

CHAPTER 8

GRAPHS AND CHARTS

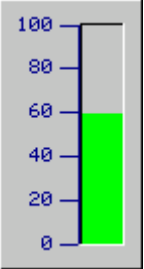
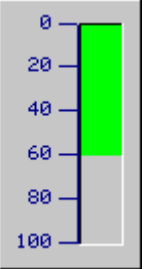
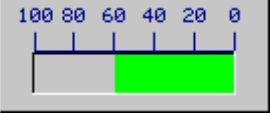
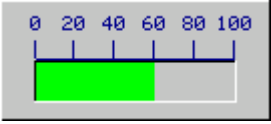
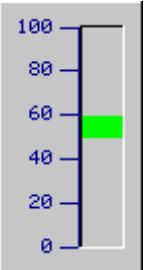
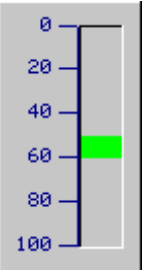
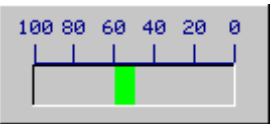
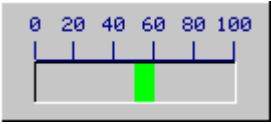
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8.1. Bar Graphs

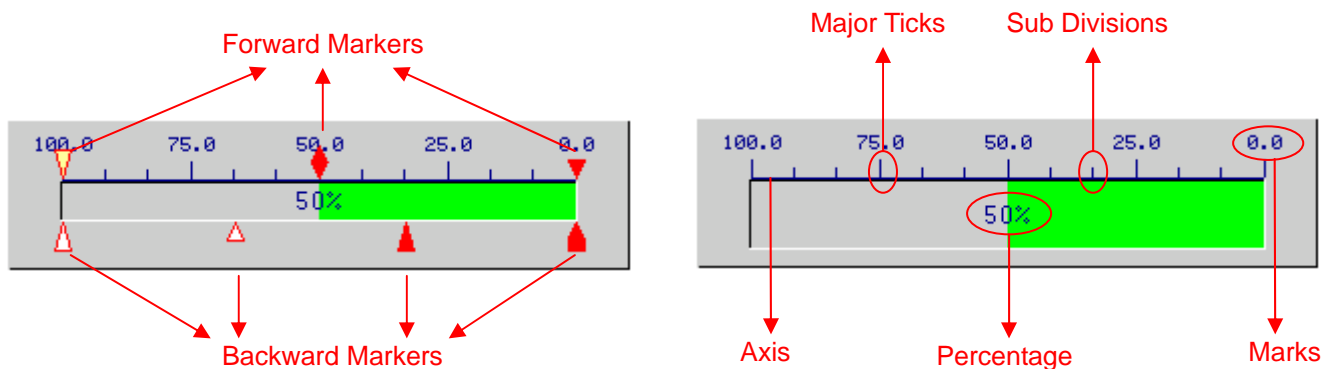
8.1.1. Basic Operations

A bar graph shows the value of a monitored variable by displaying a bar with variable length. When the value of the variable increases or decreases, the length of the bar increases or decreases accordingly. A bar graph can have a scale and the scale enables you to measure the length of the bar and read the current value of the monitored variable.

There are two bar types that a bar graph can have: a polar bar and a bipolar bar. The polar bar can only move at one end, but the bipolar bar can move both ends. The bar and the scale can be displayed in any of the following four directions:

Type	Upward	Downward	Leftward	Rightward
Polar Bar (Monitored Value = 60)				
Bipolar Bar (Monitored Value = 60 Middle Point = 50)				

A bar graph can also have a scale, forward markers, backward markers and a percentage display.

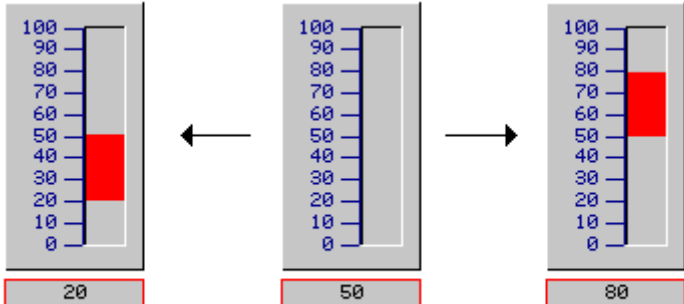
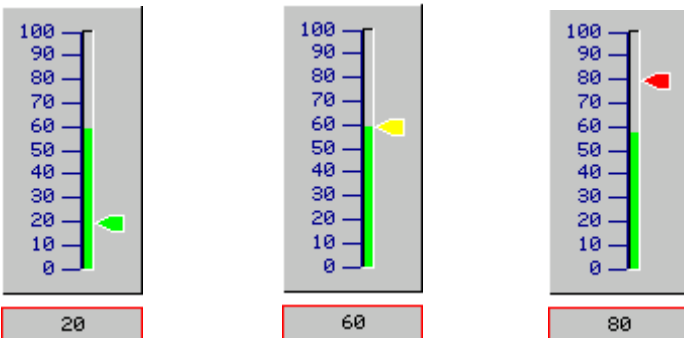
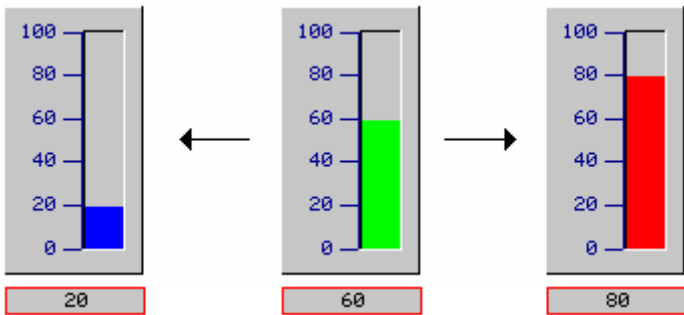


Note:

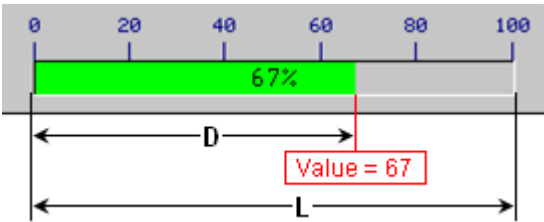
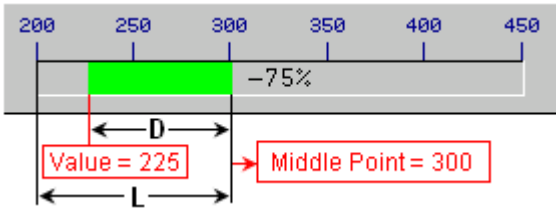
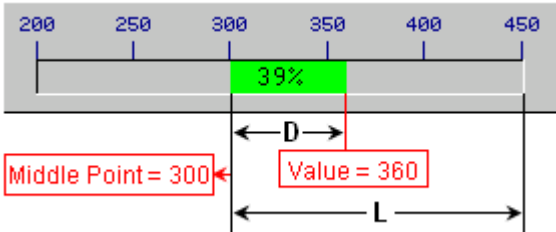
- The bipolar bar graph does not have forward and backward markers.
- If the bar graph is upward or downward, the scale and forward/backward markers will be located on the left or right sides.
- If the bar graph is leftward or rightward, the scale and forward/backward markers will be located at the top or bottom.

8.1.2. Operation Options

The following operation options can be added to a bar graph to make it more informative. You need to select and set these options in the Bar Graph property sheet.

Options	Description
Bipolar Bar	<p>A bar graph can be configured to display the difference between the monitored value and a specified value called the middle point. The bar can move at both ends, hence bipolar bar.</p>  <p style="text-align: center;">Middle Point = 50</p> <p>Select and set this option in the General page.</p>
Scale	<p>A bar graph can have a scale. Select and set this option in the Scale page.</p>
Forward / Backward Marker	<p>The forward/backward markers of a bar graph can have up to 12 marks. You can select equilateral triangle, triangle, diamond, or cone as the mark. The actual number of marks and the value of each mark is specified at runtime by the forward/backward marker control block. The position of a mark is determined by that mark's value. The color of a mark is determined by comparing the monitored value to the mark's value.</p>  <p style="text-align: right;">Monitored Value = 60 The color of a mark: LT Color = Light Red EQ Color = Yellow GT Color = Light Green</p> <p style="text-align: center;">Mark's Value</p> <p>Select and set Forward Marker option in the F. Marker page. Select and set Backward Marker option in the B. Marker page.</p>
Range Display	<p>You can specify a low limit and a high limit for a bar graph. The limits can be constants or variables. At runtime, when the monitored value is equal to or below the low limit, the bar graph shows the bar with the FG color and the BG color set for the low limit. When the monitored value is equal to or above the high limit, the bar graph shows the bar with the FG color and the BG color set for the high limit.</p>  <p style="text-align: right;">Low Limit = 20 High Limit = 80 Low BG Color = Light Blue High BG Color = Light red</p> <p style="text-align: center;">Monitored Value</p> <p>Select and set this option in the Advanced page.</p>

Continued

Options	Description	
Percentage Display	A bar graph can show the current bar length as a percentage of the full bar length.	
	Type	Percentage
	Polar Bar	<div></div> <div>D / L x 100%</div>
	Bipolar Bar	<div>Value < Middle Point</div> <div></div> <div>- D / L x 100%</div>
	<div>Value > Middle Point</div> <div></div> <div>D / L x 100%</div>	
	Select and set this option in the Advanced page .	
Visibility Control	A bar graph can be shown or hidden either by a specified bit or by the current user level. Select and set this option in the Visibility page .	

8.1.3. Settings

You can complete all the settings of a bar graph in the Bar Graph property sheet. This sheet contains the following six pages.

- **General**

Described in [Section 8.1.4](#).

- **Scale**

Described in [Section 4.4.4](#).

- **F. Marker**

Described in [Section 8.1.5](#).

- **B. Marker**

Described in [Section 8.1.5](#).

- **Advanced**

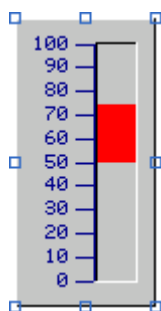
Described in [Section 8.1.6](#).

- **Visibility**

Described in [Section 4.4.6](#).

8.1.4. General Settings

This section describes how to define the general settings for a bar graph.







The above is an example of the General page of the Bar Graph dialog box.

The following table describes each property in the General page.

Property	Description
ID	The object's identifier. It is generated when the object is created. The identifier is unique within the screen where the object is located. The format of the IDs for the bar graphs is BGnnnn.
Note	You can type a note for the object.
Shape settings	For details about the following properties, see Section 4.3.1.4 Setting up the Shape of an Object , Shape... , Border Color, BG Color
External Label	Check this option if you want the object to have an external label. Set up the external label in the External Label page.
Direction	Specifies the bar direction for the bar graph.
Data Type	The data type of the monitored variable. The supported data types include: 16-Bit Unsigned Integer, 32-Bit Unsigned Integer, 16-Bit Signed Integer, 32-Bit Signed Integer, 16-Bit BCD, 32-Bit BCD, 32-Bit Floating Point, 16-Bit Signed BCD (LMB), 32-Bit Signed BCD (LMB), 16-Bit Signed BCD (LMD), and 32-Bit Signed BCD (LMD)

Continued

Property	Description																																
Monitor Address	Specifies the variable to be monitored. Click  to enter an address for this field. Click  to select a tag for this field.																																
Dynamic Range	Check this option so the minimum and maximum of the monitored variable will be specified at runtime. When this option is selected, the minimum and maximum of the marks for the scale of the bar graph can be specified at runtime as well. The data that specifies the above two ranges should be set and arranged correctly in a memory block called the dynamic range parameter block. You need to specify the dynamic range parameter block for the bar graph in the Dynamic Range Parameter Block field.																																
Dynamic Range Parameter Block	<p>Specifies the variable that stores the dynamic range parameter block for the bar graph when Dynamic Range is selected. Click  to enter an address for this field. Click  to select a tag for this field.</p> <p>The following table shows the data arrangements of the parameter block when the data type is 16-bit and the scale of the bar graph is not dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0</td><td>The minimum of the monitored variable</td></tr> <tr> <td>1</td><td>The maximum of the monitored variable</td></tr> </tbody> </table> <p>The following table shows the data arrangement of the parameter block when the data type is 16-bit and the scale of the bar graph is dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0</td><td>The minimum of the monitored variable</td></tr> <tr> <td>1</td><td>The maximum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The minimum of the mark for the scale; 32-bit integer number</td></tr> <tr> <td>4, 5</td><td>The maximum of the mark for the scale; 32-bit integer number</td></tr> </tbody> </table> <p>The following table shows the data arrangement of the parameter block when the data type is 32-bit and the scale of the bar graph is not dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0, 1</td><td>The minimum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The maximum of the monitored variable</td></tr> </tbody> </table> <p>The following table shows the data arrangement of the parameter block when the data type is 32-bit and the scale of the bar graph is dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0, 1</td><td>The minimum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The maximum of the monitored variable</td></tr> <tr> <td>4, 5</td><td>The minimum of the mark for the scale; 32-bit integer number</td></tr> <tr> <td>6, 7</td><td>The maximum of the mark for the scale; 32-bit integer number</td></tr> </tbody> </table>	Word	Parameter	0	The minimum of the monitored variable	1	The maximum of the monitored variable	Word	Parameter	0	The minimum of the monitored variable	1	The maximum of the monitored variable	2, 3	The minimum of the mark for the scale; 32-bit integer number	4, 5	The maximum of the mark for the scale; 32-bit integer number	Word	Parameter	0, 1	The minimum of the monitored variable	2, 3	The maximum of the monitored variable	Word	Parameter	0, 1	The minimum of the monitored variable	2, 3	The maximum of the monitored variable	4, 5	The minimum of the mark for the scale; 32-bit integer number	6, 7	The maximum of the mark for the scale; 32-bit integer number
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Min.	Specifies the minimum of the monitored variable when Dynamic Range is not selected.																																
Max.	Specifies the maximum of the monitored variable when Dynamic Range is not selected.																																
Bipolar Bar	Check this option for the bar graph to display the difference between the monitored value and the value specified in the Middle Point field.																																
Middle Point	Specifies the reference value/point for the bipolar bar.																																
Pie Pattern	Select a pattern for the bar graph. The pattern will be used to fill the bar. When the pattern is filled in the bar, the black part of the pattern is painted with the color specified in the Bar FG Color field, and the white part of the pattern is painted with the color specified in the Bar BG Color field.																																
Pie FG Color	Select a color for painting the black part of the specified pattern.																																
Pie BG Color	Select a color for painting the white part of the specified pattern.																																

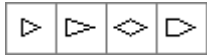
8.1.5. Forward and Backward Marker Settings

This section describes how to define the forward marker and the backward marker settings for a bar graph. The following is an example of the Forward Marker page.

The following table describes each property in the Forward Marker page and the Backward Marker page.

Property	Description																								
Number of Marks	Specifies the maximum number of marks this marker can support.																								
Location	Select Up or Down for the location of the marker when the bar direction is Leftward or Rightward. Select Left or Right for the location of the marker when the bar direction is Upward or Downward.																								
Forward/Backward Marker Control Block	<p>Specifies the variable that stores the marker control block.</p> <p>Click to enter an address for this field. Click to select a tag for this field.</p> <p>The following table shows the data arrangement of the marker control block when the data type is 16-bit.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Description</th></tr> </thead> <tbody> <tr> <td>0</td><td>Specifies the actual number of marks that the marker will display.</td></tr> <tr> <td>1</td><td>The value of mark 1.</td></tr> <tr> <td>2</td><td>The value of mark 2</td></tr> <tr> <td>...</td><td>...</td></tr> <tr> <td>12</td><td>The value of mark 12</td></tr> </tbody> </table> <p>The following table shows the data arrangement of the marker control block when the data type is 32-bit.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Description</th></tr> </thead> <tbody> <tr> <td>0,1</td><td>Specifies the actual number of marks that the marker will display.</td></tr> <tr> <td>2,3</td><td>The value of mark 1.</td></tr> <tr> <td>4,5</td><td>The value of mark 2</td></tr> <tr> <td>...</td><td>...</td></tr> <tr> <td>24,25</td><td>The value of mark 12</td></tr> </tbody> </table> <p>Note: The data format of the mark values should be the same as that of the monitored variable.</p>	Word	Description	0	Specifies the actual number of marks that the marker will display.	1	The value of mark 1.	2	The value of mark 2	12	The value of mark 12	Word	Description	0,1	Specifies the actual number of marks that the marker will display.	2,3	The value of mark 1.	4,5	The value of mark 2	24,25	The value of mark 12
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...	...																								
24,25	The value of mark 12																								

Continued





Property		Description
Mark No. 1 - No. 12	Style	Specifies the mark style. There are four mark styles: 
	Border Color	The border color of the mark.
	LT Color	The fill color of the mark when the monitored value is less than the mark's value.
	EQ Color	The fill color of the mark when the monitored value is equal to the mark's value.
	GT Color	The fill color of the mark when the monitored value is greater than the mark's value.

8.1.6. Advanced Settings

This section describes how to define the advanced settings for the bar graphs and circular bar graphs with the Advanced page. The following is an example of the Advanced page.

The screenshot shows the 'Advanced' settings page for a bar graph. It has four tabs: 'General', 'Scale', 'Advanced' (selected), and 'Visibility'. The 'Range Display' section has a checked 'Range Display' checkbox, an unchecked 'Variable Range' checkbox, and input fields for 'Low Limit' (30) and 'High Limit' (70). Below these are color selection boxes for 'Low Color' (FG: cyan, BG: blue) and 'High Color' (FG: red, BG: red). The 'Percentage Display' section has a checked 'Percentage Display' checkbox, a 'Text Color' selector (black), and a 'Font' selector (8x12).

The following table describes each property in the Advanced page.

Property			Description
Range Display	Range Display		Check this option if you want the object to display the monitored value with different colors when the monitored value is below the specified low limit or above the specified high limit.
	Variable Range		Check this option if the low limit and high limit are specified at runtime by the designated variables.
	Low Limit		Specifies the low limit when Variable Range is not selected. When Variable Range is selected, this property specifies the variable whose value is the low limit. Click  to enter an address. Click  to select a tag.
	High Limit		Specifies the high limit when Variable Range is not selected. When Variable Range is selected, this property specifies the variable whose value is the high limit. Click  to enter an address. Click  to select a tag.
	High Color	FG Color	The bar FG color for the high limit.
		BG Color	The bar BG color for the high limit.
	Low Color	FG Color	The bar FG color for the low limit.
		BG Color	The bar BG color for the low limit.
Percentage Display	Percentage Display		<p>Check this option so the object will display the percentage that is calculated by the following formula: <i>Percentage = (Value - Min.) / (Max. - Min.) * 100%</i></p> <p>If the bipolar bar is used, the percentage formula when Value > Middle Point is: <i>Percentage = (Value – Middle Point) / (Max. - Middle Point) * 100%</i></p> <p>The percentage formula when Value < Middle Point is: <i>Percentage = -(Middle Point - Value) / (Middle Point - Min.) * 100%</i></p> <p>The <i>Value</i> is the current value of the monitored variable. The <i>Max.</i> and <i>Min.</i> define the value range of the monitored variable and are defined in the General page of the property sheet.</p>
	Text Color		Select a color for the percentage display.
	Font		Select a fixed size font for the percentage display.

8.2. Meters

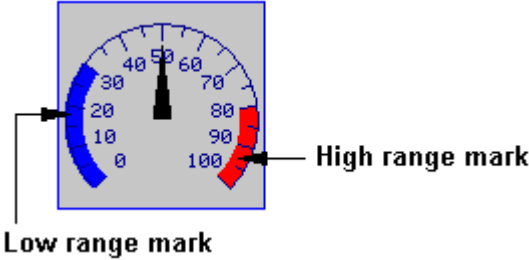
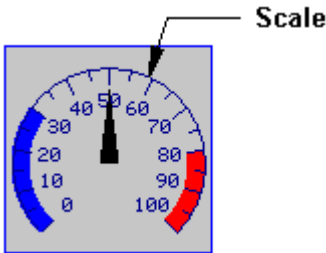
8.2.1. Basic Operations

A meter shows the value of a monitored variable by rotating its needle to the appropriate place. When the value of the variable increases or decreases, the rotation angle of the needle increases or decreases accordingly. A meter can have an arc/circle scale that enables you to measure the rotation angle of the needle and read the current value for the monitored variable. A meter can be configured to perform one of the following swing types:

Span and Origin	360° & 90°	360° & 0°	360° & 270°	360° & 180°
Example				
Span and Origin	270° & 45°	270° & 315°	270° & 225°	270° & 135°
Example				
Span and Origin	180° & 90°	180° & 0°	180° & 270°	180° & 180°
Example				
Span and Origin	90° & 90°	90° & 0°	90° & 270°	90° & 180°
Example				
Span and Origin	90° & 45°	90° & 315°	90° & 225°	90° & 135°
Example				

8.2.2. Operation Options

The following operation options can be added to a meter to make it more informative. You need to select and set these options in the Meter property sheet.

Options	Description
Range Display	 <p>The meter can display the low range mark and the high range mark along its swing path. The limits for range marks can be specified at runtime by the designated variables. Select and set this option in the Range page.</p>
Scale	 <p>The meter can have a scale. Select and set this option in the Scale page.</p>
Visibility Control	The meter can be shown or hidden either by a specified bit or by the current user level. Select and set this option in the Visibility page.

8.2.3. Settings

You can complete all the settings of a meter in the Meter property sheet. This sheet contains the following four pages.

- **General**

Described in [Section 8.2.4.](#)

- **Range**

Described in [Section 8.2.5.](#)

- **Scale**

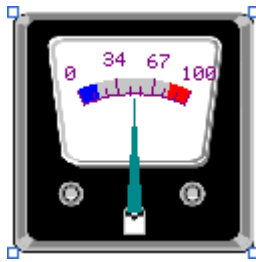
Described in [Section 4.4.4.](#)

- **Visibility**

Described in [Section 4.4.6.](#)

8.2.4. General Settings

This section describes how to define the general settings for a meter.



Meter

General Range Scale Visibility

ID: M0000 Note:

☒ Picture Shape
MeterPanel

Shape... Swing...

Border Color:

BG Color:

NO_BDR

Direction: ☒ Clockwise

Data Type: 16-Bit Unsigned Integer

Monitor Address: W20

☐ Dynamic Range

Min.: 0 Max.: 100

Needle Color:

Swing Adjustment

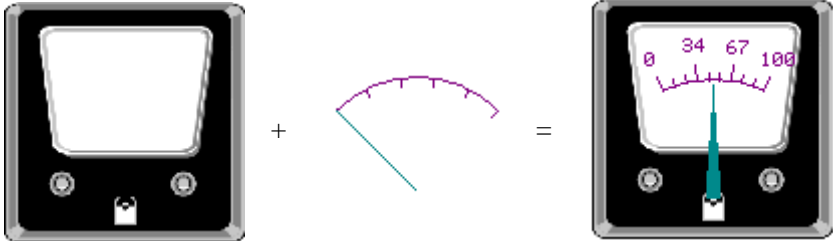



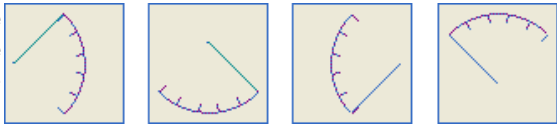


Radius: 14 Angle: -20

Center X: 0 Center Y: -49



OK Cancel Help

The above is an example of the General page of the Meter property sheet.

The following table describes each property in the General page.

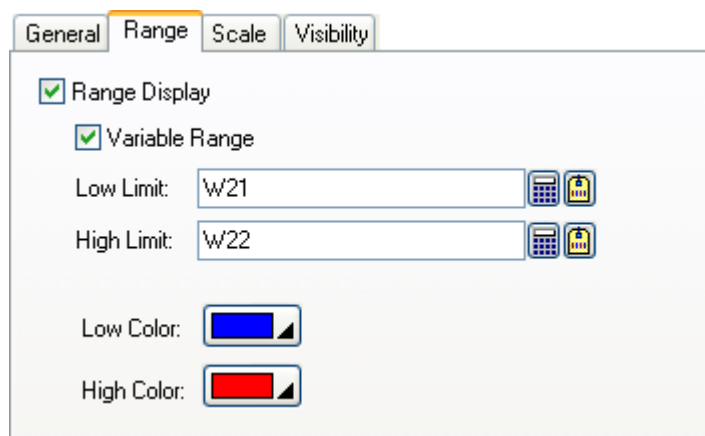
Property		Description
ID		The object's identifier. It is generated when the object is created. The identifier is unique within the screen where the object is located. The format of the IDs for the meters is Mnnnn.
Note		You can type a note for the object.
Picture Shape	Picture Shape	Check this option if you want to use a picture for the meter's shape. You can use a picture to customize your own meter. For example: 
	<Drop-down List>	The name of the picture. You can use the drop-down list to select a picture from the picture database.
		Click this icon to select a picture file. After selection, the picture of the selected file is imported and saved in the picture database.
		Click this icon to bring up the Select/Import from Library dialog box. Select a picture from a picture library file. After selection, the selected picture is imported and saved in the picture database.
Graphical shape settings		For details about the following properties, Section 4.3.1.4 Setting up the Shape of an Object .  , Border Color, BG Color
Swing		Specifies the type of swing. For details, see Section 8.2.1 Basic Operation . The swing styles on the right are more space saving because their needles can be placed outside the shape by changing the position of Center X or Center Y. 
Direction		Specifies the direction that the needle moves. Only Clockwise is available.
Data Type		The data type of the monitored variable. The supported data types include: 16-Bit Unsigned Integer, 32-Bit Unsigned Integer, 16-Bit Signed Integer, 32-Bit Signed Integer, 16-Bit BCD, 32-Bit BCD, 32-Bit Floating Point, 16-Bit Signed BCD (LMB), 32-Bit Signed BCD (LMB), 16-Bit Signed BCD (LMD), and 32-Bit Signed BCD (LMD).
Monitor Address		Specifies the variable to be monitored. Click  to enter an address for this field. Click  to select a tag for this field.

Continued

Property		Description																															
Dynamic Range	Dynamic Range	Check this option so the minimum and maximum of the monitored variable will be specified at runtime. When this option is selected, the minimum and maximum of the marks for the scale of the meter can be specified at runtime as well. The data that specifies the above two ranges should be set and arranged correctly in a memory block called the dynamic range parameter block. You need to specify the dynamic range parameter block for the meter in the Dynamic Range Parameter Block field.																															
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Min.		Specifies the minimum of the monitored variable when Dynamic Range is not selected.																															
Max.		Specifies the maximum of the monitored variable when Dynamic Range is not selected.																															
Needle Color		Select a color for the needle.																															
Swing Adjustment	Radius	You can adjust the radius of the swing of the needle. This field specifies the offset to be added to the default radius.																															
	Angle	You can adjust the span of the swing of the needle. This field specifies the offset to be added to the default span.																															
	Center X	You can adjust the horizontal position for the pivot of the needle. This field specifies the offset to be added to the default horizontal position.																															
	Center Y	You can adjust the vertical position for the pivot of the needle. This field specifies the offset to be added to the default vertical position.																															

8.2.5. Range Settings





This section describes how to define the range settings for a meter. The following is an example of the Range page of the Meter property sheet.



The screenshot shows the 'Range' tab of a property sheet. It contains the following elements:

- General** | **Range** | **Scale** | **Visibility** (tabs)
- ☒ **Range Display**
- ☒ **Variable Range**
- Low Limit:** [Calculator Icon] [Tag Selection Icon]
- High Limit:** [Calculator Icon] [Tag Selection Icon]
- Low Color:** [Color Picker showing blue]
- High Color:** [Color Picker showing red]

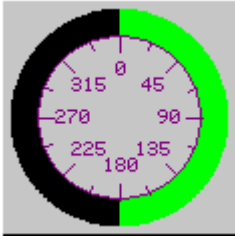
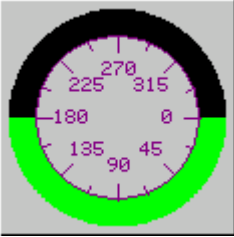
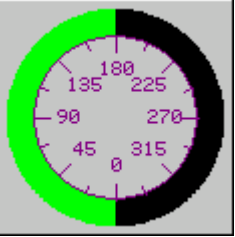
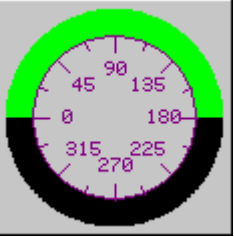
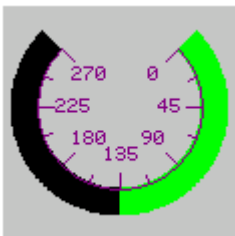
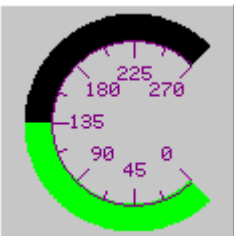
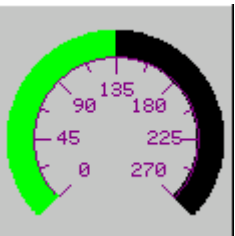
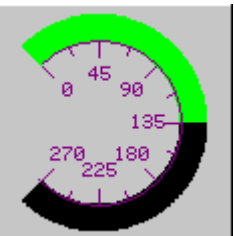
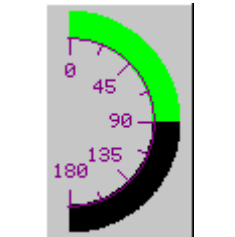
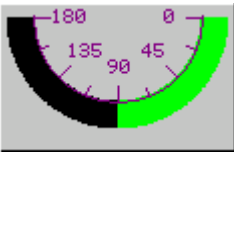
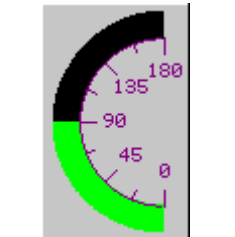
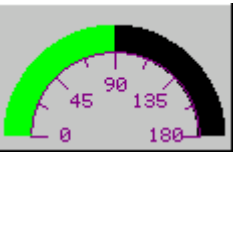
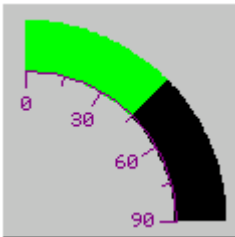
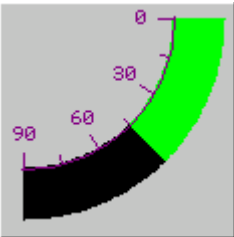
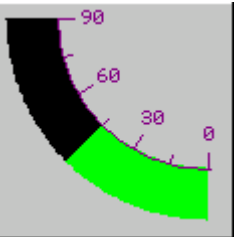
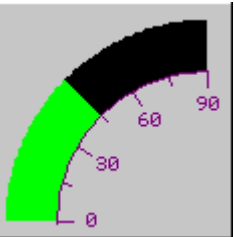
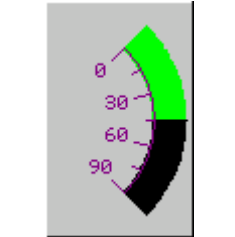
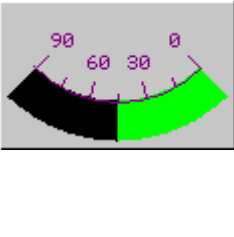
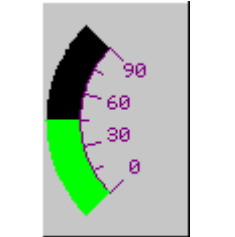
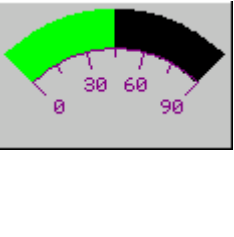
The following table describes each property in the Range page.

Property	Description
Range Display	Check this option if you want the meter to display the range marks along its swing path.
Variable Range	Check this option so the low limit and high limit for the range marks will be specified at runtime by the designated variables.
Low Limit	Specifies the low limit of the low range mark when Variable Range is not selected. When Variable Range is selected, this property specifies the variable whose value is the low limit of the low range mark at runtime. Click  to enter an address for this field. Click  to select a tag for this field.
High Limit	Specifies the high limit of the high range mark when Variable Range is not selected. When Variable Range is selected, this property specifies the variable whose value is the high limit of the high range mark at runtime. Click  to enter an address for this field. Click  to select a tag for this field.
Low Color	The color of the low range mark.
High Color	The color of the high range mark.

8.3. Circular Bar Graphs

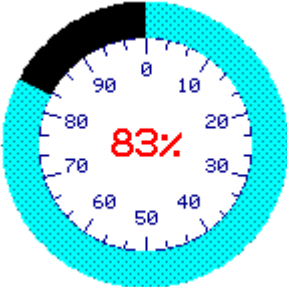
8.3.1. Basic Operations

A circular bar graph shows the value of a monitored variable by displaying a circular bar with variable length. When the value of the variable increases or decreases, the length of the circular bar increases or decreases accordingly. A circular bar graph can have a circular scale and the scale enables you to measure the length of the bar and read the current value of the monitored variable. The following table lists the supported styles of circular bar graphs.

Span and Origin	360° & 90°	360° & 0°	360° & 270°	360° & 180°
Example				
Span and Origin	270° & 45°	270° & 315°	270° & 225°	270° & 135°
Example				
Span and Origin	180° & 90°	180° & 0°	180° & 270°	180° & 180°
Example				
Span and Origin	90° & 90°	90° & 0°	90° & 270°	90° & 180°
Example				
Span and Origin	90° & 45°	90° & 315°	90° & 225°	90° & 135°
Example				

8.3.2. Operation Options

The following operation options can be added to a circular bar graph to make it more informative. You need to select and set up these options in the Circular Bar Graph property sheet.

Options	Description
Range Display	You can specify a low limit and a high limit for the object. The limits can be constants or variables. At runtime, when the monitored value is below the low limit, the object shows the bar with the FG color and the BG color set for the low limit. When the monitored value is above the high limit, the object shows the bar with the FG color and the BG color set for the high limit.
Percentage Display	<p>The object can show the current bar length as a percentage of the full bar length.</p>  <p>Select and set up this option in the Advanced page.</p>
Scale	The circular bar graph can have a circular scale. Select and set up this option in the Scale page.
Visibility Control	The object can be shown or hidden either by a specified bit or by the current user level. Select and set up this option in the Visibility page.

8.3.3. Settings

You can complete all the settings of a circular bar graph in the Circular Bar Graph property sheet. This sheet contains the following four pages.

- **General**

Described in [Section 8.3.4.](#)

- **Scale**

Described in [Section 4.4.4.](#)

- **Advanced**

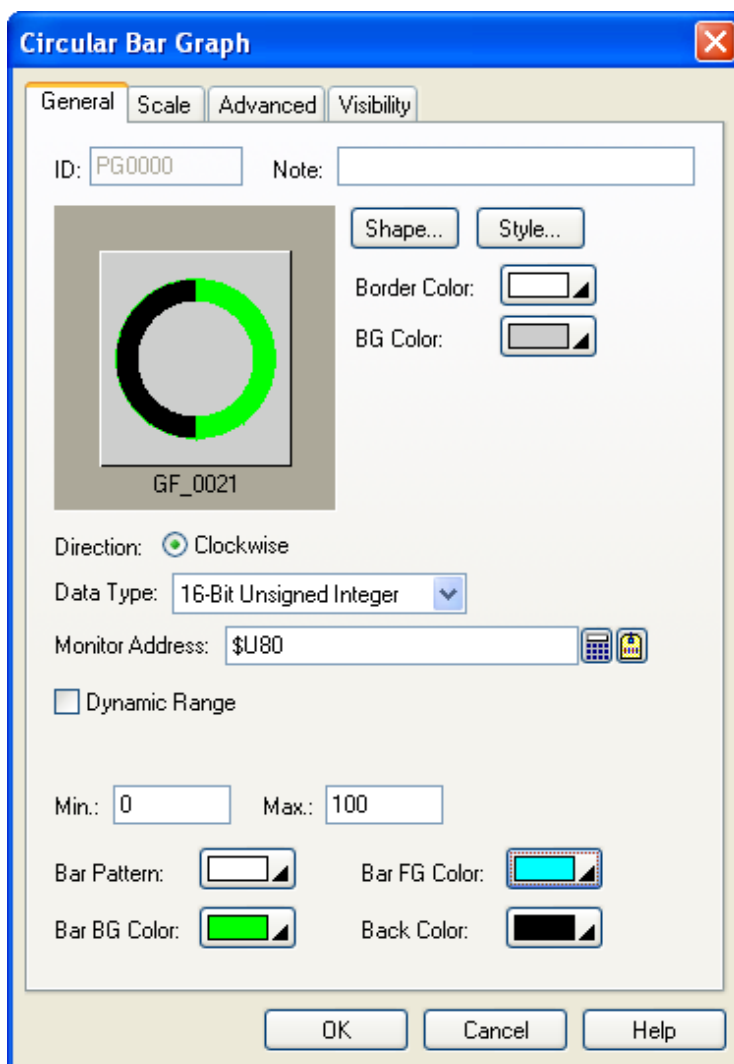
Described in [Section 4.4.5.](#)

- **Visibility**

Described in [Section 4.4.6.](#)

8.3.4. General Settings

This section describes how to define the general settings for a circular bar graph.







The above is an example of the General page of the Circular Bar Graph property sheet.

The following table describes each property in the General page.

Property	Description
ID	The object's identifier. It is generated when the object is created. The identifier is unique within the screen where the object is located. The format of the IDs for the circular bar graphs is PGnnnn.
Note	You can type a note for the object.
Shape settings	For details about the following properties, Section 4.3.1.4 Setting up the Shape of an Object . Shape... , Border Color, BG Color
Style	Specifies the style of the circular bar graph. For details, see Section 8.3.1 Basic Operations .
Direction	Specifies the progress direction of the circular bar graph. Only Clockwise is available.
Data Type	The data type of the monitored variable. The supported data types include: 16-Bit Unsigned Integer, 32-Bit Unsigned Integer, 16-Bit Signed Integer, 32-Bit Signed Integer, 16-Bit BCD, 32-Bit BCD, and 32-Bit Floating Point.

Continued

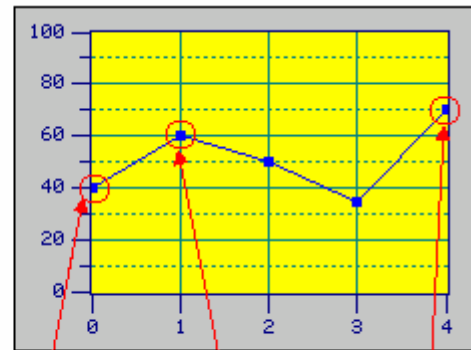
Property	Description																																
Monitor Address	Specifies the variable to be monitored. Click  to enter an address for this field. Click  to select a tag for this field.																																
Dynamic Range	Check this option so the minimum and maximum of the monitored variable will be specified at runtime. When this option is selected, the minimum and maximum of the marks of the scale of the circular bar graph can be specified at runtime as well. The data that specifies the above two ranges should be set and arranged correctly in a memory block called the dynamic range parameter block. You need to specify the dynamic range parameter block for the circular bar graph in the Dynamic Range Parameter Block field.																																
Dynamic Range Parameter Block	<p>Specifies the variable that stores the dynamic range parameter block for the circular bar graph when Dynamic Range is selected. Click  to enter an address for this field. Click  to select a tag for this field.</p> <p>The following table shows the content of the parameter block when the data type is 16-bit and the scale of the circular bar graph is not dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0</td><td>The minimum of the monitored variable</td></tr> <tr> <td>1</td><td>The maximum of the monitored variable</td></tr> </tbody> </table> <p>The following table shows the content of the parameter block when the data type is 16-bit and the scale of the circular bar graph is dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0</td><td>The minimum of the monitored variable</td></tr> <tr> <td>1</td><td>The maximum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The minimum of the mark for the scale; 32-bit integer number</td></tr> <tr> <td>4, 5</td><td>The maximum of the mark for the scale; 32-bit integer number</td></tr> </tbody> </table> <p>The following table shows the content of the parameter block when the data type is 32-bit and the scale of the circular bar graph is not dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0, 1</td><td>The minimum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The maximum of the monitored variable</td></tr> </tbody> </table> <p>The following table shows the content of the parameter block when the data type is 32-bit and the scale of the circular bar graph is dynamic.</p> <table border="1"> <thead> <tr> <th>Word</th><th>Parameter</th></tr> </thead> <tbody> <tr> <td>0, 1</td><td>The minimum of the monitored variable</td></tr> <tr> <td>2, 3</td><td>The maximum of the monitored variable</td></tr> <tr> <td>4, 5</td><td>The minimum of the mark for the scale; 32-bit integer number</td></tr> <tr> <td>6, 7</td><td>The maximum of the mark for the scale; 32-bit integer number</td></tr> </tbody> </table>	Word	Parameter	0	The minimum of the monitored variable	1	The maximum of the monitored variable	Word	Parameter	0	The minimum of the monitored variable	1	The maximum of the monitored variable	2, 3	The minimum of the mark for the scale; 32-bit integer number	4, 5	The maximum of the mark for the scale; 32-bit integer number	Word	Parameter	0, 1	The minimum of the monitored variable	2, 3	The maximum of the monitored variable	Word	Parameter	0, 1	The minimum of the monitored variable	2, 3	The maximum of the monitored variable	4, 5	The minimum of the mark for the scale; 32-bit integer number	6, 7	The maximum of the mark for the scale; 32-bit integer number
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6, 7	The maximum of the mark for the scale; 32-bit integer number																																
Min.	Specifies the minimum of the monitored variable when Dynamic Range is not selected.																																
Max.	Specifies the maximum of the monitored variable when Dynamic Range is not selected.																																
Bar Pattern	Select a pattern for the circular bar graph. The pattern will be used to fill the arc/circular strip of the circular bar graph. When the pattern fills in the circular bar graph, the black part of the pattern is painted with the color specified in the Bar FG Color field, and the white part of the pattern is painted with the color specified in the Bar BG Color field.																																
Bar FG Color	Select a color for painting the black part of the specified pattern.																																
Bar BG Color	Select a color for painting the white part of the specified pattern.																																
Back Color	Select a color as the background color for the arc/circular strip of the circular bar graph.																																

8.4. Line Charts

8.4.1. Basic Operations

A line chart displays a set of data by drawing a data point for each datum and drawing a line that connects all the data points in sequence. The vertical position of a data point is determined by the value of the associated datum. The horizontal position of a data point is determined by the order of the associated datum in the data set.

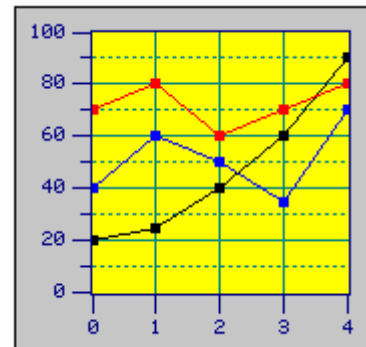
Number of data points	5
Data point 0	40
Data point 1	60
Data point 2	50
Data point 3	35
Data point 4	70



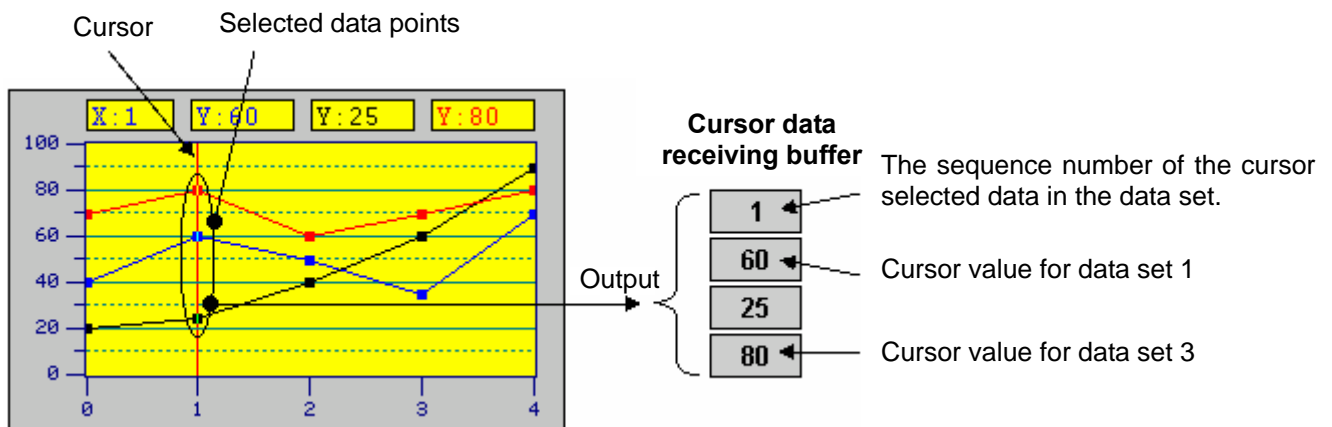
Data point Data point Data point

A line chart can display up to 8 sets of data. The following example shows a line chart that displays 3 sets of data.

Number of data points	5		
Data set	1	2	3
Data point 0	40	20	70
Data point 1	60	25	80
Data point 2	50	40	60
Data point 3	35	60	70
Data point 4	70	90	80



A line chart can provide a cursor for you to select desired data points. The cursor of the line chart is a vertical line segment. The user can move the cursor horizontally within a line chart to the desired data point(s). The values of the selected data points can be displayed and output to an internal variable called Cursor Data Receiving Buffer.



8.4.2. Operation Options

The following operation option can be added to a line chart. Select and set the option in the Line Chart dialog box.

Options	Description
Visibility Control	You can show and hide a line chart by a specified bit or the current user level. Select and set this option in the Visibility page.

8.4.3. Settings

You can complete all the settings of a line chart in the Line Chart dialog box. This dialog box contains the following four pages.

- **General**

Described in [Section 8.4.4.](#)

- **Pen**

Described in [Section 8.4.5.](#)

- **XY Axis**

Described in [Section 8.4.6.](#)

- **Visibility**

Described in [Section 4.4.6.](#)

8.4.4. General Settings

This section describes how to define the general settings for a line chart. The following is an example of the General page of the Line Chart property sheet.

Line Chart

General Pen Axis Visibility

ID: LC0000 Note:

Shape...
 Border Color:
 BG Color: Chart BG Color:

GF_0011

Data Type: 16-Bit Unsigned Integer
 Read Trigger: W100.0
 Read Address: W0
 Number of Data Sets: 2
 Maximum Number of Data Points Per Data Set: 60

Point Distribution
☒ Maximum Points
☐ Actual Points

Direction
☒ From Left to Right

☒ Show Cursor
 Cursor Color:
 Value Display Font: 8x12
 Cursor Data Receiving Buffer: \$U100

☒ Dynamic Range
 Dynamic Range Parameter Block: W300





☒ Show Mark
☒ Show Line
 Clear Trigger: W100.1

OK Cancel Help

The following table describes each property in the General page.

Property	Description
ID	The object's identifier. It is generated when the object is created. The identifier is unique within the screen where the object is located. The format of the IDs for the line charts is LCnnnn.
Note	You can type a note for the object.
Shape settings	For details about the following properties, see Section 4.3.1.4 Setting up the Shape of an Object . , Border Color, BG Color
Chart BG Color	Select a color for the background of the chart.
Data Type	The type of the data that the line chart will display. The supported data types include: 16-Bit Unsigned Integer, 32-Bit Unsigned Integer, 16-Bit Signed Integer, 32-Bit Signed Integer, 16-Bit BCD, 32-Bit BCD, 32-Bit Floating Point, 16-Bit Signed BCD (LMB), 32-Bit Signed BCD (LMB), 16-Bit Signed BCD (LMD), and 32-Bit Signed BCD (LMD).





Continued

Property	Description																																																												
Read Trigger	The bit variable that will trigger the line chart to read and display data. The bit variable triggers the line chart when its state changes from off to on. Click  to enter an address for this field. Click  to select a tag for this field.																																																												
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Property	Description																														
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Number of Data Sets	Specifies how many data sets the line chart will read. The line chart displays one line for each data set. A line chart can display up to 8 lines.																														
Maximum Number of Data Points Per Data Set	Specifies the maximum number of data points that the line chart will read for every data set. A line chart can display up to 255 data points for one data set. Note: The actual number of data points for every data set must be specified at runtime. The actual number must not exceed the maximum number.																														

Continued

Property		Description																							
Point Distribution		Select one of the following methods to distribute the data points of a data set:																							
		<table><tr><th>Method</th><th>Description</th></tr><tr><td>Maximum Points</td><td>The data points of a data set are evenly distributed across the X axis of the line chart based on the maximum number of data points for every data set. Therefore, the space between two adjacent data points is fixed.</td></tr><tr><td>Actual Points</td><td>The data points of a data set are evenly distributed across the X axis of the line chart based on the actual number of data points. When the number of actual data points decreases, the space between two adjacent data points increases.</td></tr></table>	Method	Description	Maximum Points	The data points of a data set are evenly distributed across the X axis of the line chart based on the maximum number of data points for every data set. Therefore, the space between two adjacent data points is fixed.	Actual Points	The data points of a data set are evenly distributed across the X axis of the line chart based on the actual number of data points. When the number of actual data points decreases, the space between two adjacent data points increases.																	
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Actual Points	The data points of a data set are evenly distributed across the X axis of the line chart based on the actual number of data points. When the number of actual data points decreases, the space between two adjacent data points increases.																								
Direction		Specifies the direction that the line chart draws the data points.																							
Show Mark		Check this option so the line chart will put a square mark on every data point.																							
Show Line		Check this option so the line chart will display a line connecting all the data points of a data set in sequence.																							
Clear Trigger		The bit variable that will trigger the line chart to clear its content when its state changes from off to on. Click  to enter an address for this field. Click  to select a tag for this field.																							
Cursor	Show Cursor	Check this option so the line chart will display a cursor. You can touch and drag the cursor to the data point(s) that you want to select.																							
	Cursor Color	Select a color for the cursor.																							
	Value Display Font	Select a font for displaying the values of the selected data point(s).																							
	Cursor Data Receiving Buffer	<p>The variable that will receive the value(s) of the selected data point(s). It must be a piece of the internal memory.</p> <p>Click  to enter an address for this field. Click  to select a tag for this field.</p> <p>The following table shows the data arrangement of the buffer when the data type is 16-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0</td><td>The sequence number of the cursor selected data in the data set</td></tr><tr><td>1</td><td>The value of the selected data point of data set 1.</td></tr><tr><td>2</td><td>The value of the selected data point of data set 2.</td></tr><tr><td>...</td><td>...</td></tr><tr><td>8</td><td>The value of the selected data point of data set 8.</td></tr></table> <p>The following table shows the data arrangement of the buffer when the data type is 32-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0,1</td><td>The sequence number of the cursor selected data in the data set</td></tr><tr><td>2,3</td><td>The value of the selected data point of data set 1.</td></tr><tr><td>4,5</td><td>The value of the selected data point of data set 2.</td></tr><tr><td>...</td><td>...</td></tr><tr><td>16,17</td><td>The value of the selected data point of data set 8.</td></tr></table>	Word	Description	0	The sequence number of the cursor selected data in the data set	1	The value of the selected data point of data set 1.	2	The value of the selected data point of data set 2.	8	The value of the selected data point of data set 8.	Word	Description	0,1	The sequence number of the cursor selected data in the data set	2,3	The value of the selected data point of data set 1.	4,5	The value of the selected data point of data set 2.	16,17
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16,17	The value of the selected data point of data set 8.																								

Continued

Property		Description																																															
Dynamic Range	Dynamic Range	Check this option so the minimum and the maximum of the pen for each data set will be specified at runtime. When this option is selected, the minimum and maximum of the marks for the X axis and Y axis can be specified at runtime too. The data that specifies the above two ranges should be set and arranged correctly in a memory block called the dynamic range parameter block. You need to specify the dynamic range parameter block in the Dynamic Range Parameter Block field.																																															
	Dynamic Range Parameter Block	<p>Specifies the variable that stores the dynamic range parameter block for the line chart when the Dynamic Range is selected. Click  to enter an address for this field. Click  to select a tag for this field.</p> <p>The following table shows the data arrangement of the parameter block when the data type is 16-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0,1</td><td>The minimum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>2,3</td><td>The maximum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>4,5</td><td>The minimum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>6,7</td><td>The maximum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>8</td><td>The minimum for pen #1; 16-bit integer number or 16-bit unsigned integer number</td></tr><tr><td>9</td><td>The maximum for pen #1; (Same as above)</td></tr><tr><td>10</td><td>The minimum for pen #2; (Same as above)</td></tr><tr><td>11</td><td>The maximum for pen #2; (Same as above)</td></tr><tr><td>...</td><td>...</td></tr><tr><td>22</td><td>The minimum for pen #8; (Same as above)</td></tr><tr><td>23</td><td>The maximum for pen #8; (Same as above)</td></tr></table> <p>The following table shows the data arrangement of the parameter block when the data type is 32-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0,1</td><td>The minimum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>2,3</td><td>The maximum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>4,5</td><td>The minimum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>6,7</td><td>The maximum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>8,9</td><td>The minimum for pen #1; 32-bit integer number, 32-bit unsigned integer number, or 32-bit floating point number</td></tr><tr><td>10,11</td><td>The maximum for pen #1; (Same as above)</td></tr><tr><td>12,13</td><td>The minimum for pen #2; (Same as above)</td></tr><tr><td>14,15</td><td>The maximum for pen #2; (Same as above)</td></tr><tr><td>...</td><td>...</td></tr><tr><td>36,37</td><td>The minimum for pen #8; (Same as above)</td></tr><tr><td>38,39</td><td>The maximum for pen #8; (Same as above)</td></tr></table>	Word	Description	0,1	The minimum of the mark for the X axis; 32-bit integer number	2,3	The maximum of the mark for the X axis; 32-bit integer number	4,5	The minimum of the mark for the Y axis; 32-bit integer number	6,7	The maximum of the mark for the Y axis; 32-bit integer number	8	The minimum for pen #1; 16-bit integer number or 16-bit unsigned integer number	9	The maximum for pen #1; (Same as above)	10	The minimum for pen #2; (Same as above)	11	The maximum for pen #2; (Same as above)	22	The minimum for pen #8; (Same as above)	23	The maximum for pen #8; (Same as above)	Word	Description	0,1	The minimum of the mark for the X axis; 32-bit integer number	2,3	The maximum of the mark for the X axis; 32-bit integer number	4,5	The minimum of the mark for the Y axis; 32-bit integer number	6,7	The maximum of the mark for the Y axis; 32-bit integer number	8,9	The minimum for pen #1; 32-bit integer number, 32-bit unsigned integer number, or 32-bit floating point number	10,11	The maximum for pen #1; (Same as above)	12,13	The minimum for pen #2; (Same as above)	14,15	The maximum for pen #2; (Same as above)	36,37	The minimum for pen #8; (Same as above)	38,39
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8.4.5. Pen Settings

This section describes how to define the pens for the line charts. The following is an example of the Pen page.

The screenshot shows the 'Pen' tab in a settings interface. It contains eight panels, each for a different pen (Pen #1 to Pen #8). Each panel has the following controls:

- Dynamic Range:** A checkbox. For Pen #3 and Pen #4, it is checked. For others, it is unchecked.
- Min.:** A text input field, mostly containing '0'.
- Max.:** A text input field, mostly containing '100'.
- Mark Size:** A spinner control with values 2 or 4.
- Line Style:** A dropdown menu showing a solid line icon.
- Color:** A color selection box with a small color swatch.
- Show Value:** A dropdown menu with options like 'Original', 'Scaled', or '(None)'.

Pen #1: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 4, Line Style: Solid, Color: Blue, Show Value: Original.

Pen #2: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 4, Line Style: Solid, Color: Green, Show Value: Original.

Pen #3: Dynamic Range checked, Min: 0, Max: 100, Mark Size: 2, Line Style: Solid, Color: Cyan, Show Value: Scaled.

Pen #4: Dynamic Range checked, Min: 0, Max: 100, Mark Size: 2, Line Style: Solid, Color: Red, Show Value: Scaled.

Pen #5: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 2, Line Style: Dashed, Color: Magenta, Show Value: (None).

Pen #6: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 2, Line Style: Dashed, Color: Yellow, Show Value: (None).

Pen #7: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 2, Line Style: Dashed, Color: Orange, Show Value: (None).

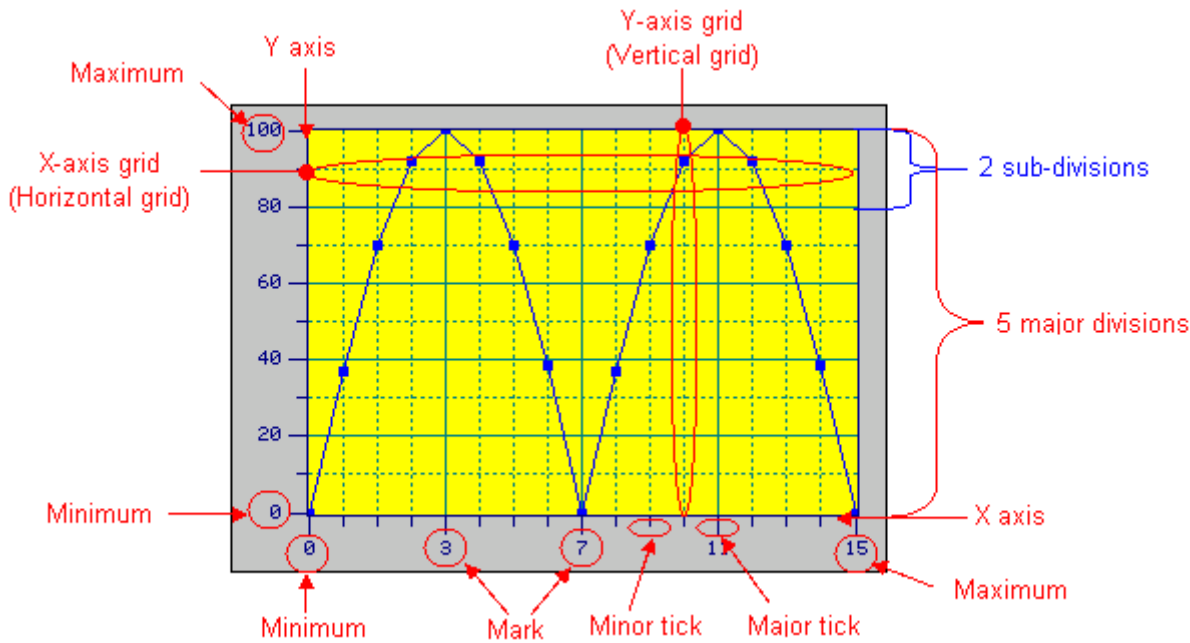
Pen #8: Dynamic Range unchecked, Min: 0, Max: 100, Mark Size: 2, Line Style: Dashed, Color: Light Green, Show Value: (None).

The following table describes each property in the Pen page. Note that pen #1 is for data set 1; pen #2 is for data set 2; and so on.

Property		Description							
Pen #1 to Pen #8	Dynamic Range	Check this option so the minimum and the maximum of the associated data set will be specified at runtime. This option is available when the Dynamic Range option in the General page is selected.							
	Min.	The minimum of the associated data set. This property is available when the Dynamic Range option is not selected.							
	Max.	The maximum of the associated data set. This property is available when the Dynamic Range option is not selected.							
	Mark Size	Select a size for the data point mark. The selection is valid when the Show Mark option in the General page is selected.							
	Line Style	Select a style for the connecting lines. The selection is valid when the Show Line option in the General page is selected.							
	Color	Select a color for the connecting lines.							
	Show Value	Select one of the following methods for displaying the selected data point value. <table><tr><th>Show Value</th><th>Description</th></tr><tr><td>(None)</td><td>Does not display the data point value.</td></tr><tr><td>Original</td><td>Displays the data point value without modification.</td></tr><tr><td>Scaled</td><td>Displays the corresponding Y axis value of the data point.</td></tr></table> The selection is valid when the Show Cursor option in the General page is selected.	Show Value	Description	(None)	Does not display the data point value.	Original	Displays the data point value without modification.	Scaled
Show Value	Description								
(None)	Does not display the data point value.								
Original	Displays the data point value without modification.								
Scaled	Displays the corresponding Y axis value of the data point.								

8.4.6. Axis Settings

This section describes how to define the X axis and the Y axis for the line charts and the scatter charts.



The following is an example of the Axis page.

General	Pen	Axis	Visibility
<div> <div> <div>X Axis</div> <div> <input checked="" type="checkbox"/> Show Ticks <input checked="" type="checkbox"/> Show Y-Axis Grid </div> <div> Axis/Tick Color: </div> <div> Grid Color: </div> <div> Number of Major Divisions: <input type="text" value="4"/> </div> <div> Number of Sub-divisions: <input type="text" value="4"/> </div> <div> <input checked="" type="checkbox"/> Show Marks <div> Font: <input checked="" type="radio"/> 6x8 <input type="radio"/> 8x12 <input type="radio"/> 12x16 </div> <div> <input type="checkbox"/> Dynamic Range <div> Min.: <input type="text" value="0"/> Max.: <input type="text" value="15"/> </div> <div> Total Digits: <input type="text" value="2"/> </div> <div> Fractional Digits: <input type="text" value="0"/> </div> </div> </div> <div> <div>Y Axis</div> <div> <input checked="" type="checkbox"/> Show Ticks <input checked="" type="checkbox"/> Show X-Axis Grid </div> <div> Axis/Tick Color: </div> <div> Grid Color: </div> <div> Number of Major Divisions: <input type="text" value="5"/> </div> <div> Number of Sub-divisions: <input type="text" value="2"/> </div> <div> <input checked="" type="checkbox"/> Show Marks <div> Font: <input checked="" type="radio"/> 6x8 <input type="radio"/> 8x12 <input type="radio"/> 12x16 </div> <div> <input type="checkbox"/> Dynamic Range <div> Min.: <input type="text" value="0"/> Max.: <input type="text" value="100"/> </div> <div> Total Digits: <input type="text" value="3"/> </div> <div> Fractional Digits: <input type="text" value="0"/> </div> </div> </div> </div> </div> <div data-bbox="100 2121 173 2161" data-label="Page-Footer">8-27</div> <div data-bbox="228 2128 675 2163" data-label="Page-Footer">CHAPTER 8 GRAPHS AND CHARTS</div></div>			

The following table describes each property in the Axis page.

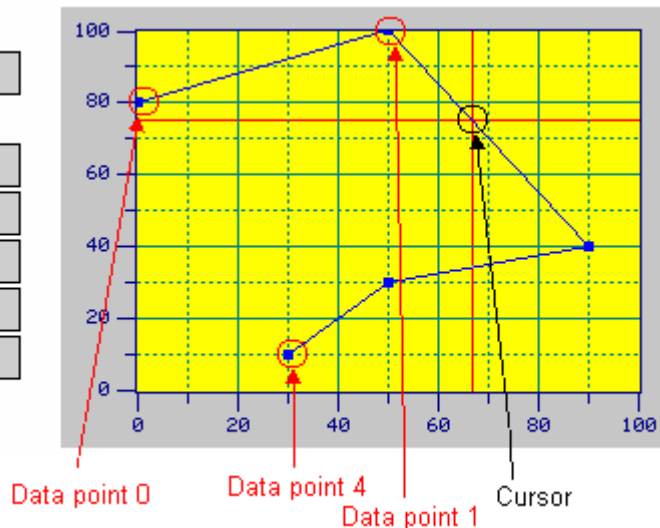
Property		Description
X Axis	Show Ticks	Check this option if you want the X axis to have ticks.
	Show Y-axis Grid	Select this option if you want the X axis to have vertical grids.
	Axis/Tick Color	Select a color for the X axis and its ticks.
	Grid Color	Select a color for the vertical grids.
	Number of Major Divisions	The number of major divisions for the X axis. The minimum you can specify is one.
	Number of Sub-divisions	The number of divisions between two adjacent major ticks. The minimum you can specify is one.
Mark	Show Marks	Check this option if you want the major ticks to have marks.
	Font	The font of the marks.
	Dynamic Range	Check this option if you want the minimum and maximum of the marks to be controlled by the dynamic range parameter block of the associated object at runtime.
	Min.	The minimum of the marks. It is a 32-bit integer.
	Max.	The maximum of the marks. It is a 32-bit integer.
	Total Digits	The total digits to be displayed for the marks.
	Fractional Digits	The number of fractional digits for the marks. For example, when the Maximum is 5000, the Total Digits is 4, and the Fractional Digits is 2, the mark for the Maximum will be 50.00.
Y Axis	Show Ticks	Check this option if you want the Y axis to have ticks.
	Show X-axis Grid	Select this option if you want the Y axis to have horizontal grids.
	Axis/Tick Color	Select a color for the Y axis and its ticks.
	Grid Color	Select a color for the horizontal grids.
	Number of Major Divisions	The number of major divisions for the Y axis. The minimum you can specify is one.
	Number of Sub-divisions	The number of divisions between two adjacent major ticks. The minimum you can specify is one.
Mark	Show Marks	Check this option if you want the major ticks to have marks.
	Font	The font of the marks.
	Dynamic Range	Check this option if you want the minimum and maximum of the marks to be controlled by the dynamic range parameter block of the associated object at runtime.
	Min.	The minimum of the marks. You can specify a 32-bit signed integer.
	Max.	The maximum of the marks. You can specify a 32-bit signed integer.
	Total Digits	The total digits to be displayed for the marks.
	Fractional Digits	The number of fractional digits for the marks. For example, when the Maximum is 5000, the Total Digits is 4, and the Fractional Digits is 2, the mark for the Maximum will be 50.00.

8.5. Scatter Charts

8.5.1. Basic Operations

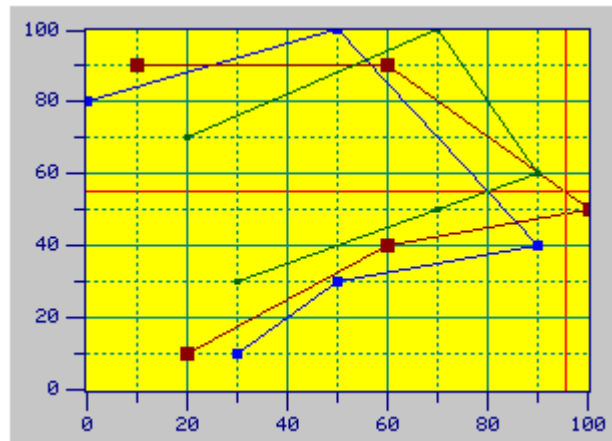
A scatter chart displays a set of data by drawing a data point for each datum and drawing a line that connects all the data points in sequence. Each datum is a coordinate that contains an X value and a Y value. The vertical position of a data point is determined by the X value of the associated datum. The horizontal position of a data point is determined by the Y value of the associated datum.

Number of data points	5	
	X	Y
Data point 0	0	80
Data point 1	50	100
Data point 2	90	40
Data point 3	50	30
Data point 4	30	10



A scatter chart can display up to 8 sets of data. The following example shows a scatter chart that displays 3 sets of data.

Number of data points	5					
	Data set 1		Data set 2		Data set 3	
	X	Y	X	Y	X	Y
Data point 0	0	80	10	90	20	70
Data point 1	50	100	60	90	70	100
Data point 2	90	40	100	50	90	60
Data point 3	50	30	60	40	70	50
Data point 4	30	10	20	10	30	30



8.5.2. Operation Options

The following operation option can be added to a scatter chart. Select and set the option in the Scatter Chart dialog box.

Options	Description
Visibility Control	You can show and hide a scatter chart by a specified bit or the current user level. Select and set this option in the Visibility page.

8.5.3. Settings

You can complete all the settings of a scatter chart in the Scatter Chart dialog box. This dialog box contains the following four pages.

- **General**

Described in [Section 8.5.4.](#)

- **Pen**

Described in [Section 8.5.5.](#)

- **XY Axis**

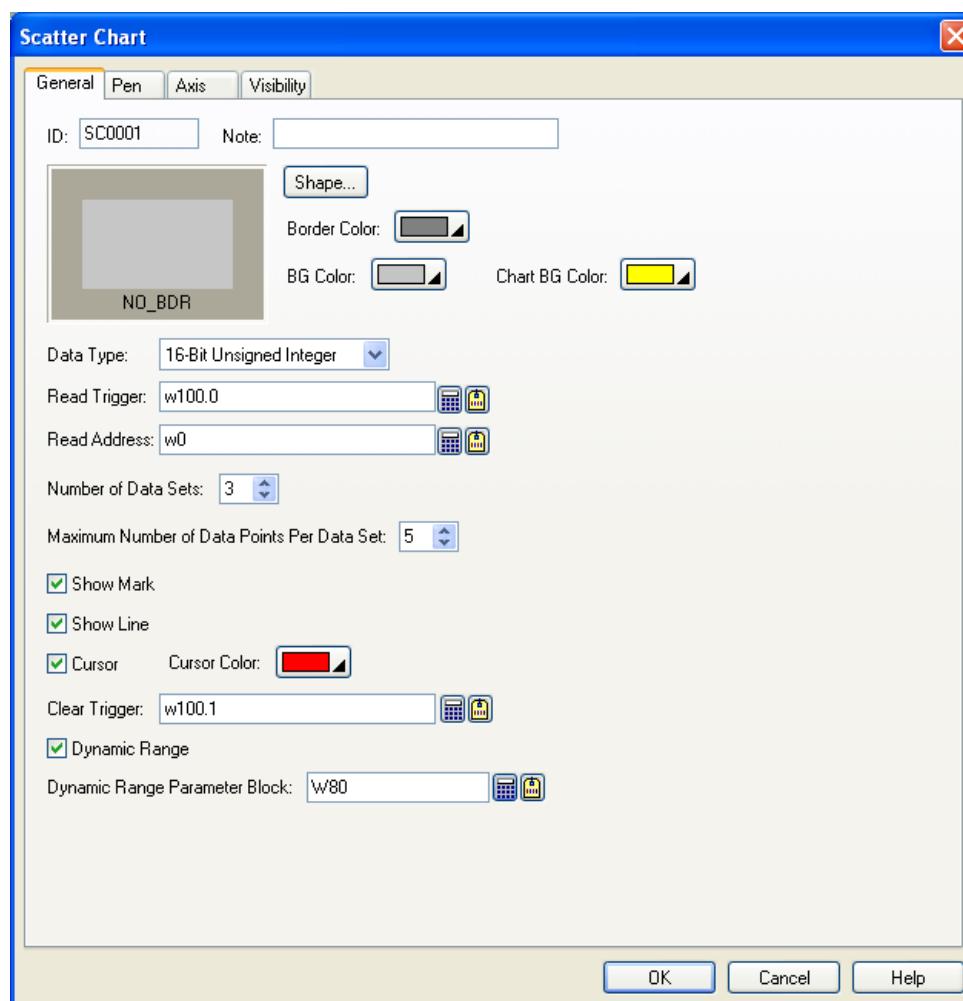
Described in [Section 8.4.6.](#)

- **Visibility**

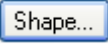


Described in [Section 4.4.6.](#)



8.5.4. General Settings

This section describes how to define the general settings for a scatter chart. The following is an example of the General page of the Scatter Chart property sheet.





The following table describes each property in the General page.



Property	Description
ID	The object's identifier. It is generated when the object is created. The identifier is unique within the screen where the object is located. The format of the IDs for the scatter charts is SCnnnn.
Note	You can type a note for the object.
Shape settings	For details about the following properties, see Section 4.3.1.4 Setting up the Shape of an Object .  , Border Color, BG Color
Chart BG Color	Select a color for the background of the char.
Data Type	The type of the data that the scatter chart will display. The supported data types include: 16-Bit Unsigned Integer, 32-Bit Unsigned Integer, 16-Bit Signed Integer, 32-Bit Signed Integer, 16-Bit BCD, 32-Bit BCD, 32-Bit Floating Point, 16-Bit Signed BCD (LMB), 32-Bit Signed BCD (LMB), 16-Bit Signed BCD (LMD), and 32-Bit Signed BCD (LMD).
Read Trigger	The bit variable that will trigger the scatter chart to read and display data. The bit variable triggers the scatter chart when its state changes from off to on. Click  to enter an address for this field. Click  to select a tag for this field.

Property	Description																																															
Read Address	The variable whose data is to be read and displayed. Click  to enter an address for this field. Click  to select a tag for this field.																																															
	The following tables show the data arrangements of the variable.																																															
	Data Type: 16-bit; Number of Data Sets: 1																																															
	<table><tr><th>Word</th><th>Description</th></tr><tr><td>0</td><td>Actual number of data points</td></tr><tr><td>1</td><td>X value of data point 0</td></tr><tr><td>2</td><td>Y value of data point 0</td></tr><tr><td>3</td><td>X value of data point 1</td></tr><tr><td>4</td><td>Y value of data point 1</td></tr><tr><td>...</td><td>...</td></tr><tr><td>2n+1</td><td>X value of data point n</td></tr><tr><td>2n+2</td><td>Y value of data point n</td></tr></table>	Word	Description	0	Actual number of data points	1	X value of data point 0	2	Y value of data point 0	3	X value of data point 1	4	Y value of data point 1	2n+1	X value of data point n	2n+2	Y value of data point n																													
	Word	Description																																														
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	4	Y value of data point 1																																														
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Data Type: 16-bit; Number of Data Sets: 2																																																
<table><tr><th>Word</th><th>Description</th></tr><tr><td>0</td><td>Actual number of data points</td></tr><tr><td>1</td><td>X value of data point 0; Data set 1</td></tr><tr><td>2</td><td>Y value of data point 0; Data set 1</td></tr><tr><td>3</td><td>X value of data point 0; Data set 2</td></tr><tr><td>4</td><td>Y value of data point 0; Data set 2</td></tr><tr><td>5</td><td>X value of data point 1; Data set 1</td></tr><tr><td>6</td><td>Y value of data point 1; Data set 1</td></tr><tr><td>7</td><td>X value of data point 1; Data set 2</td></tr><tr><td>8</td><td>Y value of data point 1; Data set 2</td></tr><tr><td>...</td><td>...</td></tr><tr><td>4n+3</td><td>X value of data point n; Data set 2</td></tr><tr><td>4n+4</td><td>Y value of data point n; Data set 2</td></tr></table>	Word	Description	0	Actual number of data points	1	X value of data point 0; Data set 1	2	Y value of data point 0; Data set 1	3	X value of data point 0; Data set 2	4	Y value of data point 0; Data set 2	5	X value of data point 1; Data set 1	6	Y value of data point 1; Data set 1	7	X value of data point 1; Data set 2	8	Y value of data point 1; Data set 2	4n+3	X value of data point n; Data set 2	4n+4	Y value of data point n; Data set 2																						
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...	...																																															
4n+3	X value of data point n; Data set 2																																															
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<table><tr><th>Word</th><th>Description</th><th>Word</th><th>Description</th></tr><tr><td>0</td><td>Actual number of data points</td><td>11</td><td>X value of data point 0; Data set 6</td></tr><tr><td>1</td><td>X value of data point 0; Data set 1</td><td>12</td><td>Y value of data point 0; Data set 6</td></tr><tr><td>2</td><td>Y value of data point 0; Data set 1</td><td>13</td><td>X value of data point 0; Data set 7</td></tr><tr><td>3</td><td>X value of data point 0; Data set 2</td><td>14</td><td>Y value of data point 0; Data set 7</td></tr><tr><td>4</td><td>Y value of data point 0; Data set 2</td><td>15</td><td>X value of data point 0; Data set 8</td></tr><tr><td>5</td><td>X value of data point 0; Data set 3</td><td>16</td><td>Y value of data point 0; Data set 8</td></tr><tr><td>6</td><td>Y value of data point 0; Data set 3</td><td>17</td><td>X value of data point 1; Data set 1</td></tr><tr><td>7</td><td>X value of data point 0; Data set 4</td><td>18</td><td>Y value of data point 1; Data set 1</td></tr><tr><td>8</td><td>Y value of data point 0; Data set 4</td><td>...</td><td>...</td></tr><tr><td>9</td><td>X value of data point 0; Data set 5</td><td>16n+15</td><td>X value of data point n; Data set 8</td></tr><tr><td>10</td><td>Y value of data point 0; Data set 5</td><td>16n+16</td><td>Y value of data point n; Data set 8</td></tr></table>	Word	Description	Word	Description	0	Actual number of data points	11	X value of data point 0; Data set 6	1	X value of data point 0; Data set 1	12	Y value of data point 0; Data set 6	2	Y value of data point 0; Data set 1	13	X value of data point 0; Data set 7	3	X value of data point 0; Data set 2	14	Y value of data point 0; Data set 7	4	Y value of data point 0; Data set 2	15	X value of data point 0; Data set 8	5	X value of data point 0; Data set 3	16	Y value of data point 0; Data set 8	6	Y value of data point 0; Data set 3	17	X value of data point 1; Data set 1	7	X value of data point 0; Data set 4	18	Y value of data point 1; Data set 1	8	Y value of data point 0; Data set 4	9	X value of data point 0; Data set 5	16n+15	X value of data point n; Data set 8	10	Y value of data point 0; Data set 5	16n+16	Y value of data point n; Data set 8
Word	Description	Word	Description																																													
0	Actual number of data points	11	X value of data point 0; Data set 6																																													
1	X value of data point 0; Data set 1	12	Y value of data point 0; Data set 6																																													
2	Y value of data point 0; Data set 1	13	X value of data point 0; Data set 7																																													
3	X value of data point 0; Data set 2	14	Y value of data point 0; Data set 7																																													
4	Y value of data point 0; Data set 2	15	X value of data point 0; Data set 8																																													
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6	Y value of data point 0; Data set 3	17	X value of data point 1; Data set 1																																													
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9	X value of data point 0; Data set 5	16n+15	X value of data point n; Data set 8																																													
10	Y value of data point 0; Data set 5	16n+16	Y value of data point n; Data set 8																																													

Continued

Property	Description																																															
Read Address	Data Type: 32-bit; Number of Data Sets: 1																																															
	Word	Description	Word	Description	0,1	Actual number of data points	8,9	Y value of data point 1	2,3	X value of data point 0	4,5	Y value of data point 0	4n+2, 4n+3	X value of data point n	6,7	X value of data point 1	4n+4, 4n+5	Y value of data point n																												
	Word	Description	Word	Description																																												
	0,1	Actual number of data points	8,9	Y value of data point 1																																												
	2,3	X value of data point 0																																												
	4,5	Y value of data point 0	4n+2, 4n+3	X value of data point n																																												
	6,7	X value of data point 1	4n+4, 4n+5	Y value of data point n																																												
	Data Type: 32-bit; Number of Data Sets: 2																																															
	Word	Description	Word	Description	0,1	Actual number of data points	12,13	Y value of data point 1; Data set 1	2,3	X value of data point 0; Data set 1	14,15	X value of data point 1; Data set 2	4,5	Y value of data point 0; Data set 1	16,17	Y value of data point 1; Data set 2	6,7	X value of data point 0; Data set 2	8,9	Y value of data point 0; Data set 2	8n+6, 8n+7	X value of data point n; Data set 2	10,11	X value of data point 1; Data set 1	8n+8, 8n+9	Y value of data point n; Data set 2																				
	Word	Description	Word	Description																																												
	0,1	Actual number of data points	12,13	Y value of data point 1; Data set 1																																												
	2,3	X value of data point 0; Data set 1	14,15	X value of data point 1; Data set 2																																												
	4,5	Y value of data point 0; Data set 1	16,17	Y value of data point 1; Data set 2																																												
	6,7	X value of data point 0; Data set 2																																												
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	10,11	X value of data point 1; Data set 1	8n+8, 8n+9	Y value of data point n; Data set 2																																												
	Data Type: 32-bit; Number of Data Sets: 8																																															
	Word	Description	Word	Description	0,1	Actual number of data points	22,23	X value of data point 0; Data set 6	2,3	X value of data point 0; Data set 1	24,25	Y value of data point 0; Data set 6	4,5	Y value of data point 0; Data set 1	26,27	X value of data point 0; Data set 7	6,7	X value of data point 0; Data set 2	28,29	Y value of data point 0; Data set 7	8,9	Y value of data point 0; Data set 2	30,31	X value of data point 0; Data set 8	10,11	X value of data point 0; Data set 3	32,33	Y value of data point 0; Data set 8	12,13	Y value of data point 0; Data set 3	34,35	X value of data point 1; Data set 1	14,15	X value of data point 0; Data set 4	36,37	Y value of data point 1; Data set 1	16,17	Y value of data point 0; Data set 4	18,19	X value of data point 0; Data set 5	32n+30, 32n+31	X value of data point n; Data set 8	20,21	Y value of data point 0; Data set 5	32n+32, 32n+33	Y value of data point n; Data set 8
	Word	Description	Word	Description																																												
	0,1	Actual number of data points	22,23	X value of data point 0; Data set 6																																												
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16,17	Y value of data point 0; Data set 4																																													
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20,21	Y value of data point 0; Data set 5	32n+32, 32n+33	Y value of data point n; Data set 8																																													
Number of Data Sets	Specifies how many data sets the scatter chart will display. A scatter chart can display up to 8 sets of data.																																															
Maximum Number of Data Points Per Data Set	Specifies the maximum number of data points that the scatter chart will display for every data set. A scatter chart can display up to 255 data points for one data set. Note: The actual number of data points for every data set is specified at runtime. The actual number must not exceed the maximum number.																																															
Show Mark	Check this option so the scatter chart will show a square mark on every data point.																																															
Show Line	Check this option so the scatter chart will display a line between two adjacent data points of a data set.																																															
Clear Trigger	The bit variable that triggers the scatter chart to clear its content when its state changes from off to on. Click  to enter an address for this field. Click  to select a tag for this field.																																															

Continued

Property		Description																																																							
Cursor	Show Cursor	Check this option so the scatter chart will display a cursor. You can touch and drag the cursor within the chart.																																																							
	Cursor Color	Select a color for the cursor.																																																							
Dynamic Range	Dynamic Range	Check this option so the minimum and the maximum for the X and Y values of each data set can be specified at runtime. When this option is selected, the minimum and maximum of the marks for the X axis and Y axis can be specified at runtime as well. The data that specifies the above two ranges should be set and arranged correctly in a memory block called the dynamic range parameter block. You need to specify the dynamic range parameter block in the Dynamic Range Parameter Block field.																																																							
	Dynamic Range Parameter Block	<p>Specifies the variable that stores the dynamic range parameter block for the line chart when Dynamic Range is selected.</p> <p>Click  to enter an address for this field. Click  to select a tag for this field.</p> <p>The following table shows the data arrangement of the parameter block when the data type is 16-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0,1</td><td>The minimum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>2,3</td><td>The maximum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>4,5</td><td>The minimum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>6,7</td><td>The maximum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>8</td><td>The minimum of X values for pen #1; 16-bit integer number or 16-bit unsigned integer number</td></tr><tr><td>9</td><td>The maximum of X values for pen #1; (Same as above)</td></tr><tr><td>10</td><td>The minimum of Y values for pen #1; (Same as above)</td></tr><tr><td>11</td><td>The maximum of Y values for pen #1; (Same as above)</td></tr><tr><td>12</td><td>The minimum of X values for pen #2; (Same as above)</td></tr><tr><td>13</td><td>The maximum of X values for pen #2; (Same as above)</td></tr><tr><td>...</td><td>...</td></tr><tr><td>38</td><td>The minimum of Y values for pen #8; (Same as above)</td></tr><tr><td>39</td><td>The maximum of Y values for pen #8; (Same as above)</td></tr></table> <p>The following table shows the data arrangement of the parameter block when the data type is 32-bit.</p> <table><tr><th>Word</th><th>Description</th></tr><tr><td>0,1</td><td>The minimum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>2,3</td><td>The maximum of the mark for the X axis; 32-bit integer number</td></tr><tr><td>4,5</td><td>The minimum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>6,7</td><td>The maximum of the mark for the Y axis; 32-bit integer number</td></tr><tr><td>8,9</td><td>The minimum of X values for pen #1; 32-bit integer number, 32-bit unsigned integer number, or 32-bit floating point number</td></tr><tr><td>10,11</td><td>The maximum of X values for pen #1; (Same as above)</td></tr><tr><td>12,13</td><td>The minimum of Y values for pen #1; (Same as above)</td></tr><tr><td>14,15</td><td>The maximum of Y values for pen #1; (Same as above)</td></tr><tr><td>...</td><td>...</td></tr><tr><td>64,65</td><td>The minimum of X values for pen #8; (Same as above)</td></tr><tr><td>66,67</td><td>The maximum of X values for pen #8; (Same as above)</td></tr><tr><td>68,69</td><td>The minimum of Y values for pen #8; (Same as above)</td></tr><tr><td>70,71</td><td>The maximum of Y values for pen #8; (Same as above)</td></tr></table>	Word	Description	0,1	The minimum of the mark for the X axis; 32-bit integer number	2,3	The maximum of the mark for the X axis; 32-bit integer number	4,5	The minimum of the mark for the Y axis; 32-bit integer number	6,7	The maximum of the mark for the Y axis; 32-bit integer number	8	The minimum of X values for pen #1; 16-bit integer number or 16-bit unsigned integer number	9	The maximum of X values for pen #1; (Same as above)	10	The minimum of Y values for pen #1; (Same as above)	11	The maximum of Y values for pen #1; (Same as above)	12	The minimum of X values for pen #2; (Same as above)	13	The maximum of X values for pen #2; (Same as above)	38	The minimum of Y values for pen #8; (Same as above)	39	The maximum of Y values for pen #8; (Same as above)	Word	Description	0,1	The minimum of the mark for the X axis; 32-bit integer number	2,3	The maximum of the mark for the X axis; 32-bit integer number	4,5	The minimum of the mark for the Y axis; 32-bit integer number	6,7	The maximum of the mark for the Y axis; 32-bit integer number	8,9	The minimum of X values for pen #1; 32-bit integer number, 32-bit unsigned integer number, or 32-bit floating point number	10,11	The maximum of X values for pen #1; (Same as above)	12,13	The minimum of Y values for pen #1; (Same as above)	14,15	The maximum of Y values for pen #1; (Same as above)	64,65	The minimum of X values for pen #8; (Same as above)	66,67	The maximum of X values for pen #8; (Same as above)	68,69	The minimum of Y values for pen #8; (Same as above)	70,71
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8.5.5. Pen Settings

This section describes how to define the pens for the scatter charts. The following is an example of the Pen page.

The screenshot shows the 'Pen' tab of a settings dialog. It contains three panels for Pen #1, Pen #2, and Pen #3. Each panel has a 'Dynamic Range' checkbox, input fields for 'X Min.', 'X Max.', 'Y Min.', and 'Y Max.', a 'Mark Size' spinner set to 2, a 'Line' style selector, and a 'Color' selector. Pen #1 has 'Dynamic Range' unchecked, 'X Min.' 0, 'X Max.' 1000, 'Y Min.' 0, 'Y Max.' 1000, 'Mark Size' 2, 'Line' style 1, and 'Color' blue. Pen #2 has 'Dynamic Range' unchecked, 'X Min.' 0, 'X Max.' 1000, 'Y Min.' 0, 'Y Max.' 1000, 'Mark Size' 2, 'Line' style 2, and 'Color' green. Pen #3 has 'Dynamic Range' checked, 'X Min.' 0, 'X Max.' 1000, 'Y Min.' 0, 'Y Max.' 1000, 'Mark Size' 2, 'Line' style 3, and 'Color' cyan.

The following table describes each property in the Pen page. Note that pen #1 is for data set 1; pen #2 is for data set 2; and so on.

Property		Description
Pen #1 to Pen #8	Dynamic Range	Check this option so the minimum and maximum for the X and Y values of the associated data set will be specified at runtime. This option is available when the Dynamic Range option in the General page is selected.
	X Min.	The X minimum of the associated data set. This property is available when the Dynamic Range option is not selected.
	X Max.	The X maximum of the data value of the associated data set. This property is available when the Dynamic Range option is not selected.
	Y Min.	The Y minimum of the associated data set. This property is available when the Dynamic Range option is not selected.
	Y Max.	The Y minimum of the associated data set. This property is available when the Dynamic Range option is not selected.
	Mark Size	Select a size for the data point mark. The selection is valid when the Show Mark option in the General page is selected.
	Line Style	Select a style for the connecting lines. The selection is valid when the Show Line option in the General page is selected.
	Color	Select a color for the connecting lines.