

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

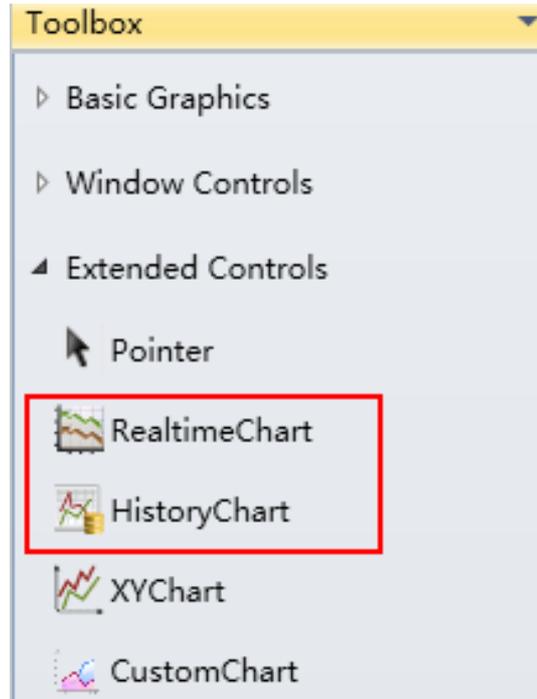
In this chapter, you will learn

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

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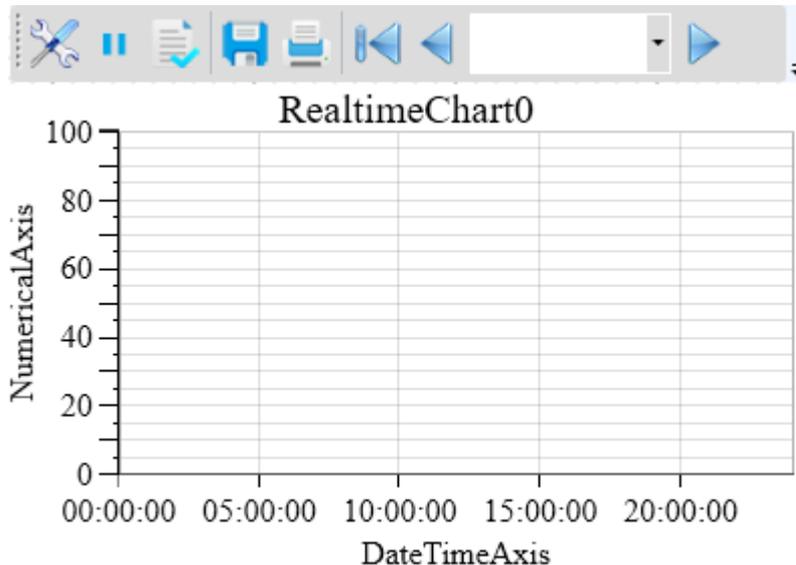
The curve that reflects the trend of data change with time, and is widely used in industry. For example, it displays the trend of environmental temperature, water temperature, production output and other changes with time, which is convenient for users to efficiently and quickly collect, analyze, and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



- The concepts of chart
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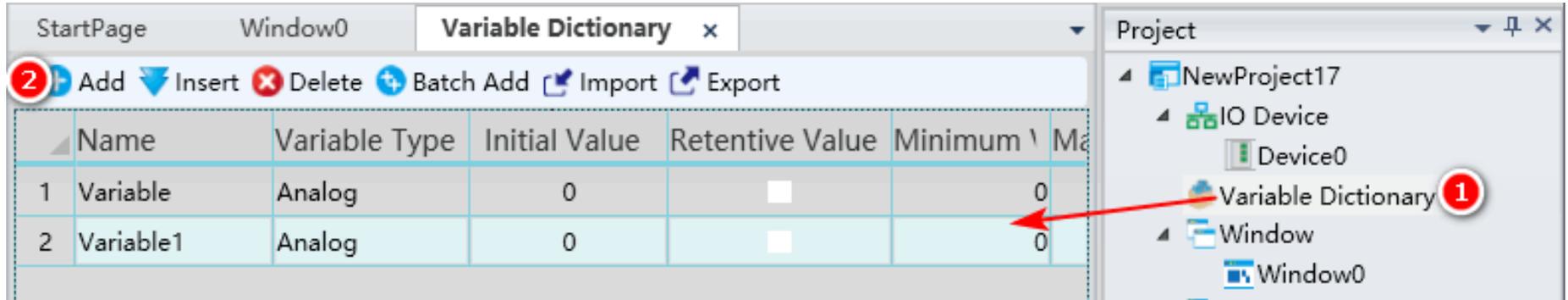
➤ Overview

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 shows the 'Variable Dictionary' window with the following table:

	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	

The Project tree on the right shows 'NewProject17' containing 'IO Device', 'Device0', 'Variable Dictionary' (highlighted with a red circle and arrow), and 'Window'.

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

(2) Create a simulated device : Device0

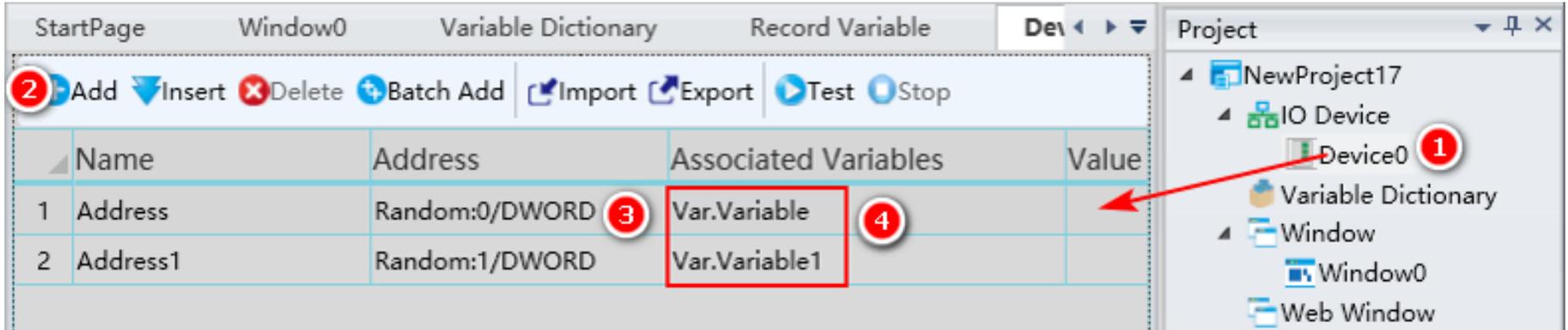
The screenshots illustrate the following steps:

- 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



StartPage Window0 Variable Dictionary Record Variable Dev

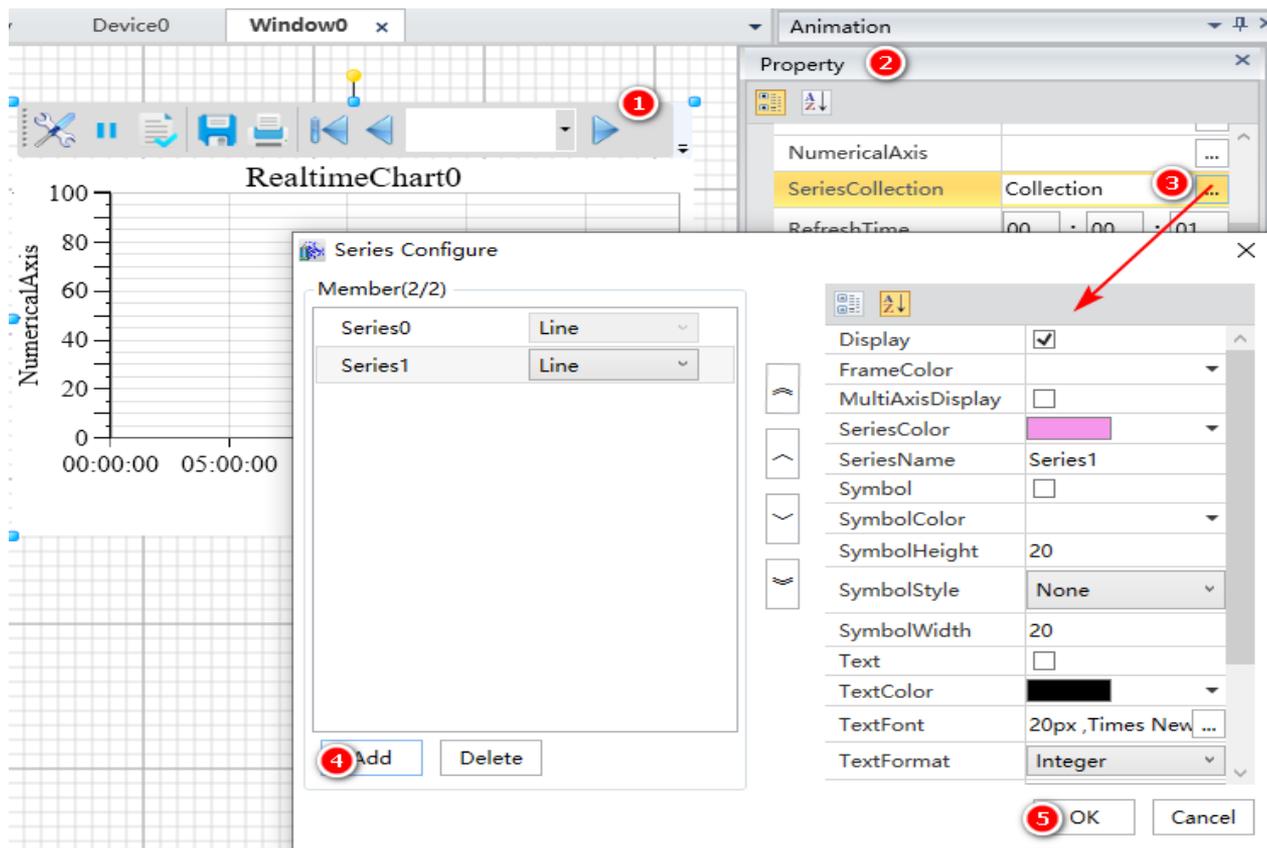
2 Add Insert Delete Batch Add Import Export Test Stop

	Name	Address	Associated Variables	Value
1	Address	Random:0/DWORD 3	Var.Variable 4	
2	Address1	Random:1/DWORD	Var.Variable1	

Project

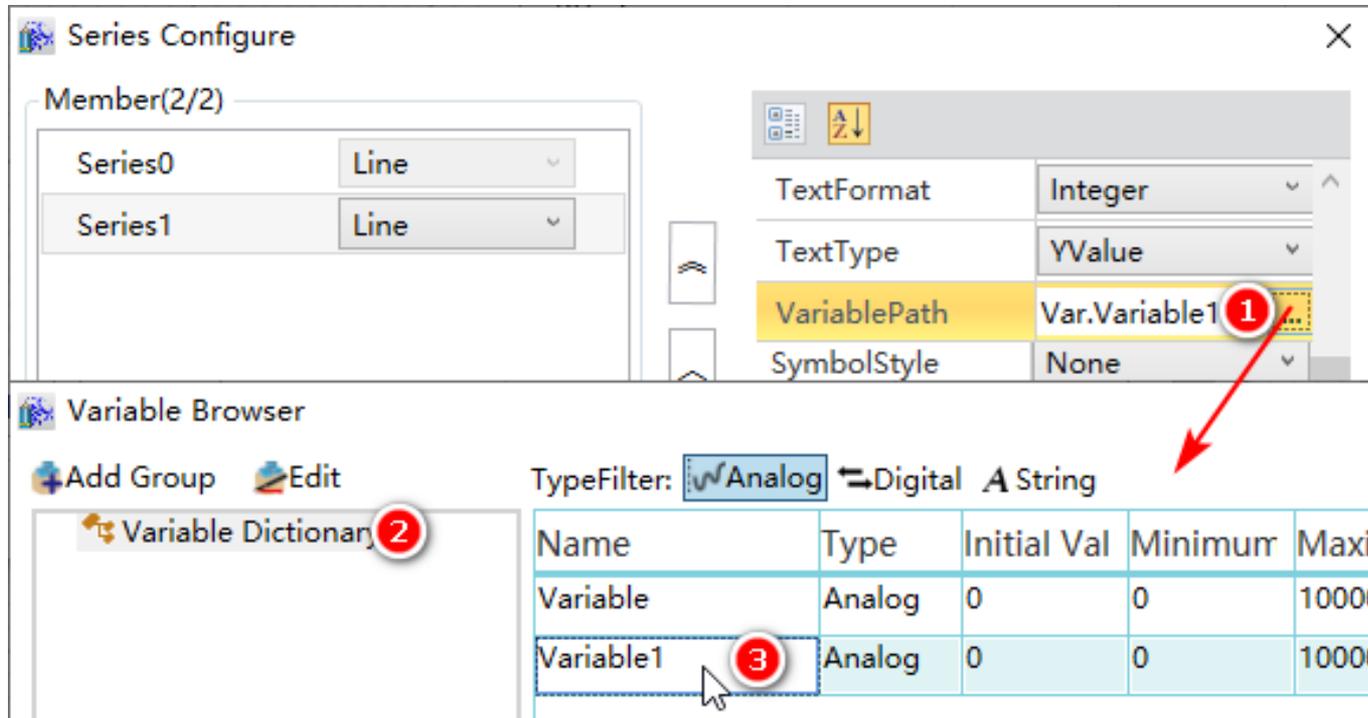
- NewProject17
 - IO Device
 - Device0 1
 - Variable Dictionary
 - Window
 - Window0
 - Web Window

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



The screenshot displays the Delta software interface for configuring a Realtime Chart. The main window shows a grid with a vertical axis labeled "NumericalAxis" ranging from 0 to 100 and a horizontal axis showing time from 00:00:00 to 05:00:00. A "RealtimeChart0" is visible on the grid. A "Series Configure" dialog box is open, showing two series: "Series0" and "Series1", both set to "Line". The "Add" button is highlighted with a red circle "4". A "Property" window is also open, showing the "SeriesCollection" property set to "Collection", with a red circle "3" and an arrow pointing to the "Add" button in the "Series Configure" dialog. The "OK" button in the "Series Configure" dialog is highlighted with a red circle "5".

(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

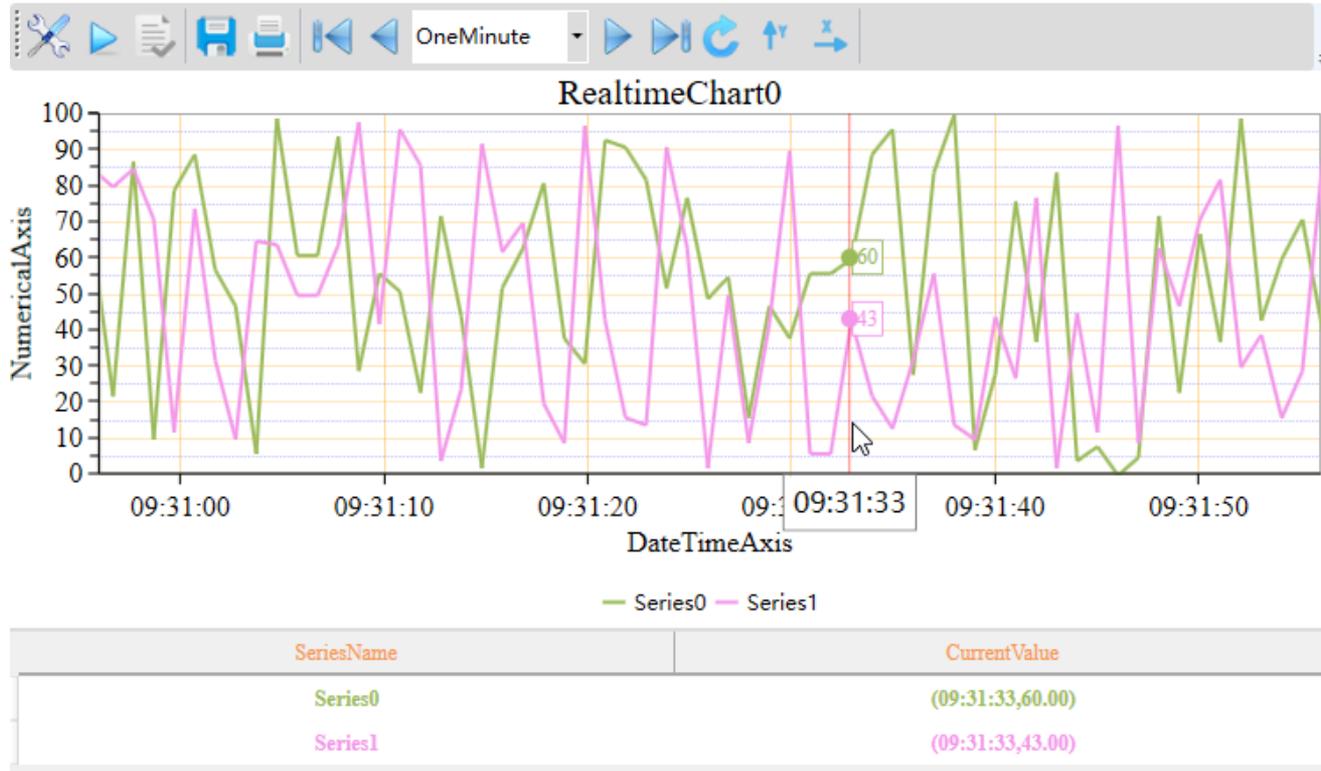


Realtime Chart

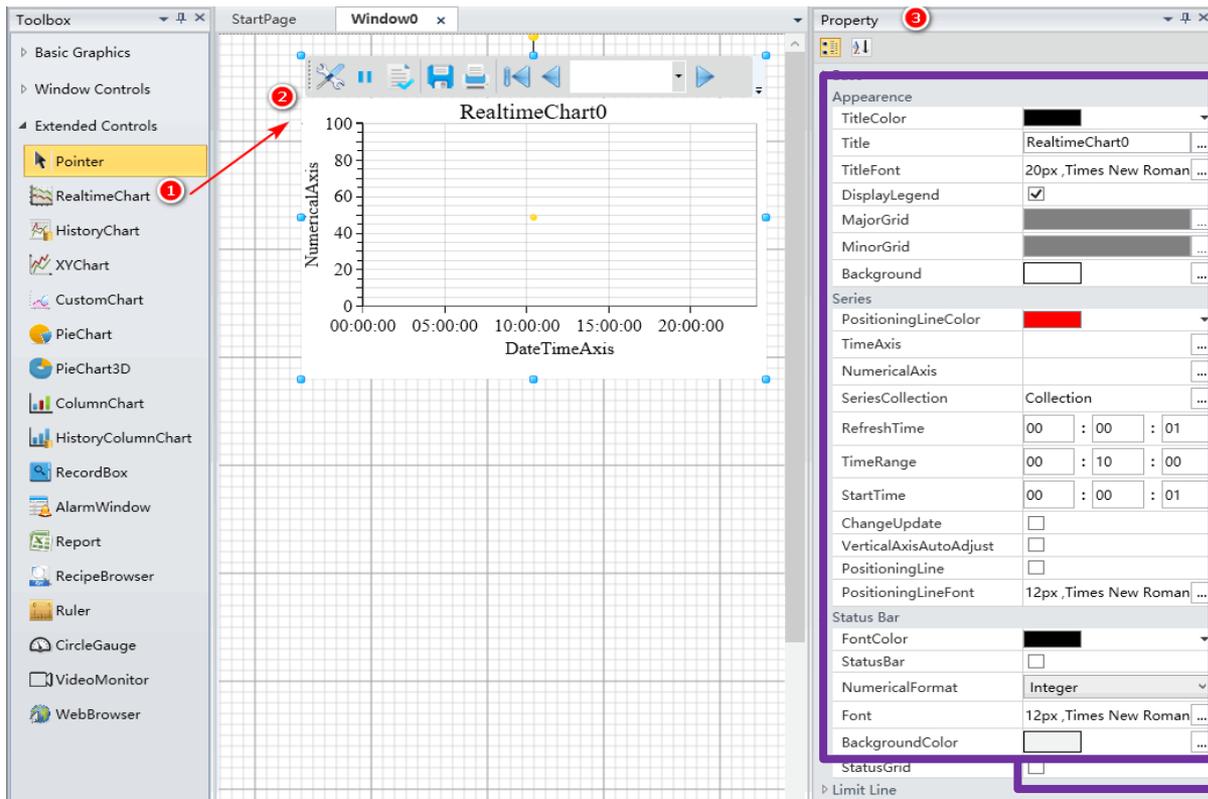
(6) Set some properties

Appearance	
TitleColor	 ▼
Title	RealtimeChart0 ...
TitleFont	20px ,Times New Roman ...
DisplayLegend	<input checked="" type="checkbox"/>
MajorGrid	 ...
MinorGrid	 ...
Background	 ...
Series	
PositioningLineColor	 ▼
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	 ▼
StatusBar	<input checked="" type="checkbox"/>
NumericalFormat	Double2 ▼
Font	12px ,Times New Roman ...
BackgroundColor	 ...
StatusGrid	<input type="checkbox"/>

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



➤ Property window

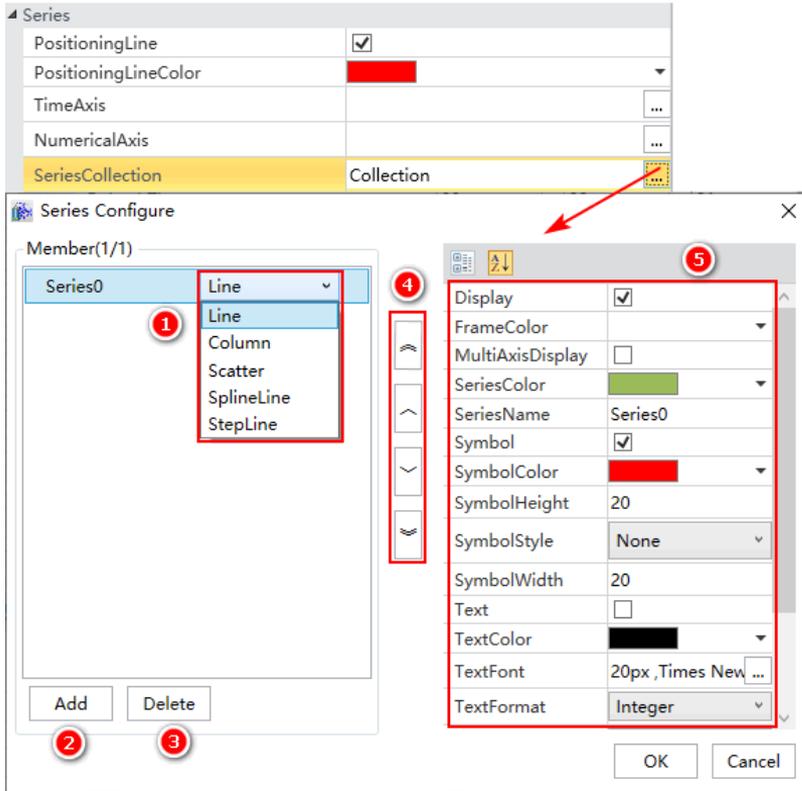


The screenshot shows the software interface with a Realtime Chart and its Property window. The chart has a NumericalAxis (0-100) and a DateTimeAxis (00:00:00 to 20:00:00). A red arrow points to the 'RealtimeChart' control in the toolbox (1) and another red arrow points to the chart's NumericalAxis (2). The Property window (3) is open, showing various settings for the chart.

Appearance	
TitleColor	█
Title	RealtimeChart0
TitleFont	20px ,Times New Roman ...
DisplayLegend	<input checked="" type="checkbox"/>
MajorGrid	█
MinorGrid	█
Background	█
Series	
PositioningLineColor	█
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 type="checkbox"/>
PositioningLineFont	12px ,Times New Roman ...
Status Bar	
FontColor	█
StatusBar	<input type="checkbox"/>
NumericalFormat	Integer
Font	12px ,Times New Roman ...
BackgroundColor	█
StatusGrid	<input type="checkbox"/>
Limit Line	

- **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

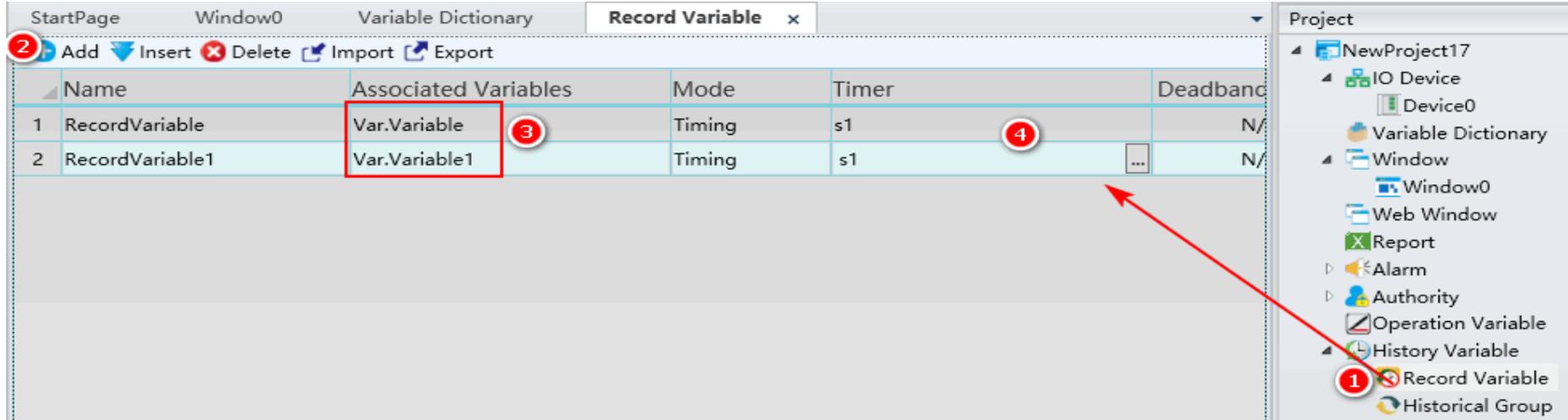


The screenshot shows the 'Series' collection in a software interface. The 'SeriesCollection' property is highlighted in yellow and has a small icon next to it. A red arrow points from this icon to the 'Series Configure' dialog box. The dialog box has a 'Member(1/1)' section with a list of series: 'Series0'. A dropdown menu is open for 'Series0', showing options: 'Line', 'Column', 'Scatter', 'SplineLine', and 'StepLine'. The 'Line' option is selected. Below the list are 'Add' and 'Delete' buttons. To the right of the list is a vertical toolbar with icons for adding, removing, and reordering series. The main area of the dialog is a list of properties for the selected series, 'Series0'. The properties are: 'Display' (checked), 'FrameColor' (dropdown), 'MultiAxisDisplay' (checkbox), 'SeriesColor' (green), 'SeriesName' (Series0), 'Symbol' (checked), 'SymbolColor' (red), 'SymbolHeight' (20), 'SymbolStyle' (None), 'SymbolWidth' (20), 'Text' (checkbox), 'TextColor' (black), 'TextFont' (20px, Times New ...), and 'TextFormat' (Integer). The 'OK' and 'Cancel' buttons are at the bottom right.

- 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

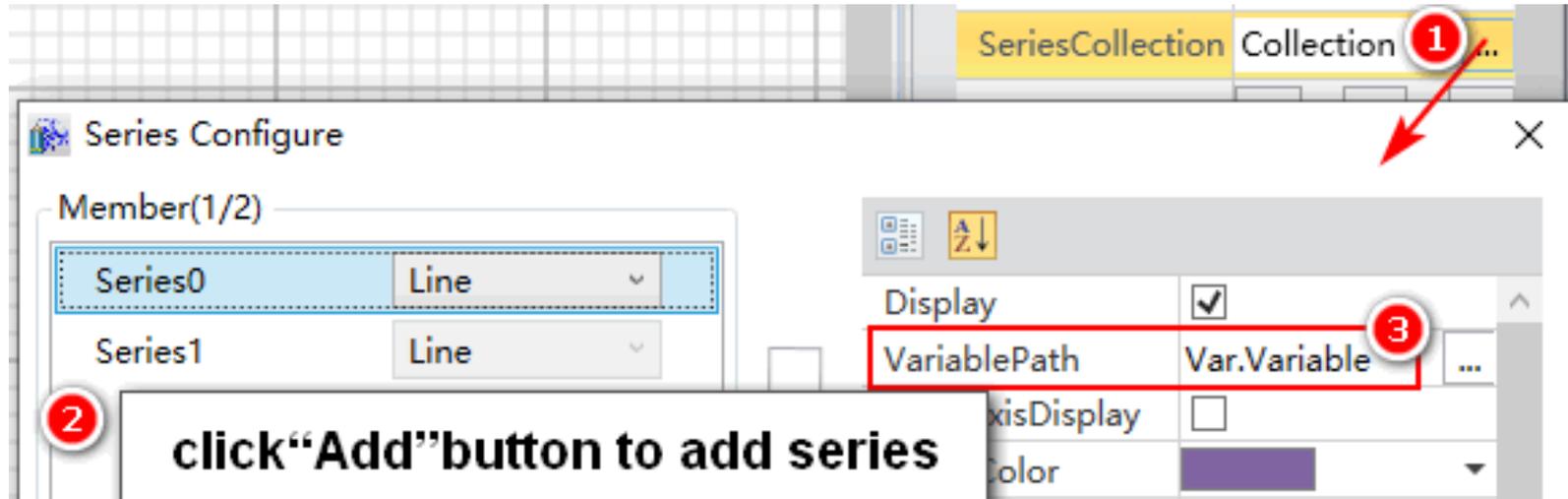
➤ TimeRange property example

(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 3	Timing	s1 4	N/A
2	RecordVariable1	Var.Variable1	Timing	s1	N/A

(2)Series0 associated Variable, Series1 associated Variable1



SeriesCollection Collection 1 ...

Series Configure

Member(1/2)

Series0	Line
Series1	Line

Display

VariablePath Var.Variable 3 ...

AxisDisplay

Color

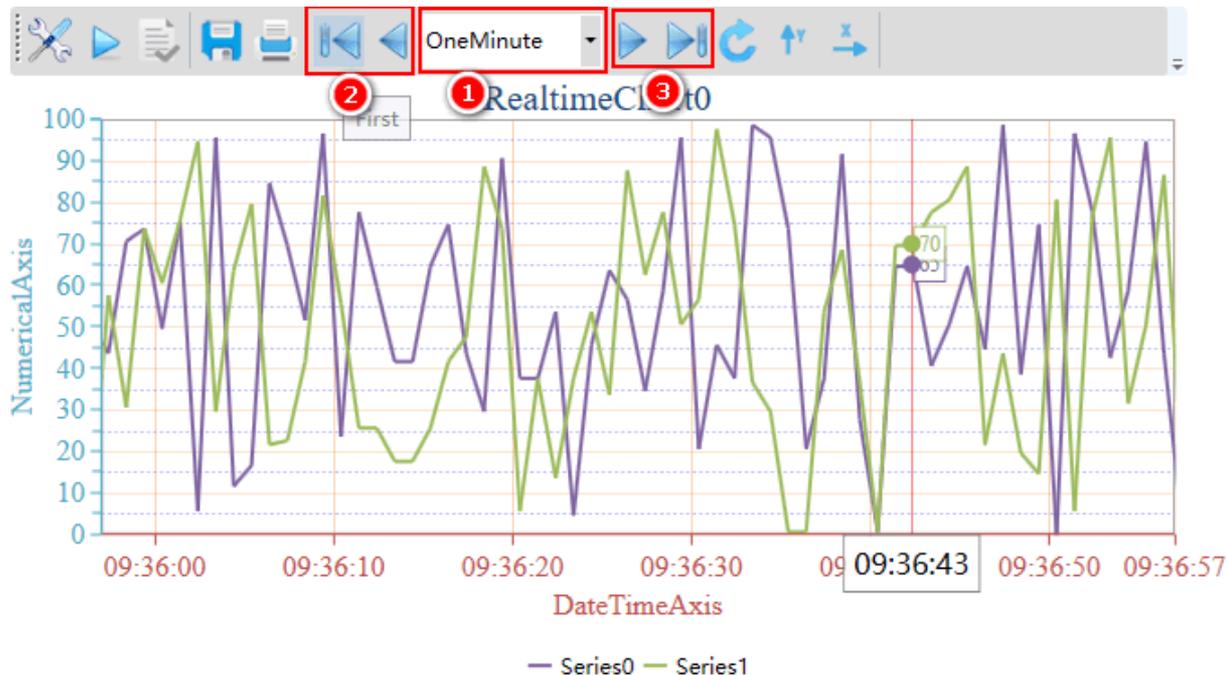
click "Add" button to add series 2



(3) Set TimeRange property to 10min

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

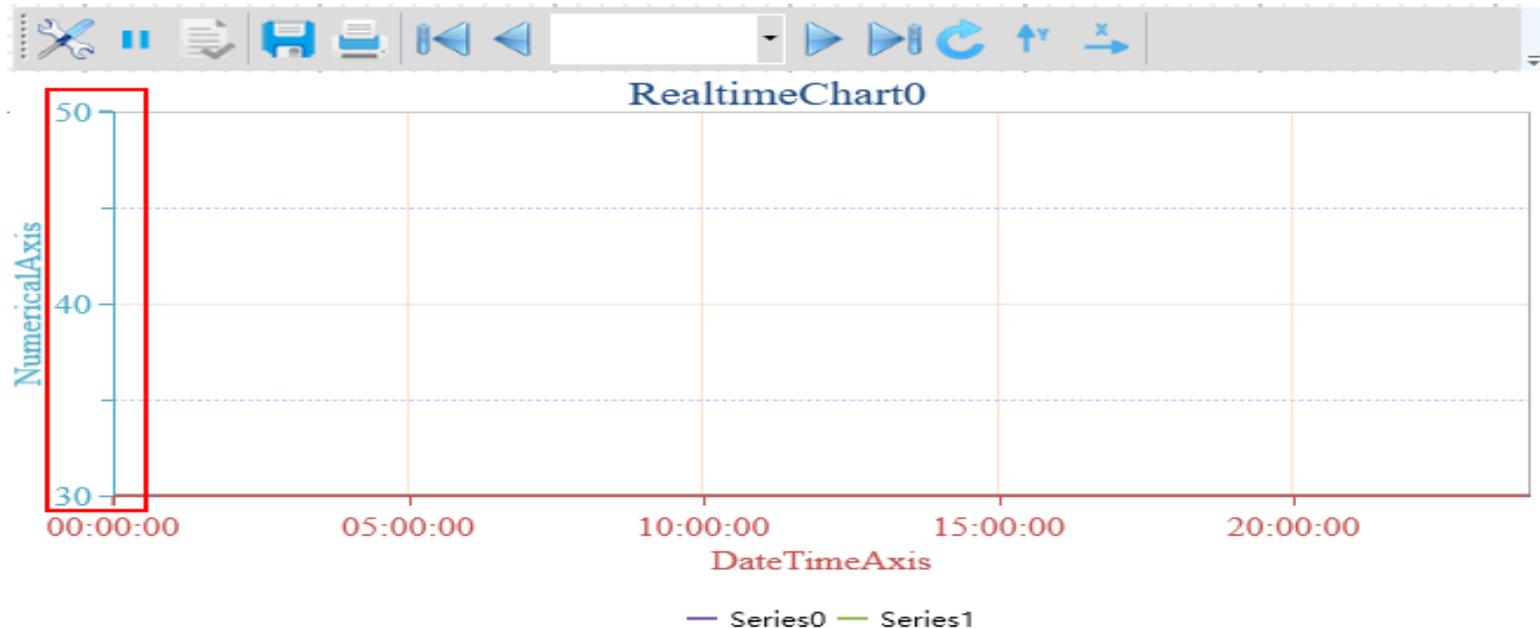
(4) Run the project



- ① Set Page Range to 1min
- ② ③ 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

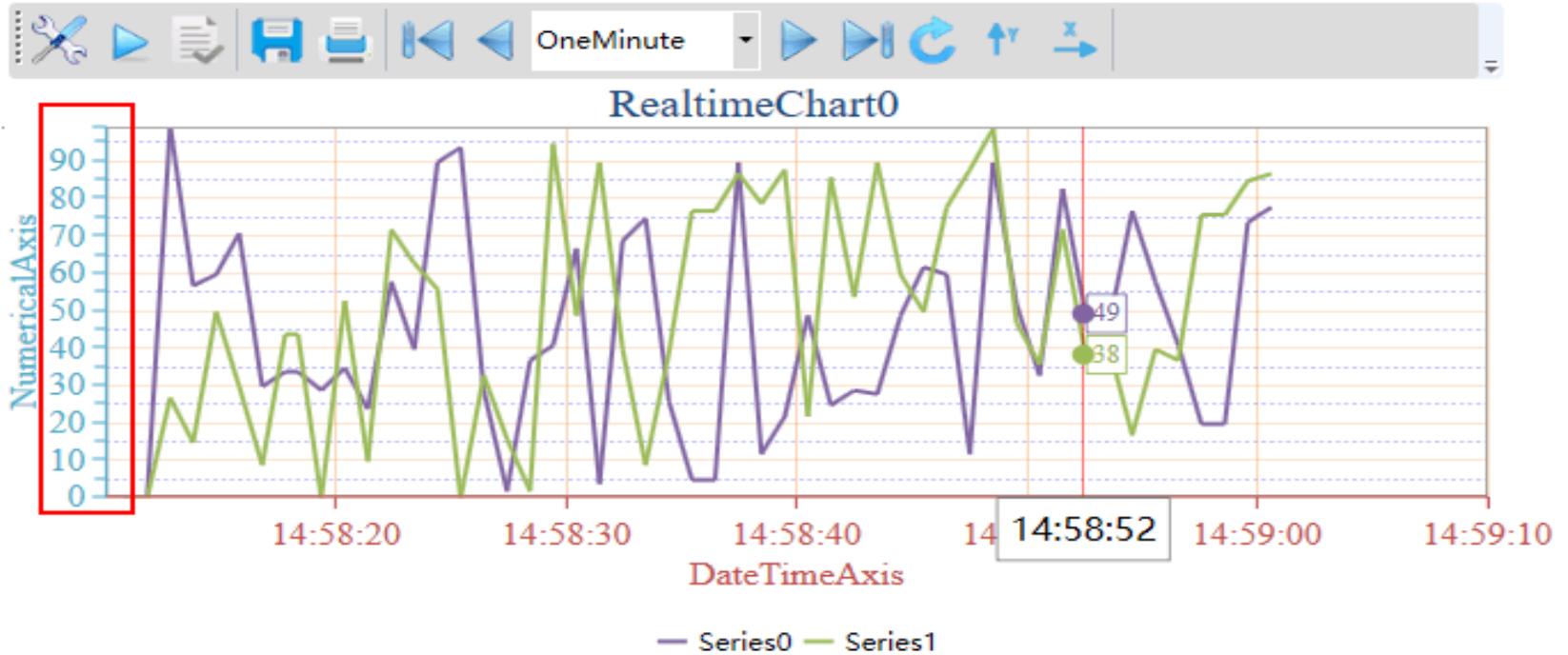
(1) Create a RealtimeChart0 and set the numerical axis range from 30 to 50, Series0, Series1 associated with the Variable0, Variable1 respectively (associated with Simulation Device) range from 0 to 100



(2) Check the VerticalAxisAutoAdjust property of RealtimeChart0

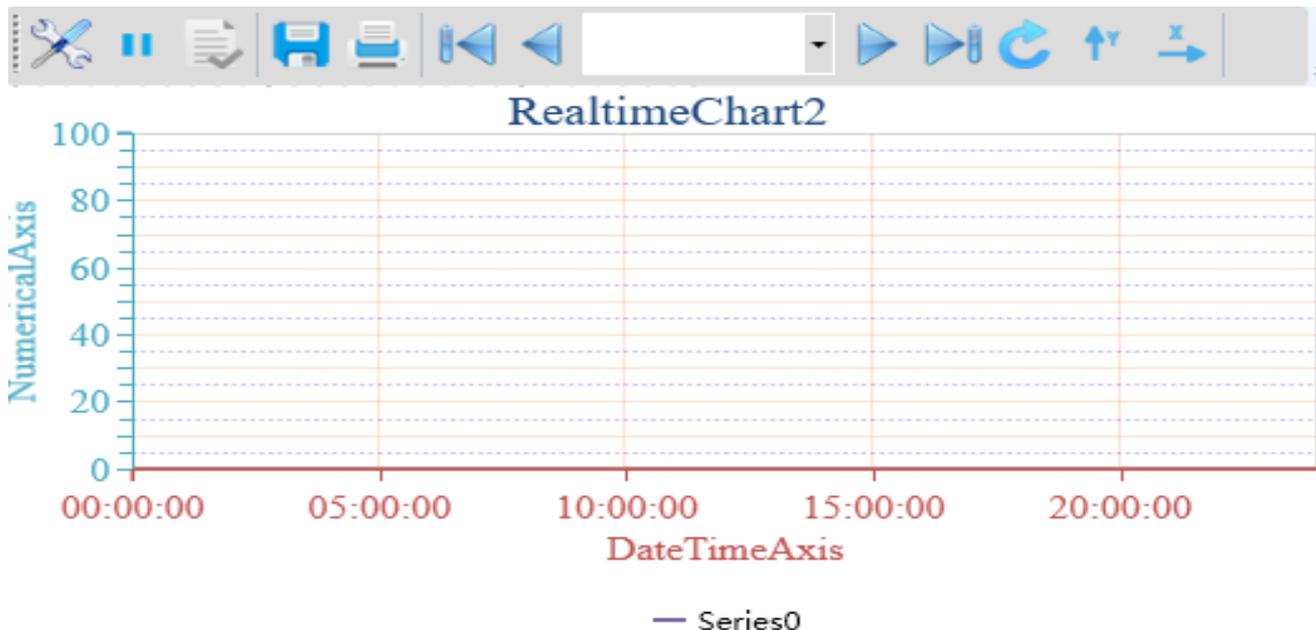


(3) Run the project, the range of the numerical axis is adjusted with the value of the data points



➤ ChangeUpdate property example

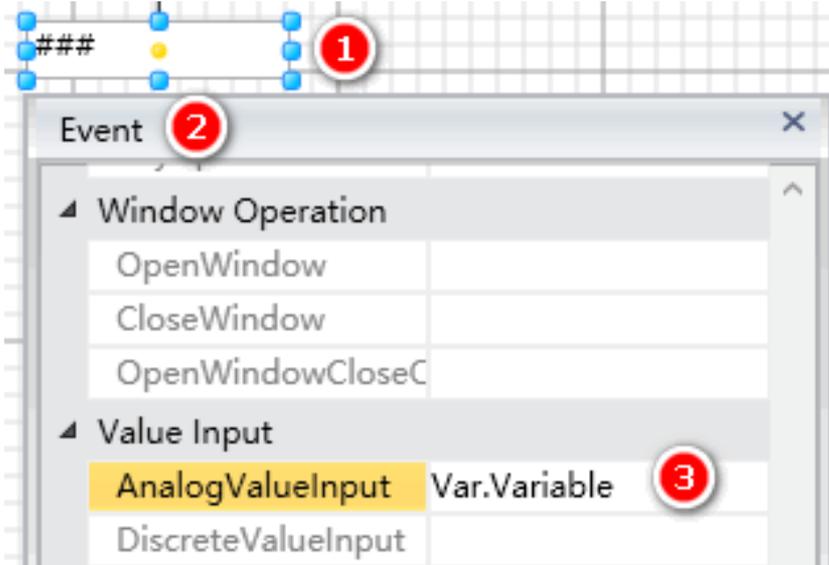
(1) Create a RealtimeChart1 , RealtimeChart2 in the Window0 and all add a Series0 who is associated with Variable4(not associated with any device) in the variable dictionary



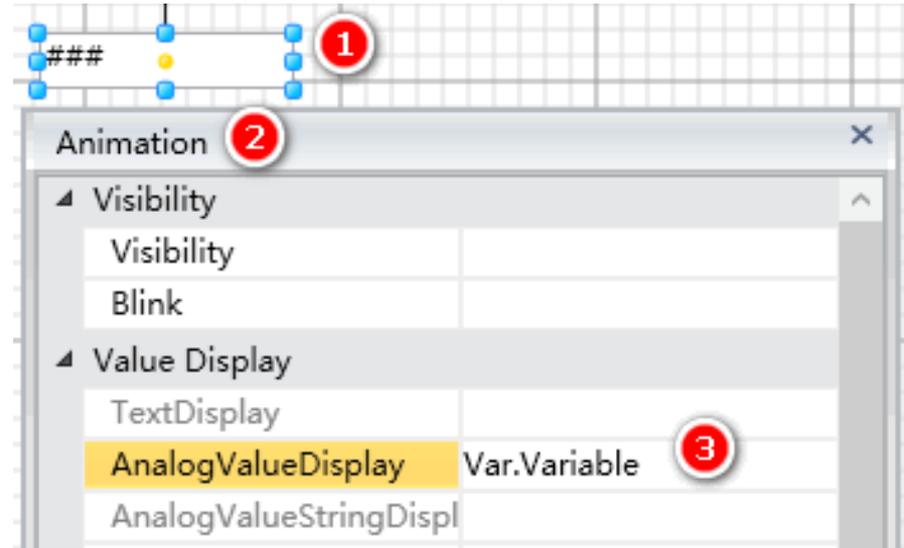
(2) Uncheck ChangeUpdate property of RealtimeChart1, Check the ChangeUpdate property of RealtimeChart2

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

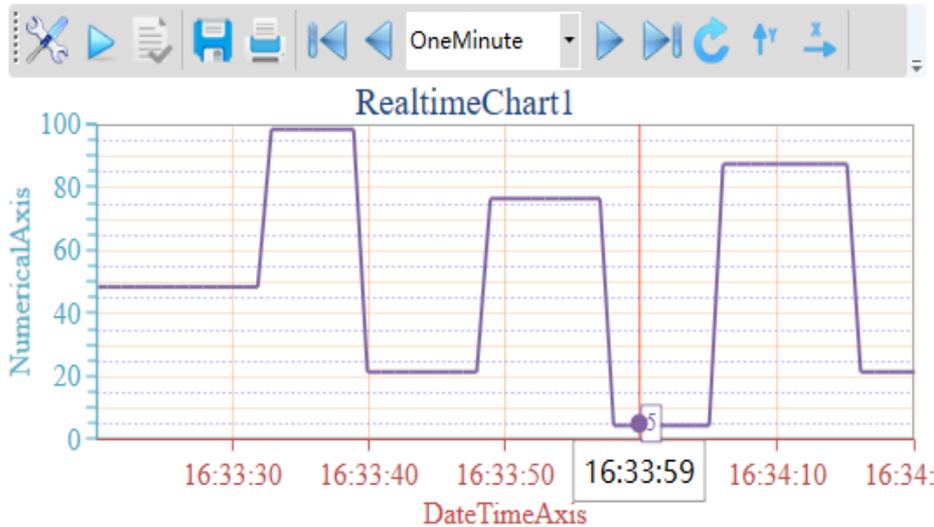


Analog Value Input Event

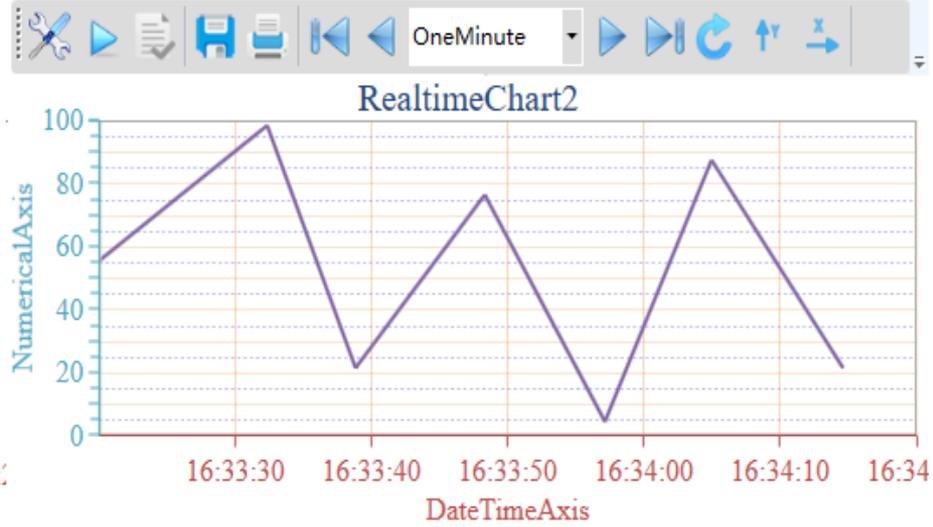


Analog Value Display Animation

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



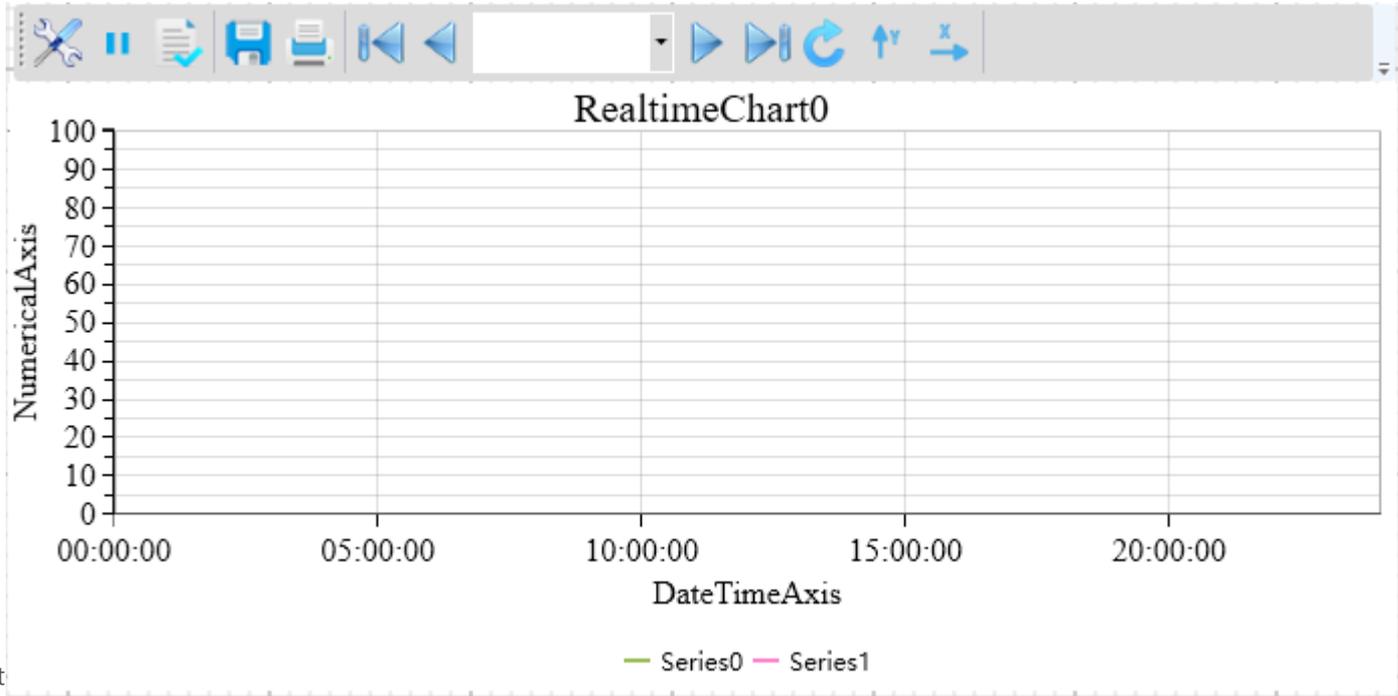
— Series0
ChangeUpdate property is Unchecked



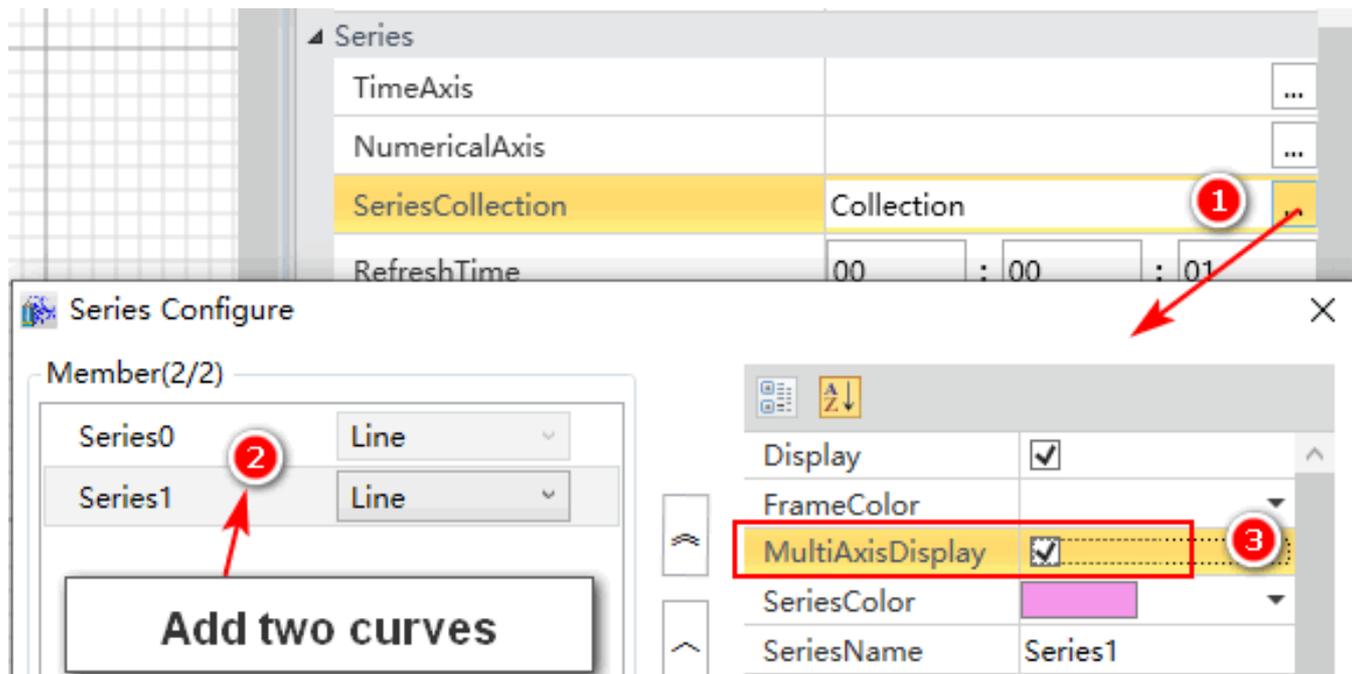
— Series0
ChangeUpdate property is checked

➤ MultiAxisDisplay property example

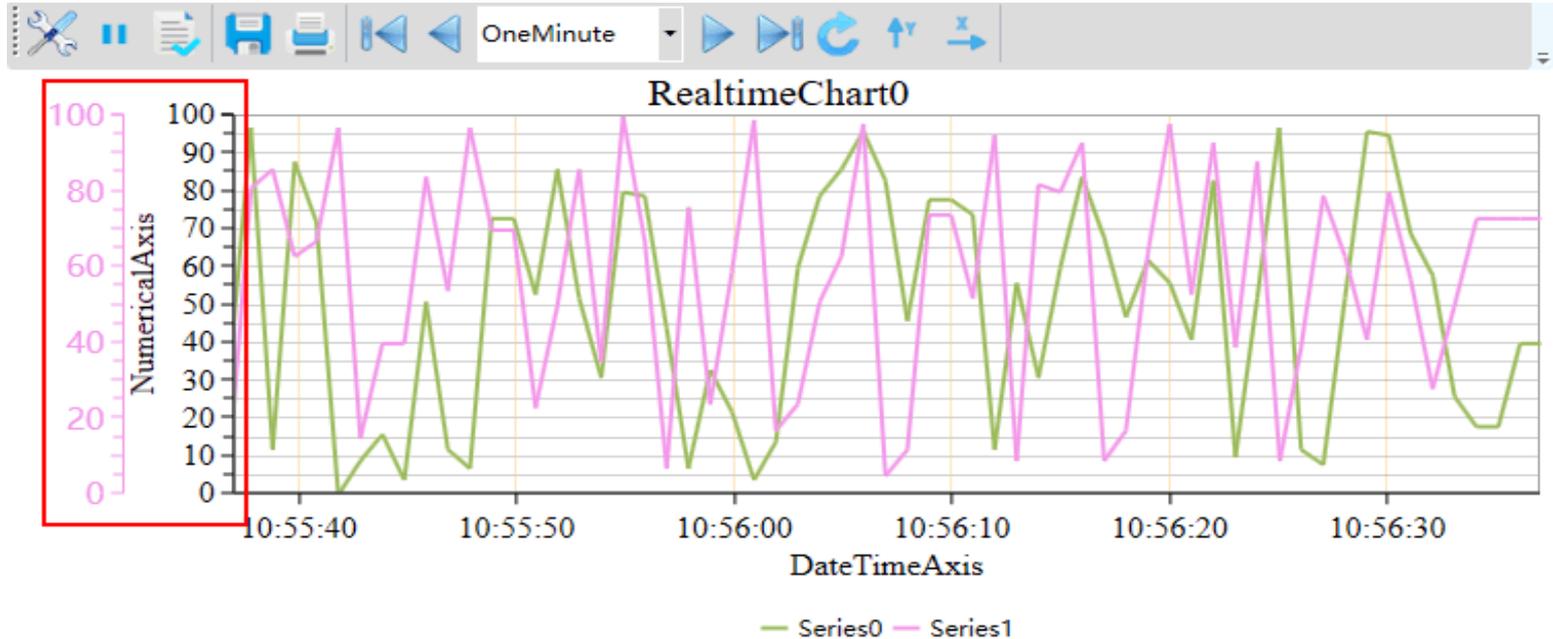
(1) Create a RealtimeChart0 and add two curves, Series0, Series1 associated with the Variable0, Variable1 respectively (associated with Simulation Device).



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

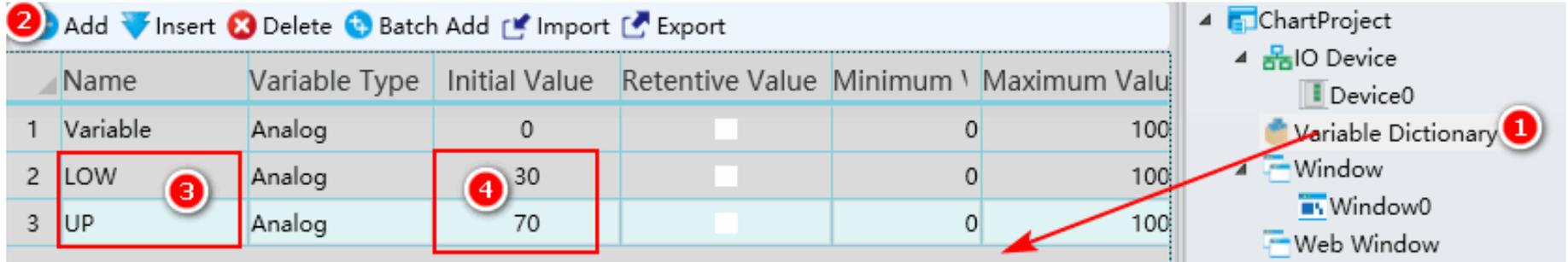


(3) Run the project, two numerical axis will be displayed on the RealtimeChart0



➤ Limit Line property example

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

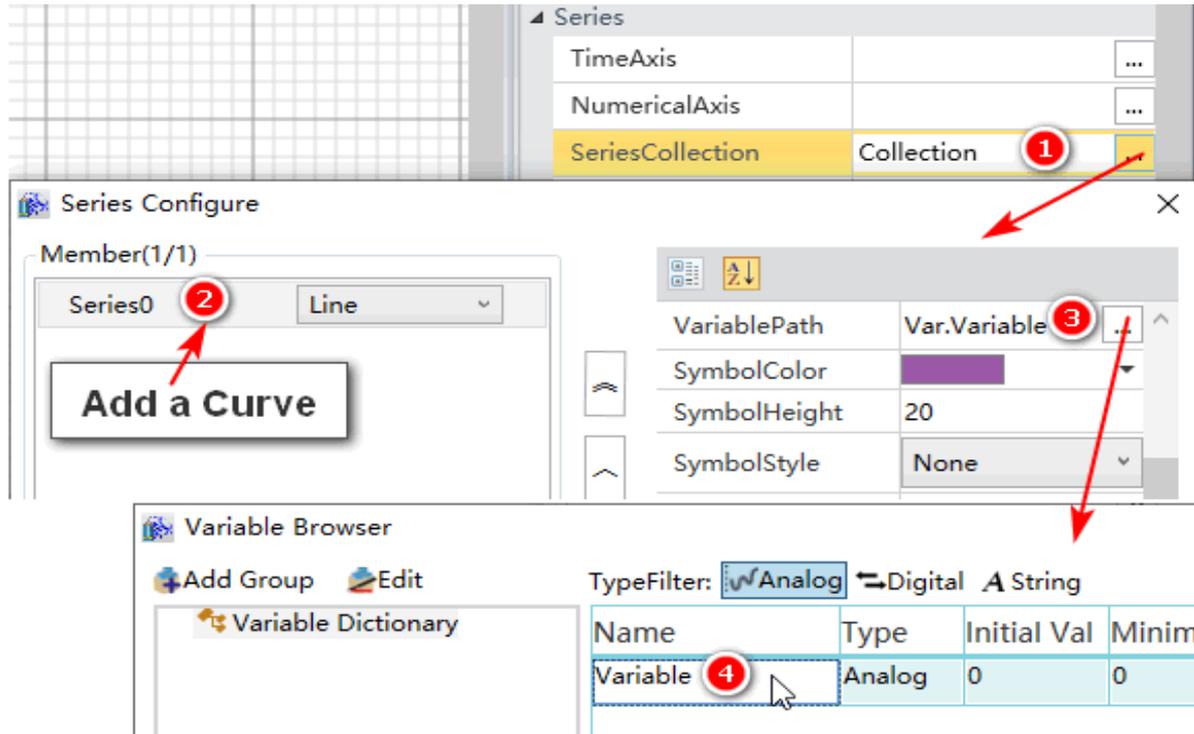


	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Maximum Valu
1	Variable	Analog	0	<input type="checkbox"/>	0	100
2	LOW	Analog	30	<input type="checkbox"/>	0	100
3	UP	Analog	70	<input type="checkbox"/>	0	100

ChartProject

- IO Device
 - Device0
- Variable Dictionary
- 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 process for a Realtime Chart series. It features three main panels:

- Series Collection Panel:** Located at the top, it shows a list of series. The 'SeriesCollection' row is highlighted in yellow, and a red circle with the number '1' is placed over the '+' icon to its right. A red arrow points from this icon to the 'Series Configure' dialog.
- Series Configure Dialog:** A modal window titled 'Series Configure' with a close button (X). It contains:
 - A 'Member(1/1)' section with a text field containing 'Series0' (circled with a red '2') and a dropdown menu set to 'Line'.
 - A large 'Add a Curve' button below the text field.
 - A 'VariablePath' field with a dropdown menu showing 'Var.Variable' (circled with a red '3') and a '+' icon to its right. A red arrow points from this icon to the 'Variable Browser'.
 - Other fields: 'SymbolColor' (a purple color swatch), 'SymbolHeight' (set to 20), and 'SymbolStyle' (set to None).
- Variable Browser:** A panel at the bottom with 'Add Group' and 'Edit' buttons. It contains a 'Variable Dictionary' section and a table with the following data:

Name	Type	Initial Val	Minim
Variable (circled with a red '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	④
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

④⑤ Set the associated variable of the limit line

Variable Browser

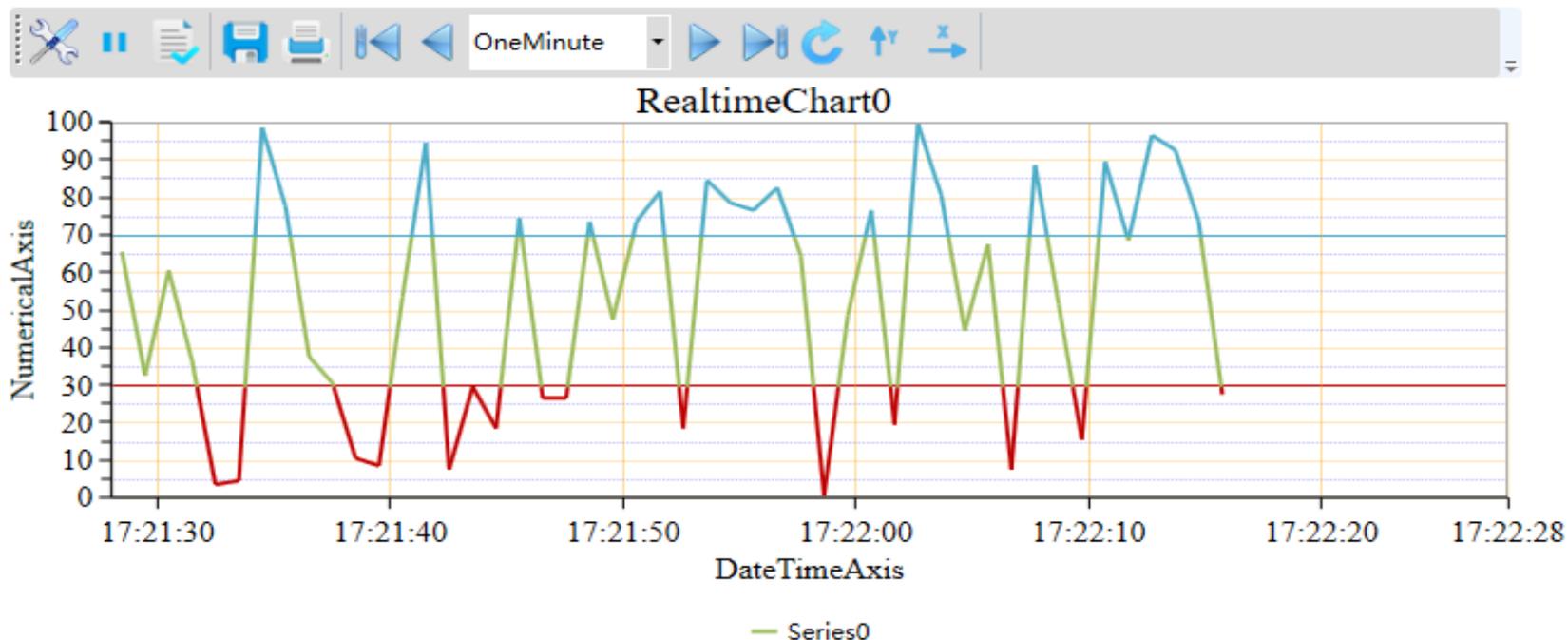
Add Group Edit

TypeFilter: Analog Digital String

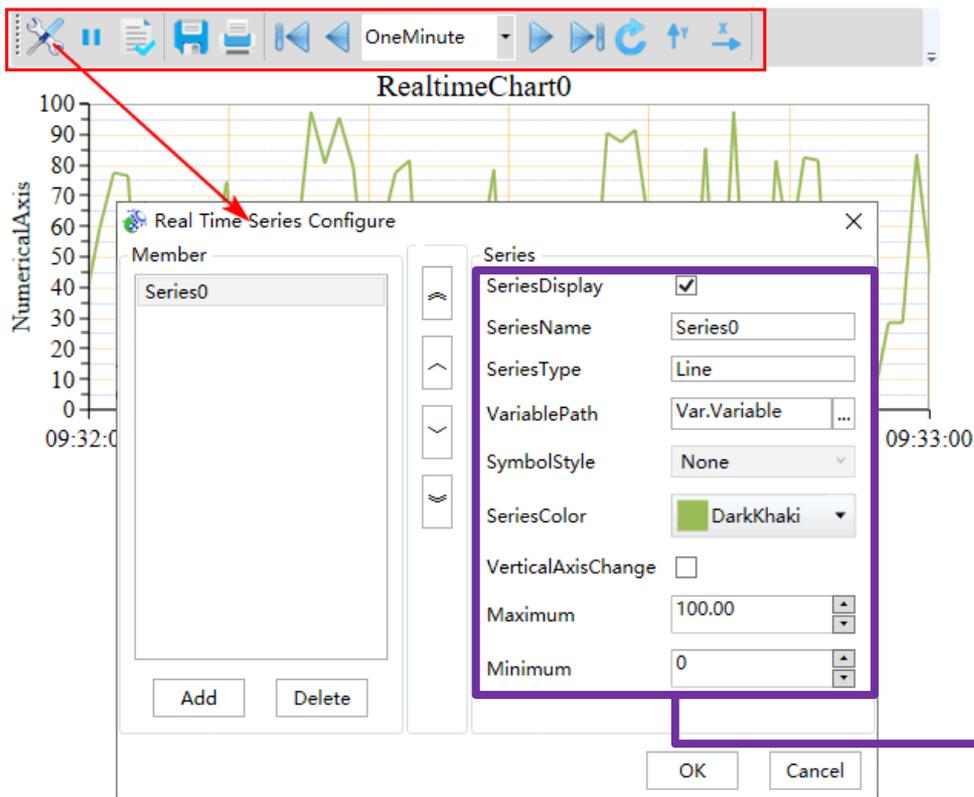
Name	Type	Initial Val	Minimum	Maximum	De
Variable	Analog	0	0	10000	
LOW	Analog	30	0	10000	
UP	Analog	70	0	10000	

⑤

(4) Run the Window0, limit line display



➤ The usage of the toolbar of RealtimeChart



The image shows a RealtimeChart window with a toolbar at the top. A red box highlights the toolbar, which includes icons for zooming, pausing, and refreshing. Below the chart, a dialog box titled "Real Time Series Configure" is open. A red arrow points from the toolbar to the dialog box. The dialog box has a "Member" list containing "Series0" and a "Series" configuration section. The "Series" section includes the following properties:

- SeriesDisplay:
- SeriesName: Series0
- SeriesType: Line
- VariablePath: Var.Variable
- SymbolStyle: None
- SeriesColor: DarkKhaki
- VerticalAxisChange:
- Maximum: 100.00
- Minimum: 0

Buttons for "Add", "Delete", "OK", and "Cancel" are also visible in the dialog box.

- 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

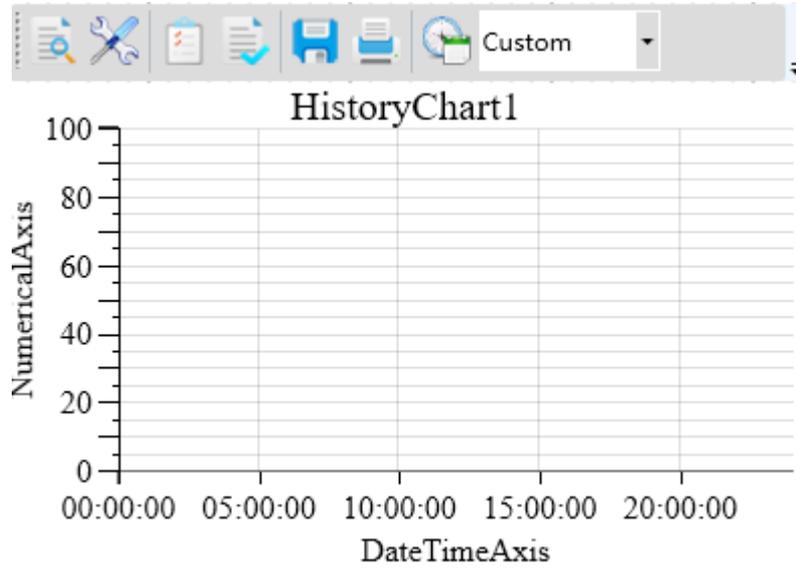
Property list

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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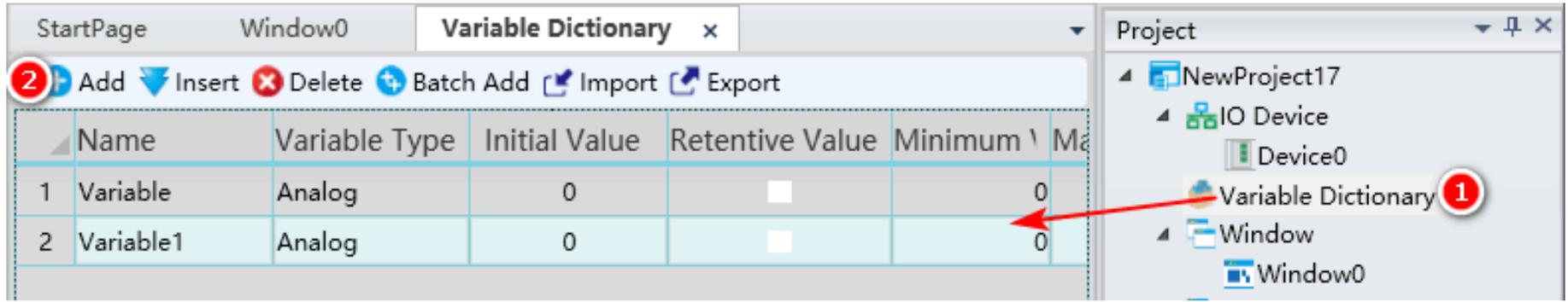
➤ Overview

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



	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	

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

(2) Create a simulated device : Device0

The screenshots illustrate the following steps:

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

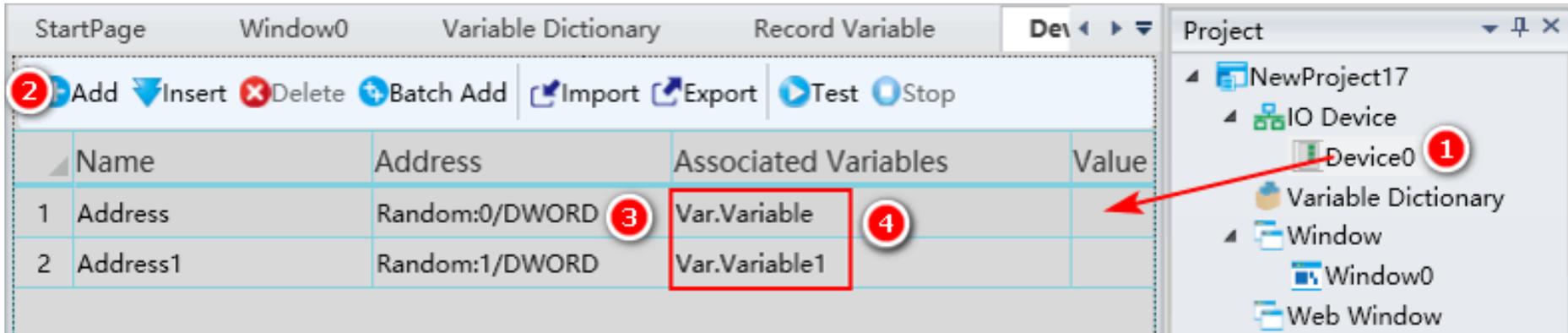
The "Simulator" dialog shows the following configuration:

Field	Value
DeviceAddress	1
ScanCycle	50 Milliseconds
Timeout	3000 Milliseconds
Retries	3
ReconnectDelay	30 Seconds
ReconnectTime	0 Minutes
Register	Increase()
RefreshCycle	100
MinValue	0
MaxValue	100
Cycle	10000
DutyRatio	50

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



StartPage Window0 Variable Dictionary Record Variable Dev

2 Add Insert Delete Batch Add Import Export Test Stop

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

Project

- 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
1 RecordVariable	Var.Variable 3	Timing	s1 4	N/A
2 RecordVariable1	Var.Variable1	Timing	s1	N/A

Timer Browser

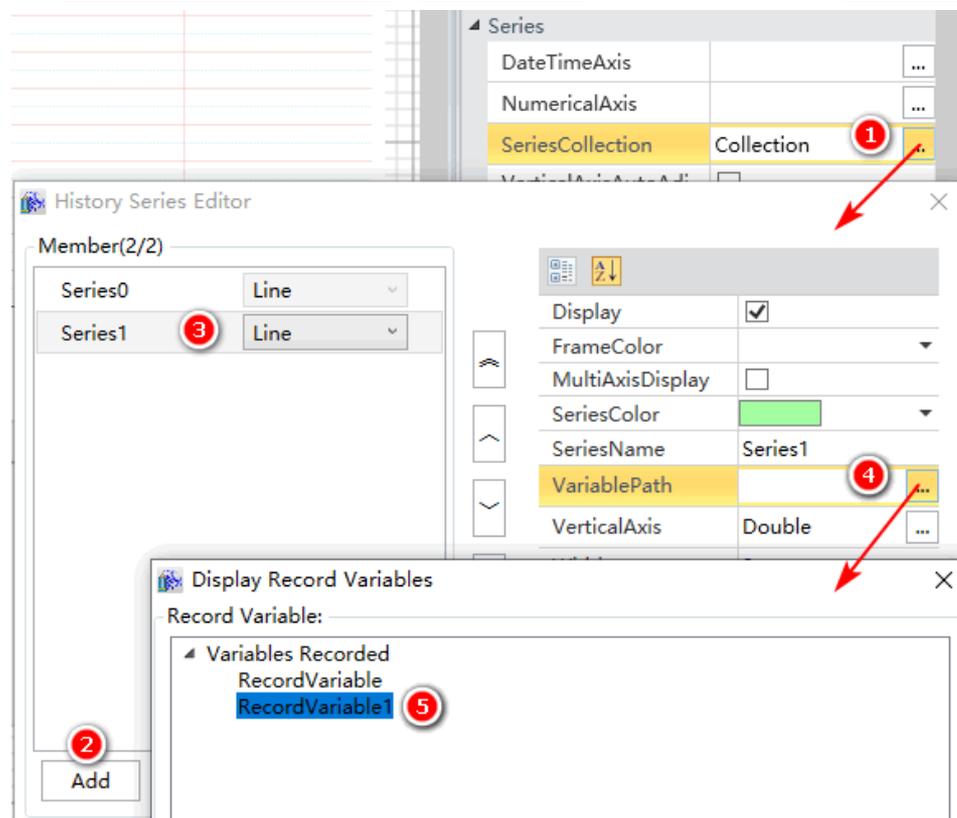
IsEnable	Name	Timer Unit	Timer Coefficient	Relative Time	Description
<input checked="" type="checkbox"/> 5	s1	Second	1	0001-01-01 00:00:00	Triggers every second
<input type="checkbox"/>	s10	Second	10	0001-01-01 00:00:00	Triggers every 10 seconds
<input type="checkbox"/>	s30	Second	30	0001-01-01 00:00:00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

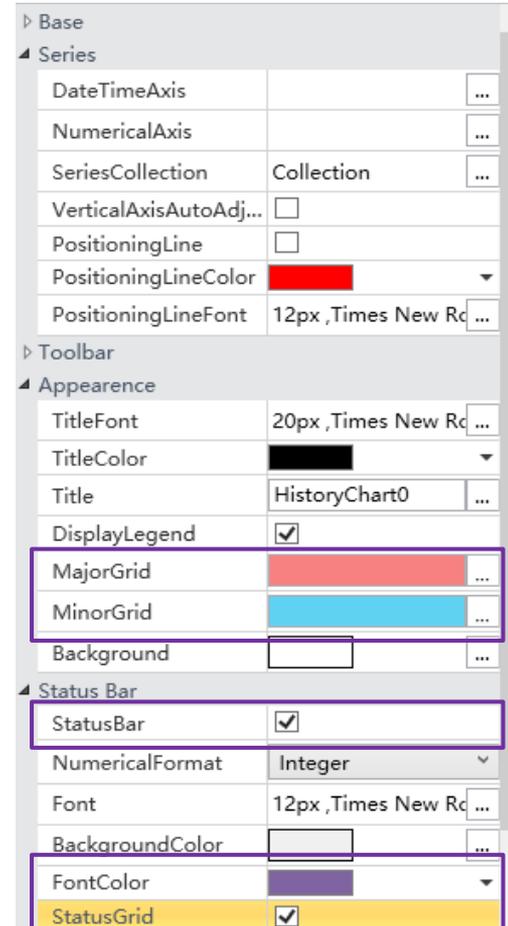
✘Refer to the section "14.2 Setting history record variable" in user manual.

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



The screenshot shows the configuration of a History Chart. The **History Series Editor** window is open, showing two series: **Series0** and **Series1**, both set to **Line** style. The **SeriesCollection** property in the parent window is highlighted with a red circle '1'. The **VariablePath** property for **Series1** is highlighted with a red circle '4'. The **Display Record Variables** dialog box is open, showing **RecordVariable1** selected under **Variables Recorded**, with a red circle '5' next to it. A red circle '2' is next to the **Add** button in the **History Series Editor**. A red circle '3' is next to the **Series1** entry in the **History Series Editor**. Red arrows point from the circles '1' and '4' to the **Display Record Variables** dialog box.

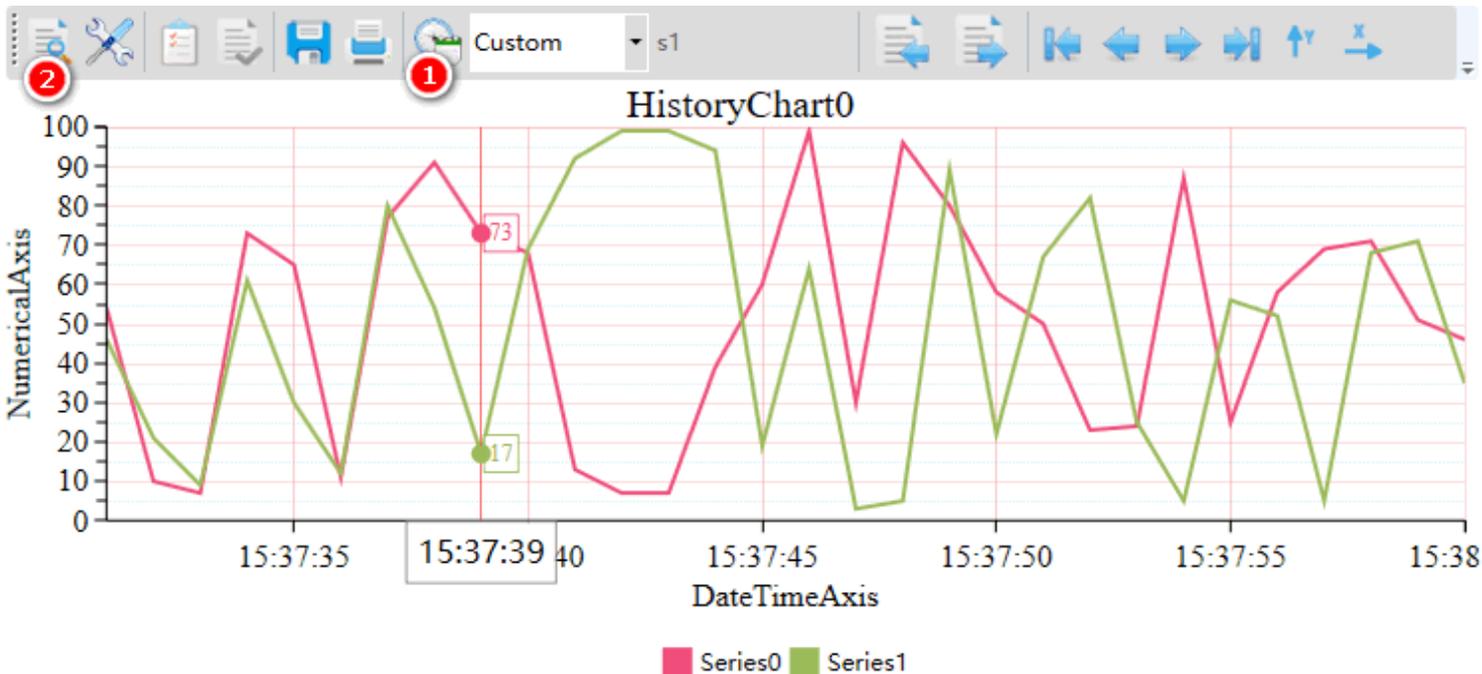
(6) Set some properties of the HistoryChart0



The screenshot shows a property grid for a History Chart. The grid is organized into several sections: Base, Series, Toolbar, Appearance, and Status Bar. The following table represents the visible properties and their values:

Property	Value
Base	
Series	
DateTimeAxis	...
NumericalAxis	...
SeriesCollection	Collection
VerticalAxisAutoAdj...	<input type="checkbox"/>
PositioningLine	<input type="checkbox"/>
PositioningLineColor	Red
PositioningLineFont	12px, Times New Rc...
Toolbar	
Appearance	
TitleFont	20px, Times New Rc...
TitleColor	Black
Title	HistoryChart0
DisplayLegend	<input checked="" type="checkbox"/>
MajorGrid	Light Red
MinorGrid	Light Blue
Background	White
Status Bar	
StatusBar	<input checked="" type="checkbox"/>
NumericalFormat	Integer
Font	12px, Times New Rc...
BackgroundColor	White
FontColor	Dark Purple
StatusGrid	<input checked="" type="checkbox"/>

(7) Run the Window0, query historical data



- ① Set query start time and end time
- ② Query

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)

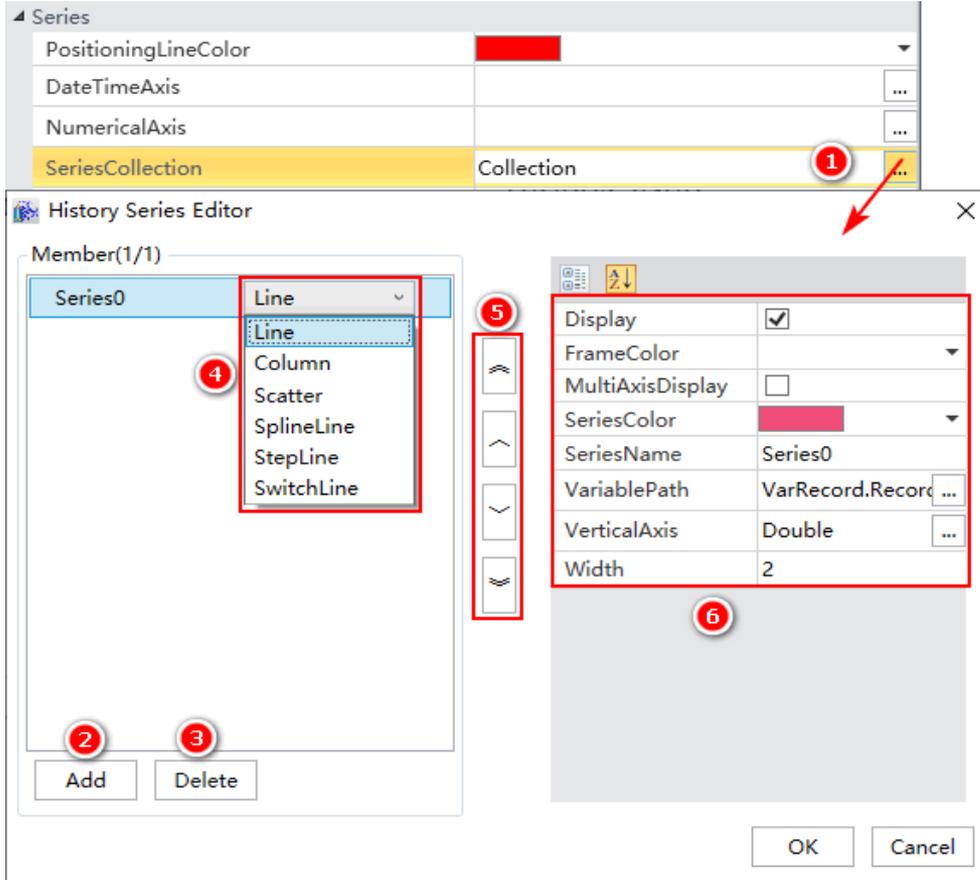
➤ Property window

The screenshot shows the Delta software interface with a HistoryChart and its property window. The chart displays a NumericalAxis (0 to 100) and a DateTimeAxis (00:00:00 to 20:00:00). The property window is open, showing settings for HistoryChart0. A red arrow points to the HistoryChart icon in the toolbox (labeled 1), and a red circle highlights the chart's title (labeled 2). A purple box highlights the property window, and a purple arrow points from the bottom of the property window to the list of properties on the right.

Name	HistoryChart0
Security	...
Display	<input checked="" type="checkbox"/>
Lock	<input type="checkbox"/>
Series	
DateTimeAxis	...
NumericalAxis	...
SeriesCollection	Collection
VerticalAxisAutoAdjust	<input type="checkbox"/>
PositioningLine	<input type="checkbox"/>
PositioningLineColor	Red
PositioningLineFont	12px ,Times New Rom
Toolbar	
Appearance	
TitleFont	20px ,Times New Rom
TitleColor	Black
Title	HistoryChart0
DisplayLegend	<input checked="" type="checkbox"/>
MajorGrid	...
MinorGrid	...
Background	...
Status Bar	
Limit Line	

- **DateTimesAxis:** 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 image shows two overlapping windows from a software interface. The top window is the 'Series' property editor, and the bottom window is the 'History Series Editor' dialog.

Series Property Editor:

- Property: **SeriesCollection** (highlighted in yellow)
- Value: **Collection**
- Callout 1: A red circle with the number '1' is placed over the ellipsis button next to the 'Collection' value.

History Series Editor:

- Member(1/1): **Series0**
- Callout 2: A red circle with the number '2' is placed over the 'Add' button.
- Callout 3: A red circle with the number '3' is placed over the 'Delete' button.
- Callout 4: A red circle with the number '4' is placed over the 'Line' option in the 'SeriesType' dropdown menu.
- Callout 5: A red circle with the number '5' is placed over the 'Move Up' button in the series list.
- Callout 6: A red circle with the number '6' is placed over the 'Properties' button at the bottom of the series list.

Series Properties (from the History Series Editor):

Display	<input checked="" type="checkbox"/>
FrameColor	...
MultiAxisDisplay	<input type="checkbox"/>
SeriesColor	...
SeriesName	Series0
VariablePath	VarRecord.Record ...
VerticalAxis	Double ...
Width	2

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

➤ VerticalAxisAutoAdjust property example

(1) Create 1 variable : Variable

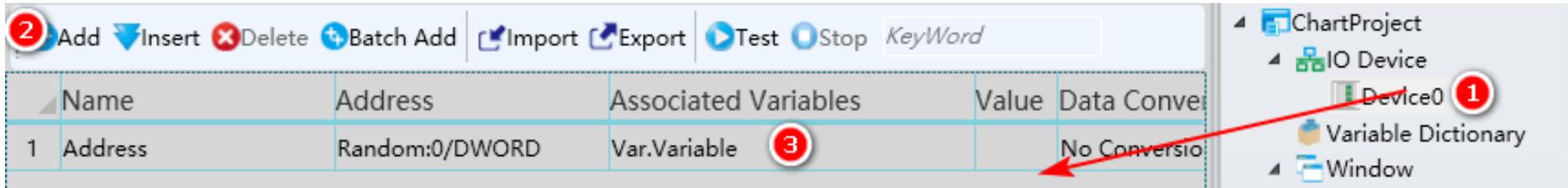


The screenshot shows a software interface with a table of variables and a tree view on the right. The table has columns for Name, Variable Type, Initial Value, Retentive Value, Minimum Value, and Maximum Value. A red circle with the number '2' is next to the 'Add' button. The tree view on the right shows a hierarchy: ChartProject > IO Device > Device0 > Variable Dictionary (marked with a red circle and '1'). A red arrow points from the 'Variable Dictionary' node to the 'Variable' row in the table.

	Name	Variable Type	Initial Value	Retentive Value	Minimum Value	Maximum Value	De
1	Variable	Analog	0	<input type="checkbox"/>	0	10000	

※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 a software interface with a table of simulation devices and a tree view on the right. The table has the following data:

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

The tree view on the right shows the following structure:

- ChartProject
 - IO Device
 - Device0
 - Variable Dictionary
 - Window

Red circles with numbers 1, 2, and 3 are overlaid on the interface. Circle 1 is on 'Device0' in the tree view. Circle 2 is on the 'Add' button in the toolbar. Circle 3 is on the 'Var.Variable' cell in the table. A red arrow points from circle 1 to the 'Data Conversion' column of the table row.

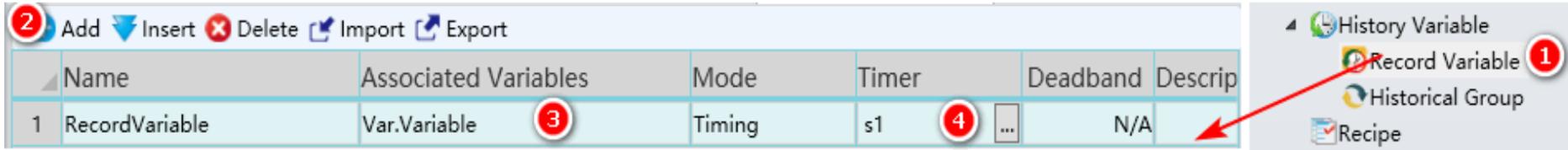
※Refer to the section "5.10.1 Simulator" in user manual.

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

2 Add Insert Delete Import Export

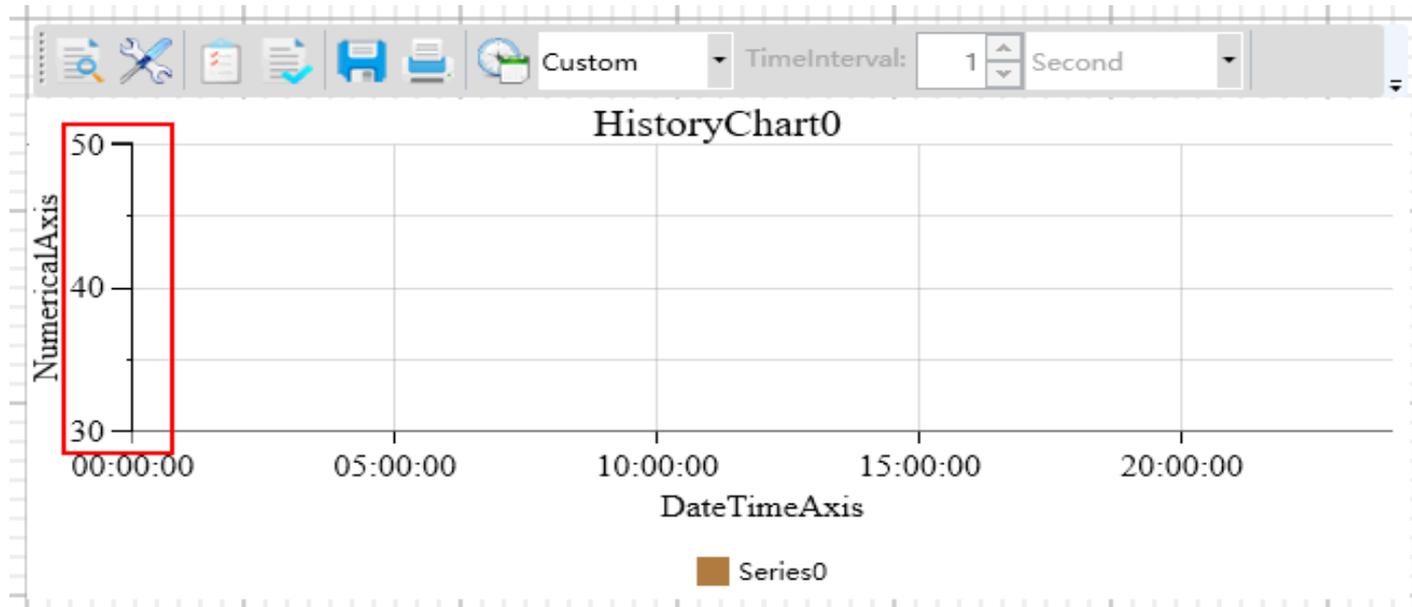
Name	Associated Variables	Mode	Timer	Deadband	Descrip
1 RecordVariable	Var.Variable 3	Timing	s1 4	N/A	

1 History Variable
Record Variable 1
Historical Group
Recipe



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

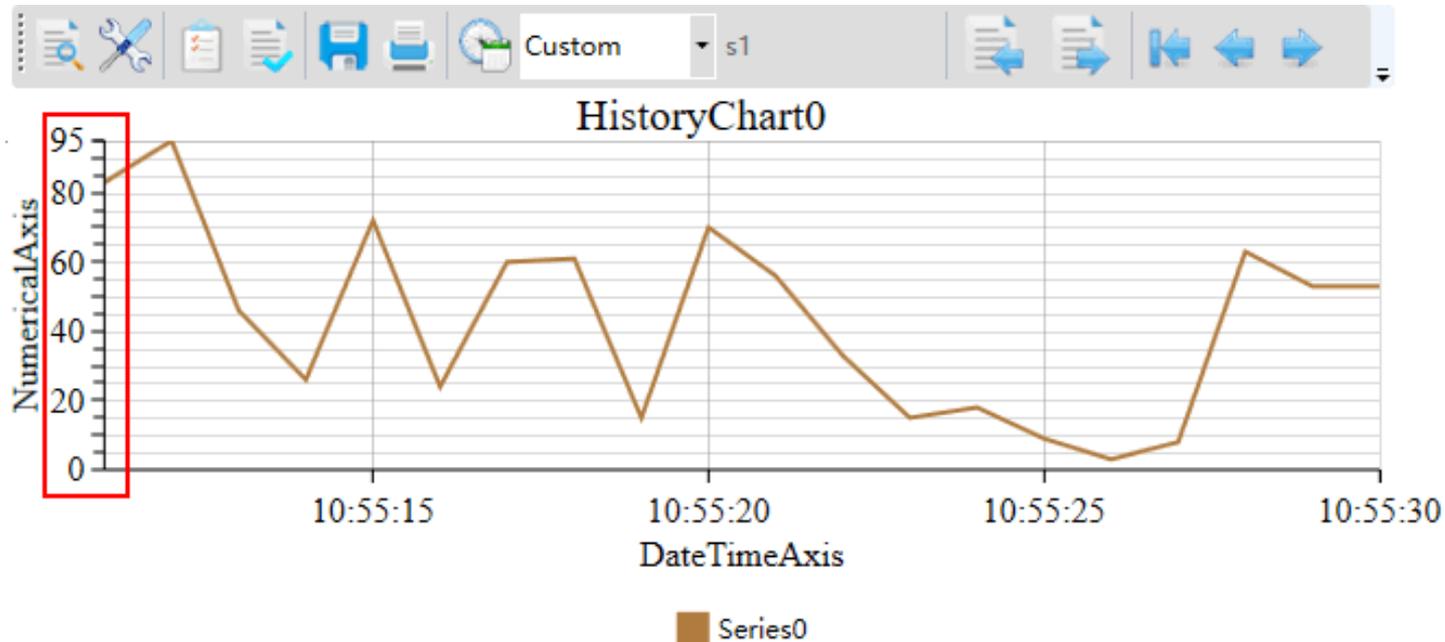
(4) Create a HistoryChart0 and set the numerical axis range from 30 to 50, add a Series0 in the HistoryChart0 that associated with the historical variable(RecordVariable) in the Record Variable



(5) Check the VerticalAxisAutoAdjust property of HistoryChart0

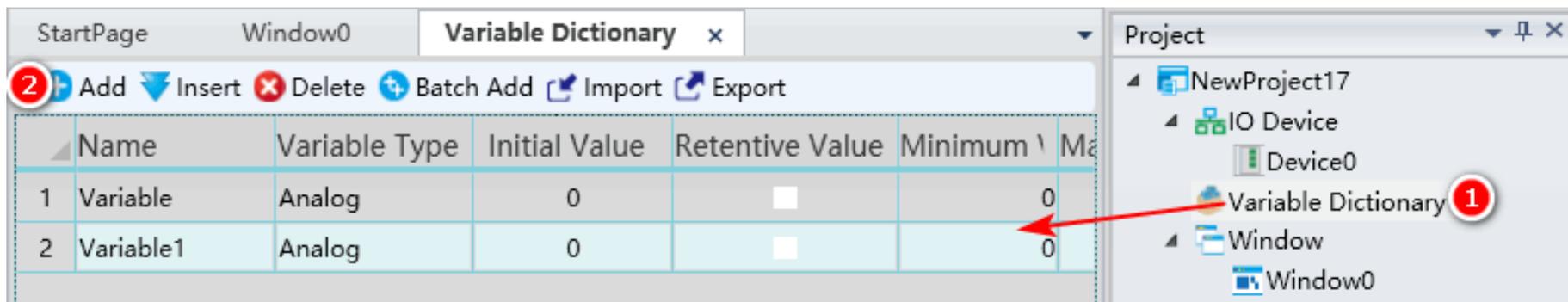
VerticalAxisAutoAdjust	<input checked="" type="checkbox"/>
PositioningLine	<input type="checkbox"/>

(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

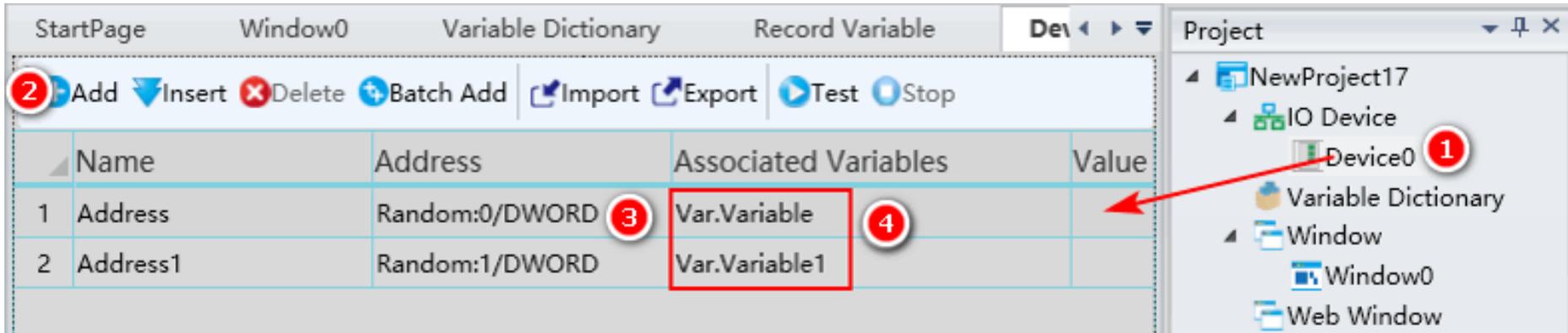
	Name	Variable Type	Initial Value	Retentive Value	Minimum \	Ma
1	Variable	Analog	0	<input type="checkbox"/>	0	
2	Variable1	Analog	0	<input type="checkbox"/>	0	

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 shows the software interface with the Variable Dictionary table and the Project tree. The Variable Dictionary table has the following data:

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

The Project tree on the right shows the following structure:

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

Annotations in the image include a red circle '2' on the 'Add' button, a red circle '1' on 'Device0' in the Project tree, a red circle '3' on the 'Random:0/DWORD' address, and a red circle '4' on 'Var.Variable' in the table. A red arrow points from 'Device0' to the 'Value' column of the first row.

(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

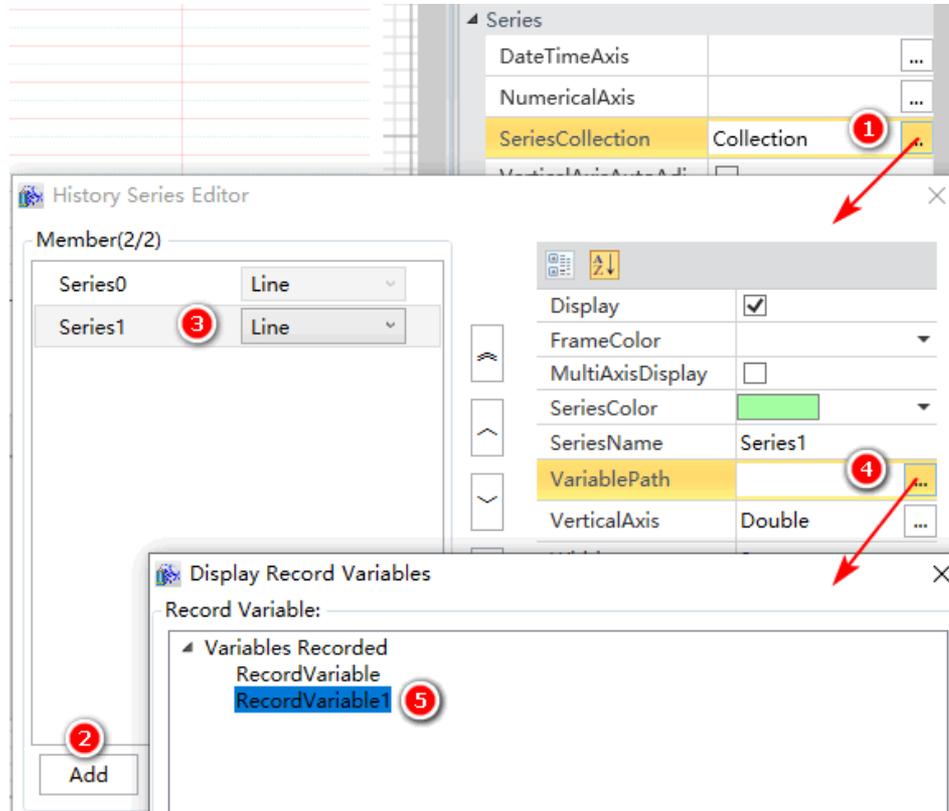
IsEnable	Name	Timer Unit	Timer Coefficient	Relative Time	Description
<input checked="" type="checkbox"/> 5	s1	Second	1	0001-01-01 00:00:00	Triggers every second
<input type="checkbox"/>	s10	Second	10	0001-01-01 00:00:00	Triggers every 10 seconds
<input type="checkbox"/>	s30	Second	30	0001-01-01 00:00:00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

ChartProject

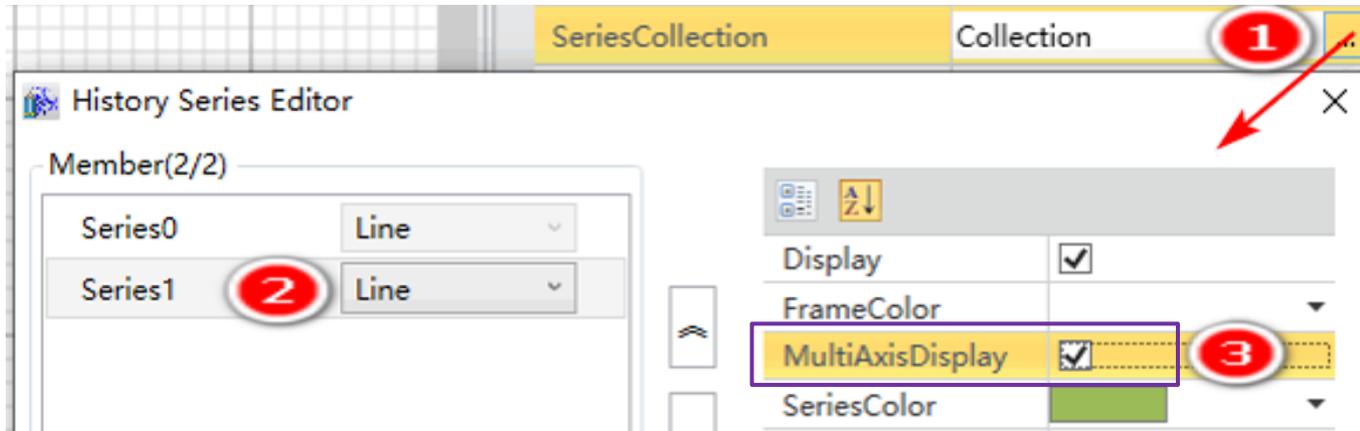
- IO Device
 - Device0
- Variable Dictionary
- Window
 - Window0
 - Window1
- Web Window
- Report
- Alarm
- Authority
- Operation Variable
- History Variable
 - Record Variable 1
 - Historical Group

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

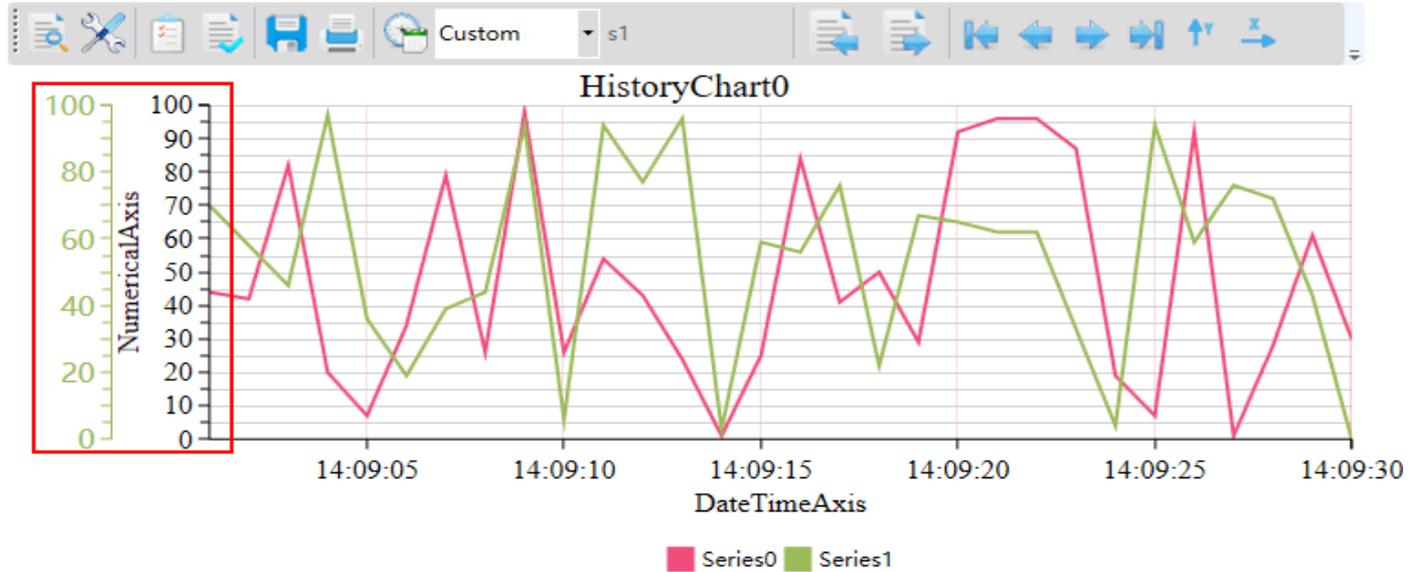
(4) Create a HistoryChart0 in the Window0, and add 2 curves in the HistoryChart0, Series0 associated RecordVariable, Series1 associated RecordVariable1



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

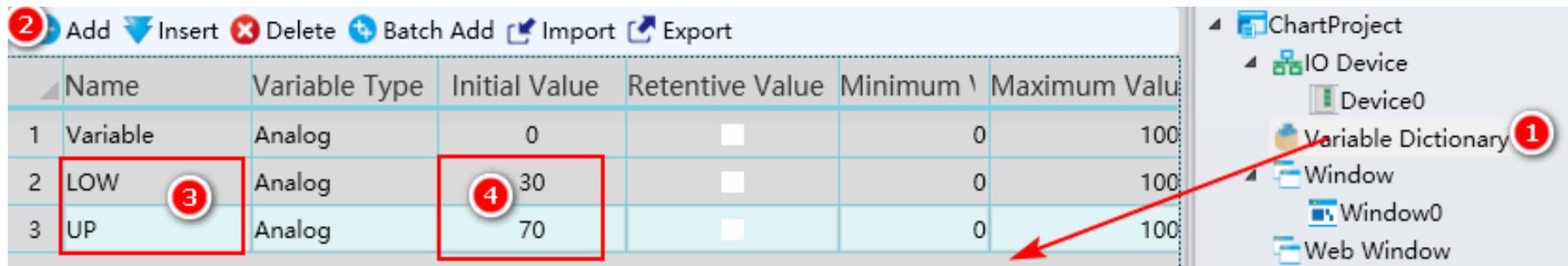


(6) Run the project, two numerical axis will be displayed on the HistoryChart0



➤ Limit Line property example

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



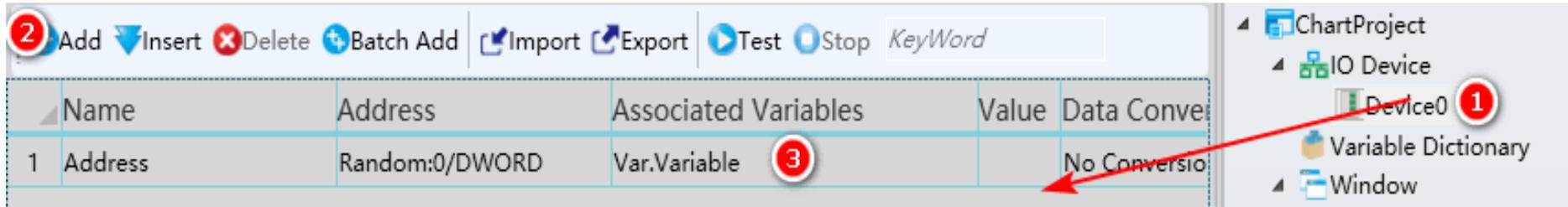
	Name	Variable Type	Initial Value	Retentive Value	Minimum	Maximum Value
1	Variable	Analog	0	<input type="checkbox"/>	0	100
2	LOW	Analog	30	<input type="checkbox"/>	0	100
3	UP	Analog	70	<input type="checkbox"/>	0	100

ChartProject

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

※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 a software interface with a table of simulation devices and a tree view on the right. The table has the following data:

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

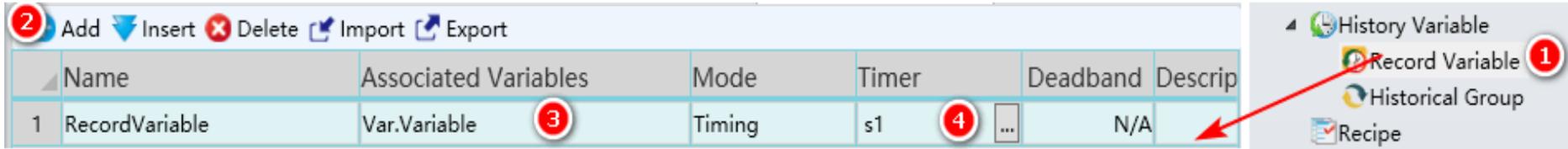
The tree view on the right shows the following structure:

- ChartProject
 - IO Device
 - Device0
 - Variable Dictionary
 - Window

Red circles with numbers 1, 2, and 3 are overlaid on the interface. Circle 1 is on 'Device0', circle 2 is on the 'Add' button, and circle 3 is on the 'Var.Variable' cell. A red arrow points from circle 1 to the 'Data Conversion' column of the table.

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

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



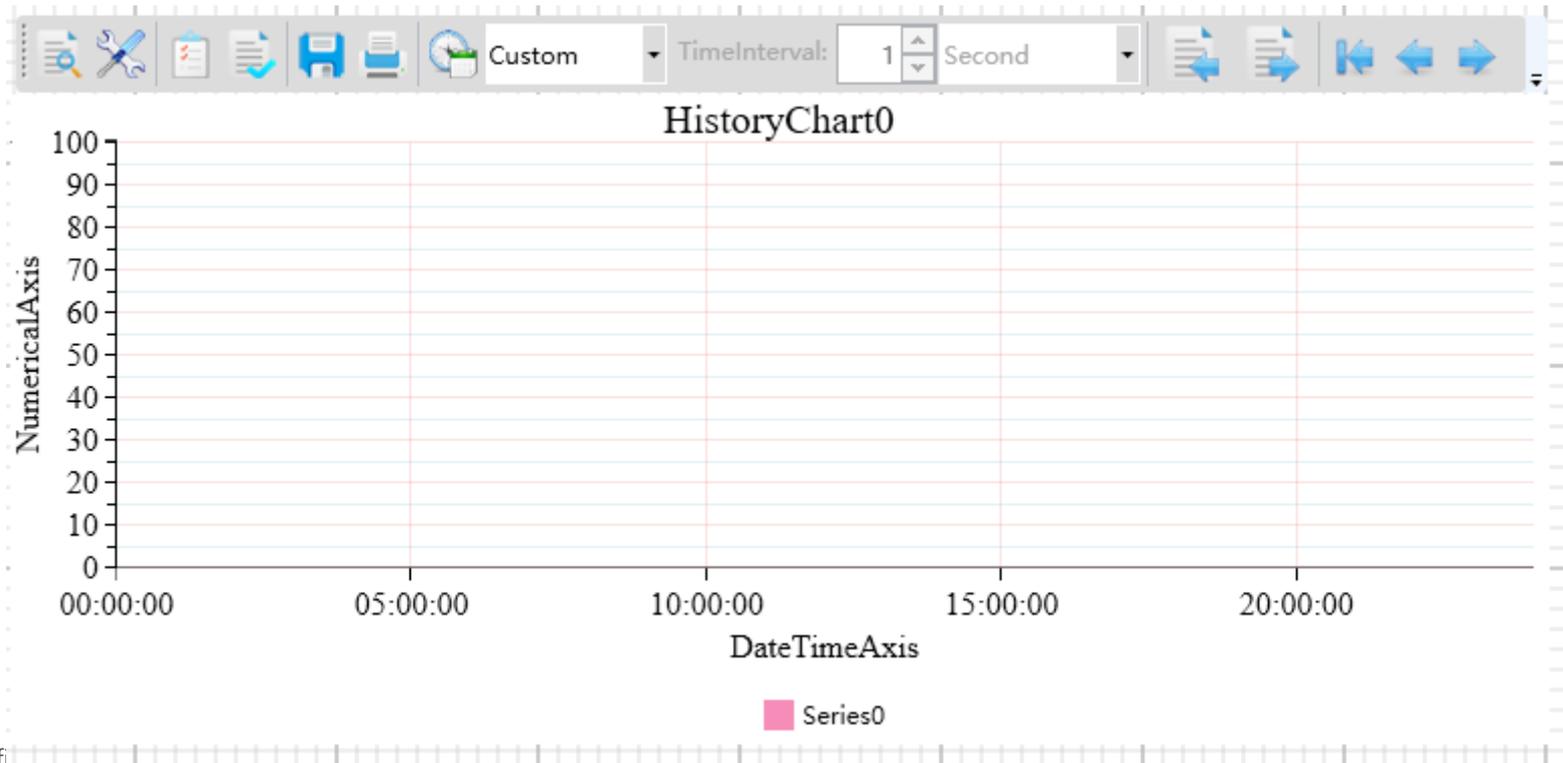
2 Add Insert Delete Import Export

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 historical 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
- ④ ⑤ Set the associated variable of the limit line

Variable Browser

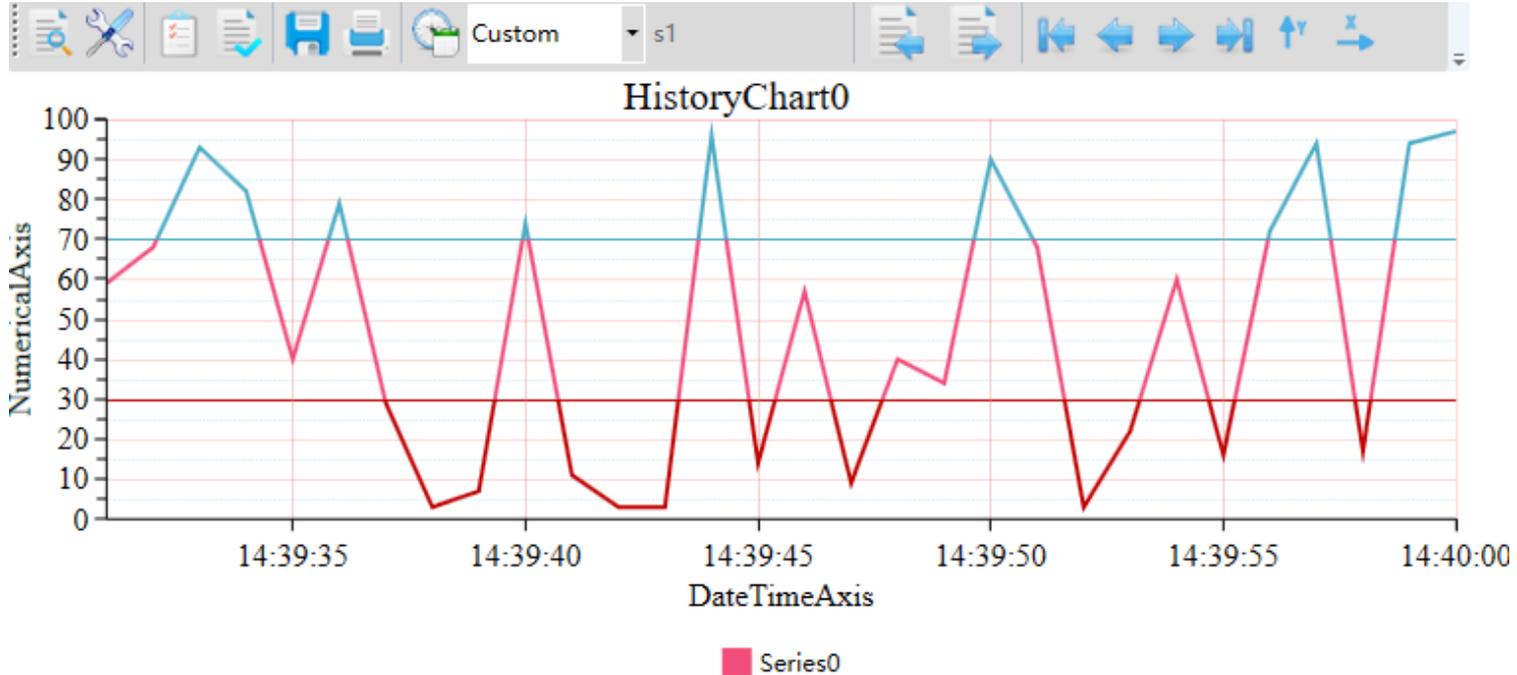
Add Group Edit

Variable Dictionary

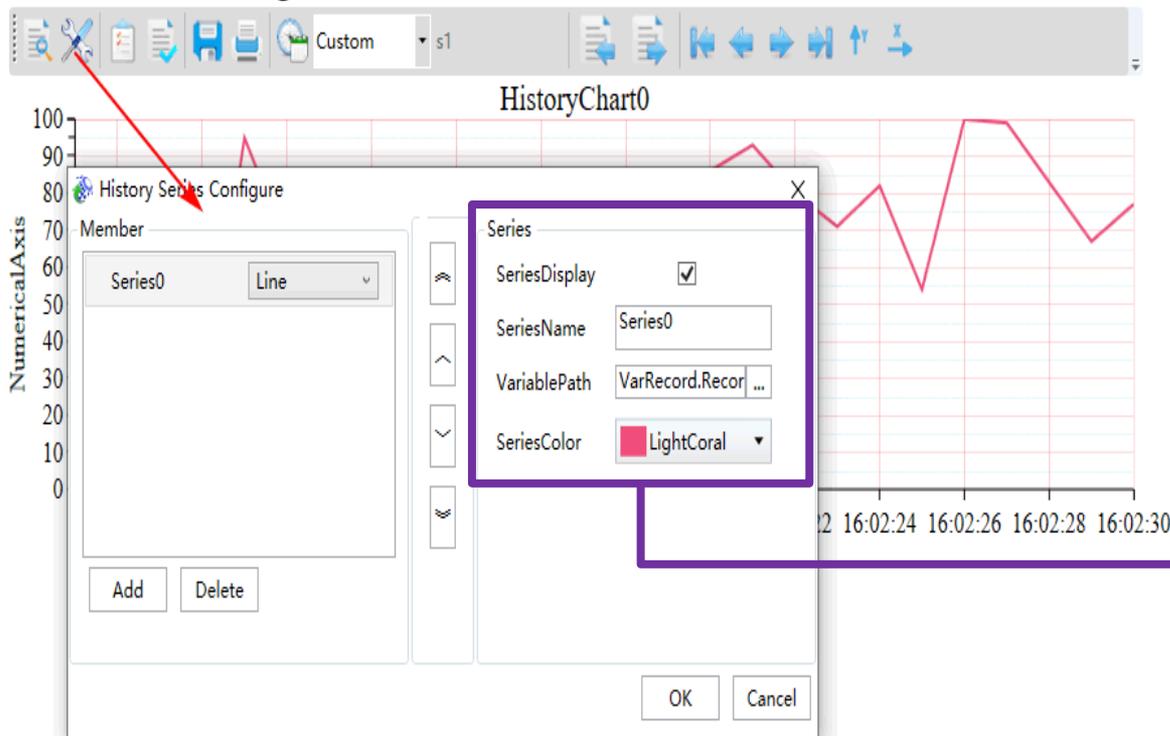
TypeFilter: Analog Digital String

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

(6) Run the Window0, limit line display

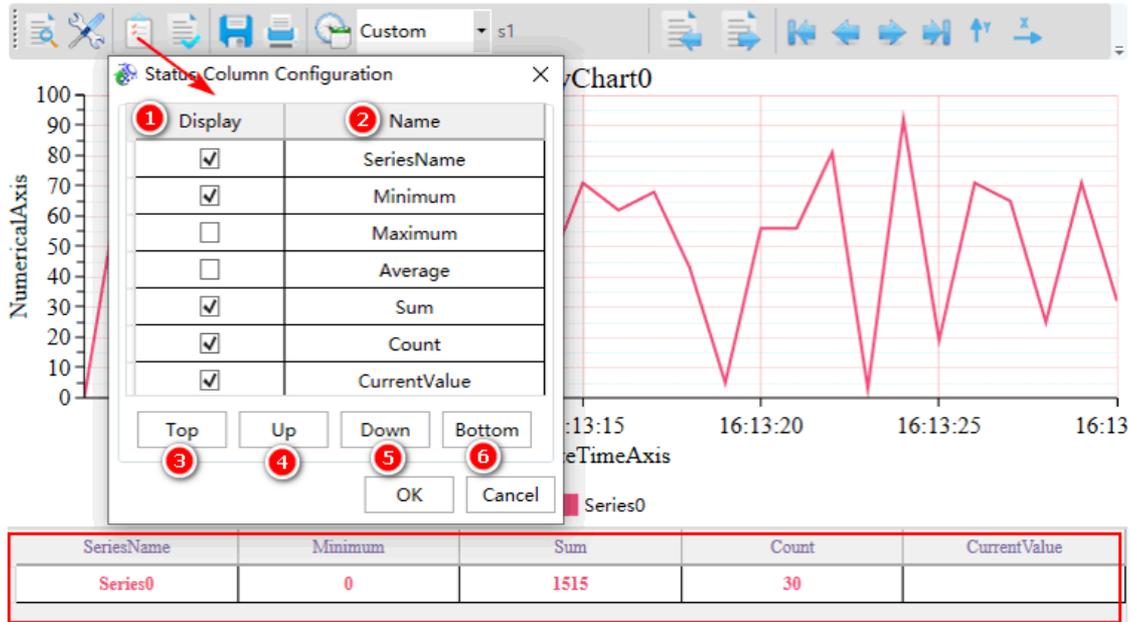


➤ The usage of the toolbar buttons



- **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

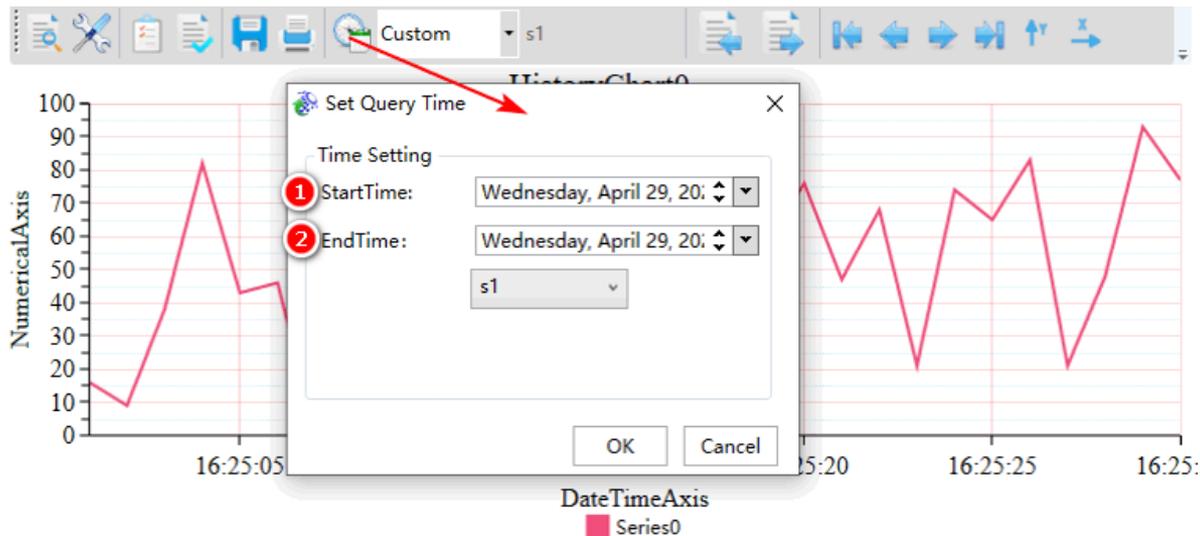
➤ The usage of the toolbar buttons



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 ruler
➤ 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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