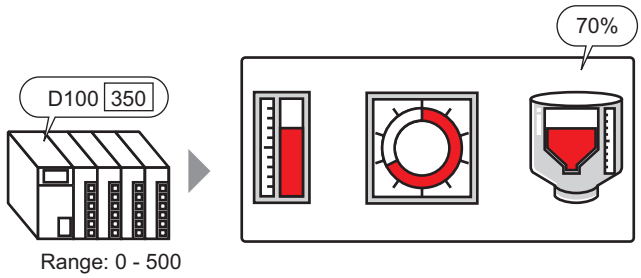
17 Graph Display

This chapter explains how to use the GP-Pro EX Graph feature.
Please start by reading "17.1 Settings Menu" (page 17-2) and then turn to the page with the relevant explanation.

17.1 Settings Menu

Displaying the Current Value in a Bar/Circle/Tank Graph

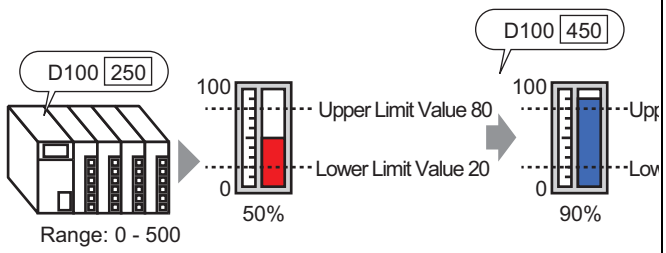
Designated data stored in a device/PLC can be displayed as a Graph.



☞ Setup Procedure (page 17-5)
☞ Introduction (page 17-4)

Displaying Alarms in a Bar/Circle/Tank Graph

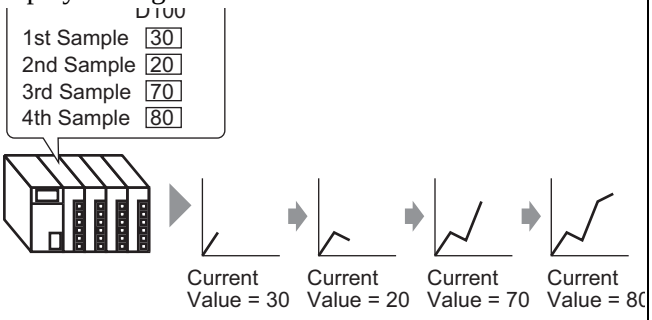
The displayed color will change when the value exceeds a set range.



☞ Setup Procedure (page 17-8)
☞ Introduction (page 17-7)

Using Line Charts

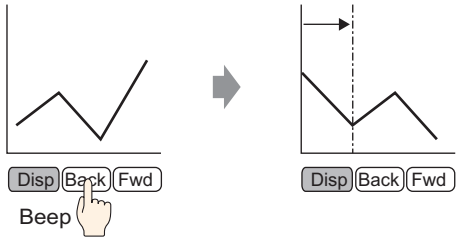
Displays changes in data on a Line Chart.



☞ Setup Procedure (page 17-12)
☞ Introduction (page 17-11)

Using a Line Chart to View Historic Data

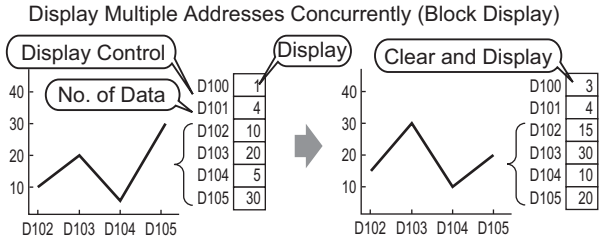
You can display a Line Chart's past data.



☞ Setup Procedure (page 17-16)
☞ Introduction (page 17-15)

Displaying Multiple Addresses Concurrently (Block Display)

Display the values of multiple consecutive Word Addresses on a single Line Chart.

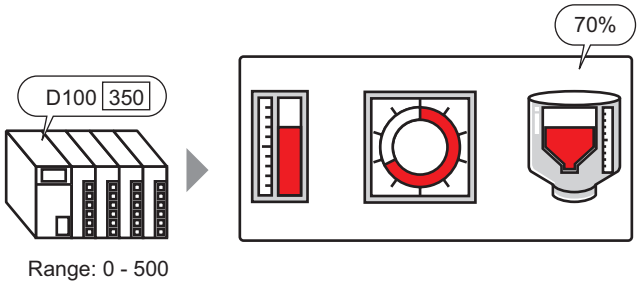


☞ Setup Procedure (page 17-20)
☞ Introduction (page 17-19)

17.2 Displaying the Current Value in a Bar/Circle/Tank Graph

17.2.1 Introduction

The current value is converted as defined in the range values and displayed on the Graph.



17.2.2 Setup Procedure

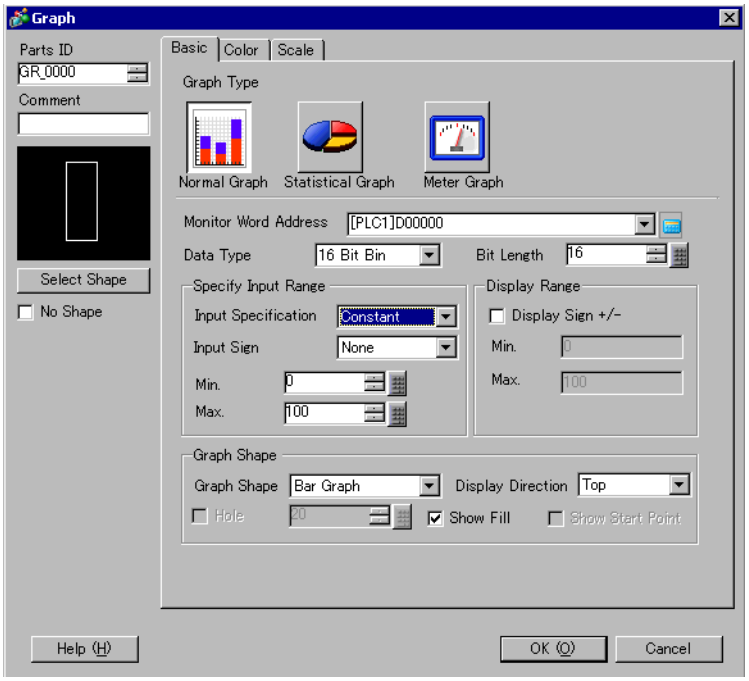
NOTE

- Please refer to the settings guide for details.
  ☞ "17.7.1 Graph Part Settings Guide" (page 17-24)
- For details about placing parts or setting addresses, shapes, or colors, please refer to the "Part Editing Procedure".
  ☞ "9.6.1 Editing Parts" (page 9-38)

Displays word address (D100) data on a Bar Graph.

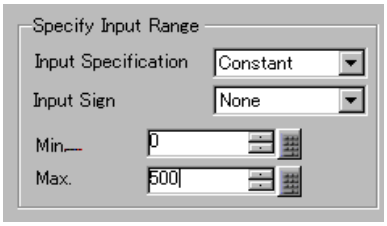
1 From the [Parts (P)] menu, select [Graph (G)] or click  . Place the Graph on the screen.

2 Double-click the new Graph. The following dialog box appears.

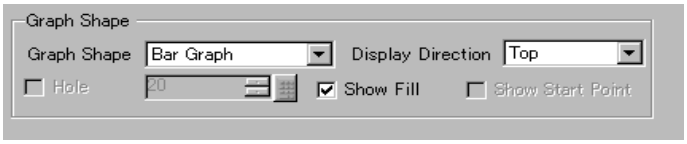


3 In [Monitor Word Address], set the address you want to display. Then set the [Data Type] and [Bit Length].

4 In the [Input Specification] drop-down list, select [Constant]. In the [Min] and [Max] fields, set the range of data stored in that address. If you are storing negative values, set the [Input Sign] to [2's Complement] or [MSB Sign].



5 In the [Graph Shape] drop-down list, select [Bar Graph].

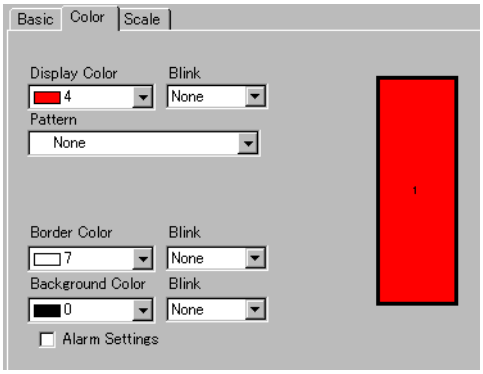


NOTE

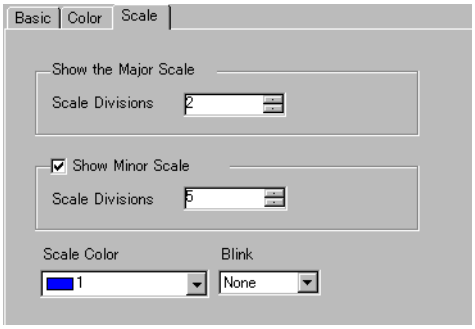
- You can also select [Circle Graph], [Semicircle Graph], and [Tank Graph].

6 In [Select Shape], select the Graph shape.

7 On the [Color] tab, set the [Display Color].
Set the Graph's other colors (pattern color, border color) if necessary.



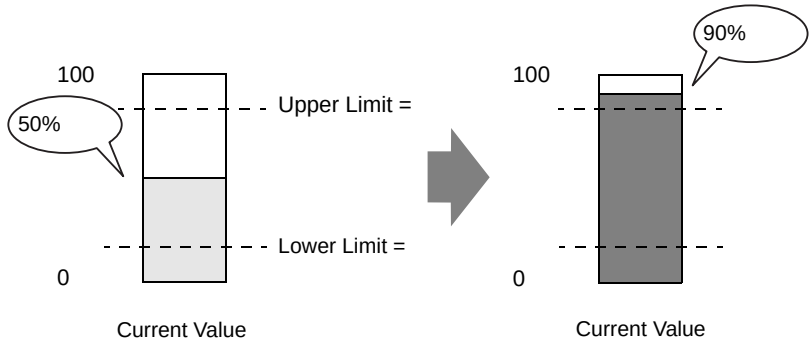
8 On the [Scale] tab, set the scale's display settings, designate the scale colors, and click [OK].



17.3 Displaying Alarms in a Bar/Circle/Tank Graph

17.3.1 Introduction

When the data range is 0-500:



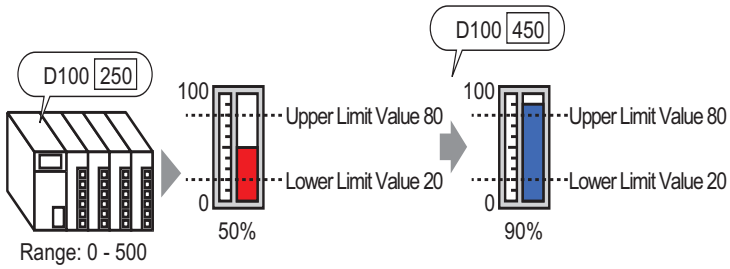
You can set the normal and abnormal values. When an abnormal value occurs, the Graph color changes.
This is useful for users to quickly see abnormal values.

17.3.2 Setup Procedure

NOTE

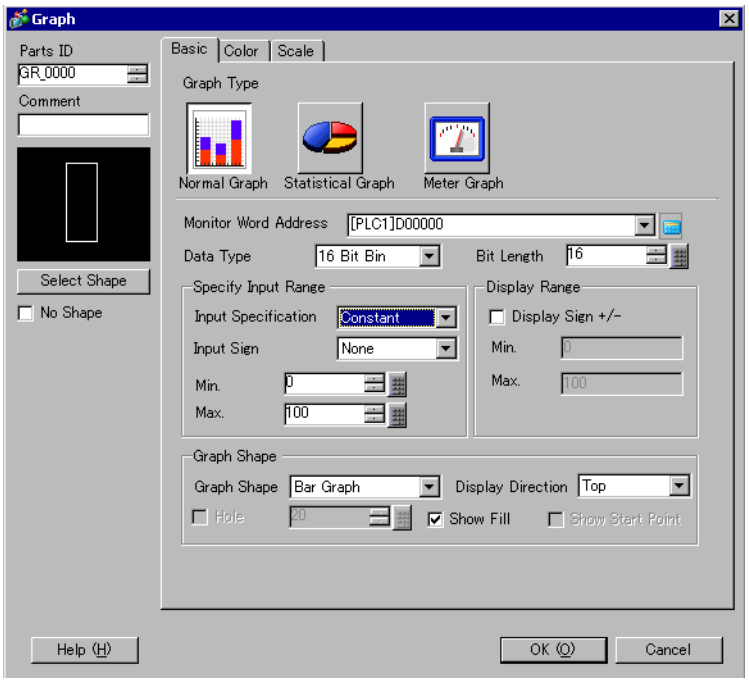
- Please refer to the settings guide for details.
  ☞ "17.7.1 Graph Part Settings Guide" (page 17-24)
- For details about placing parts or setting addresses, shapes, or colors, please refer to the "Part Editing Procedure".
  ☞ "9.6.1 Editing Parts" (page 9-38)

Set the Graph color so that it changes when the word address (D100) data goes below 20% or above 80% of the Input Range.



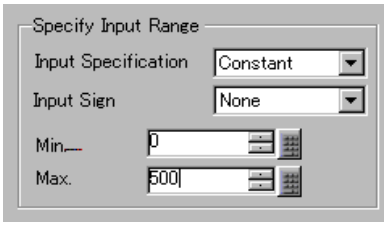
1 From the [Parts (P)] menu, select [Graph (G)] or click . Place the Graph on the screen.

2 Double-click the new Graph. The following dialog box appears.

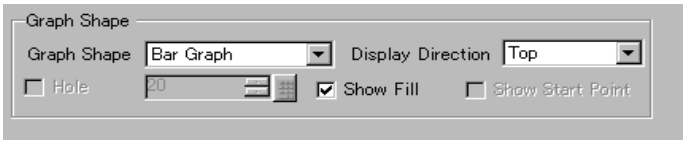


3 In [Monitor Word Address], set the address you want to display. Then set the [Data Type] and [Bit Length].

4 In the [Input Specification] drop-down list, select [Constant]. In the [Min] and [Max] fields, set the range of data stored in that address.



5 In the [Graph Shape] drop-down list, select [Bar Graph].

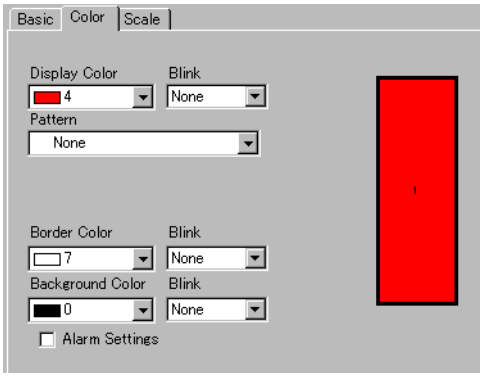


NOTE

- You can also select [Circle Graph], [Semicircle Graph], and [Tank Graph].

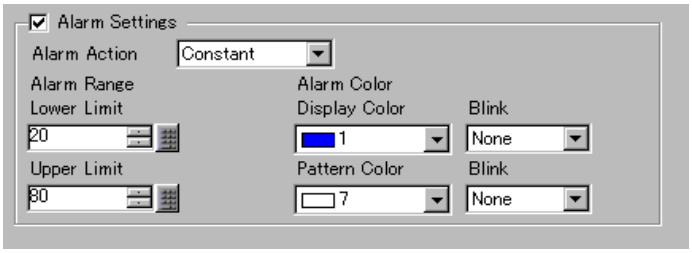
6 In [Select Shape], select the Graph shape.

7 On the [Color] tab, set the [Display Color].
Set the Graph's other colors (pattern color, border color) if necessary.

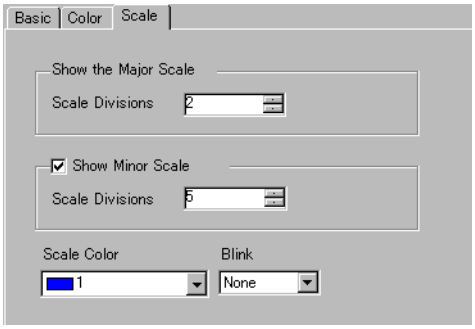


8 Select the [Alarm] check box, and specify the alarm range (percentage). (For example, Lower Limit 20, Upper Limit 80).

9 In [Display Color], set the Alarm Display color.



10 On the [Scale] tab, set to show the scales and the color and blink. Click [OK].



17.4 Using Line Charts

17.4.1 Introduction

You can collect and display data in regular or random intervals in a Line Chart.
You can use this to identify significant changes in data or to view the relationship between different data.
Up to 20 lines can be displayed on a single Line Chart.

IMPORTANT

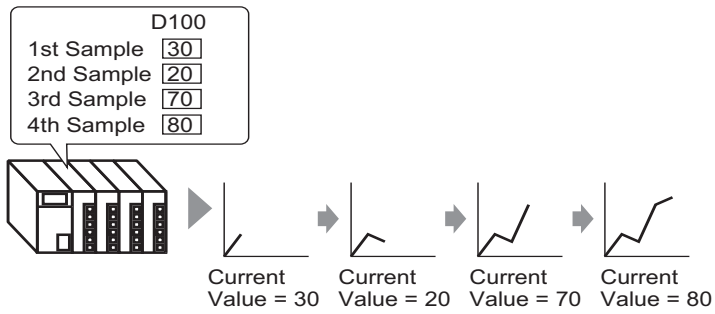
- Use the Sampling function to get data. To display a historical trend graph, you first need to set connection device/PLC data to be collected in the GP using the Sampling.
  ☞ "24.3 Sampling Data at Constant Intervals" (page 24-5)
  ☞ "24.4 Sampling Data at Specific Periods" (page 24-10)

17.4.2 Setup Procedure

NOTE

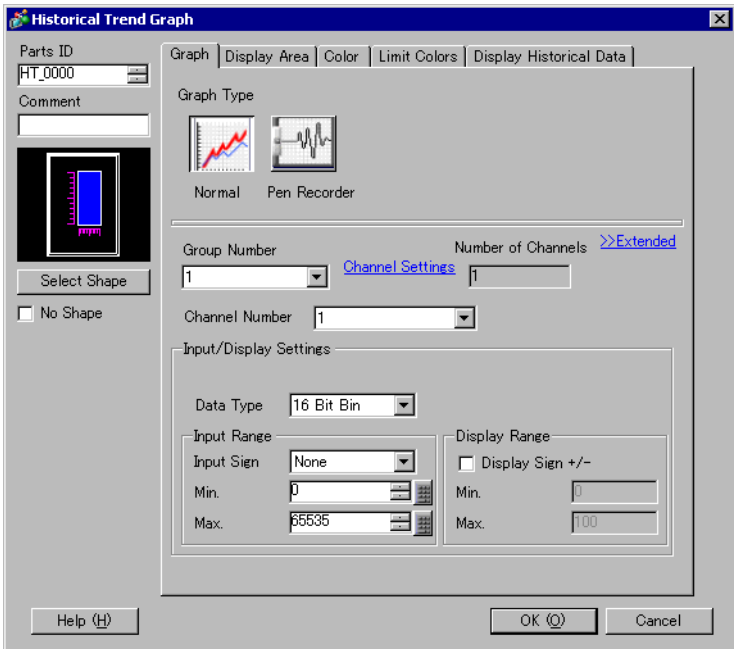
- Please refer to the settings guide for details.
  ☞ "17.7.2 Historical Trend Graph Settings Guide" (page 17-40)
- For details about placing parts or setting addresses, shapes, or colors, please refer to the "Part Editing Procedure".
  ☞ "9.6.1 Editing Parts" (page 9-38)

Each time a Word Address data point is sampled, that data point is displayed on a Line Chart.



1 From the [Parts (P)] menu, select [Historical Trend Graph (H)] or click . Place the Graph on the screen.

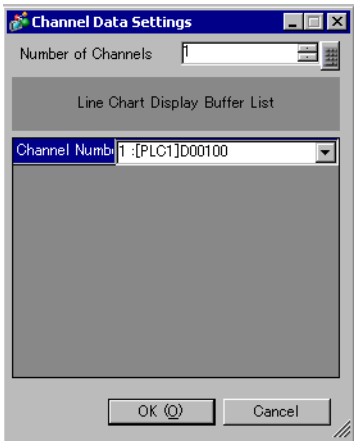
2 Double-click the new Graph. The following dialog box appears.



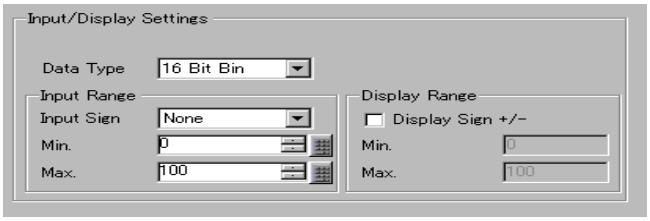
3 In [Select Shape], select the Graph shape.

4 In [Sampling Group], select the number of the sampling group you want to display.

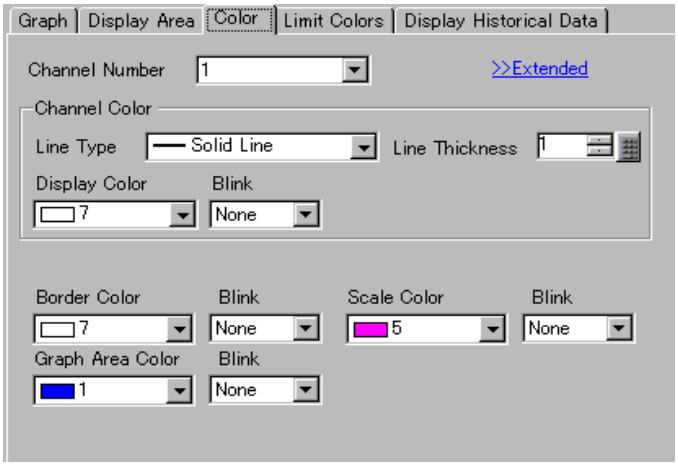
5 Click [Channel Settings]. The following dialog box appears.
In [Number of Channels], set the number of data lines to display on the graph. In [Channel1], select the graph display address.



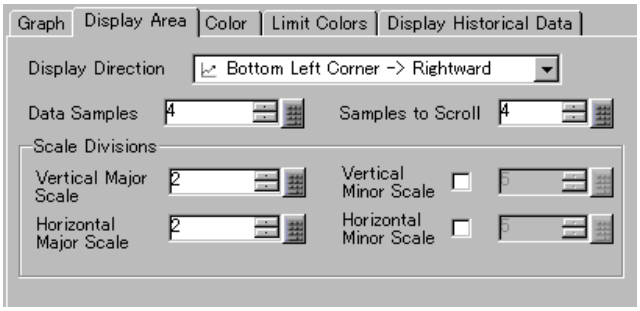
6 Set the data type and input range for the graph data.



7 On the [Color] tab, set the color and type of the line to be displayed and the color of the Graph Display Area.



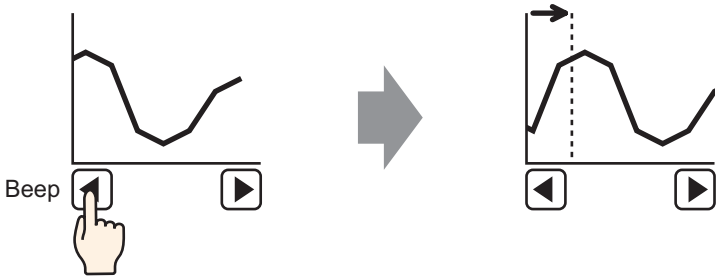
8 Click the [Display Area] tab. Set the [Display Direction] and the [Data Samples]. The initial value of the [Samples to Scroll] is the same as [Data Samples].



9 Adjust the scale settings as necessary, and click [OK].

17.5 Using a Line Chart to View Historic Data

17.5.1 Introduction



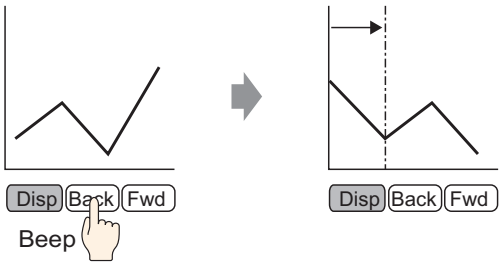
You can display a Line Chart's past data.
You can view historic data that has been cleared from the Line Chart. This function is useful looking at changes in data over a period of time.

17.5.2 Setup Procedure

NOTE

- Please refer to the settings guide for details.
  ☞ "17.7.2 Historical Trend Graph Settings Guide" (page 17-40)
- For details of the part placement method and the address, shape, color, and label setting method, refer to the "Part Editing Procedure".
  ☞ "9.6.1 Editing Parts" (page 9-38)

Use these settings when you want to check a Word Address' historic data.



1 From the [Parts (P)] menu, select [Historical Trend Graph (H)] or click . Place the Graph on the screen.

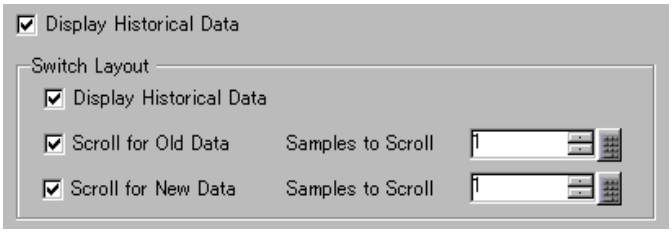
2 Double-click the new Graph. The settings dialog box appears.
Set the sampling group and address (D100), then adjust the settings needed for display such as the line color, number of display data, etc.
☞ "17.4.2 Setup Procedure" (page 17-12)

3 Open the [Display Historical Data] tab. Select the [Display Historical Data] check box.

NOTE

- Only one Historical Trend Graph part with a Display Historical Data function can be placed per screen.

4 Set the switches which will display historical data.
Set the number that the switch will scroll when pressed once.

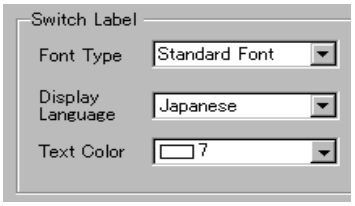


NOTE

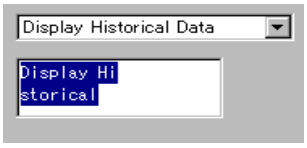
- When you use [Historical Trend Graph Switch] from [Special Switch] in the switch lamp part without setting the switch layout on the Historical Trend Graph, you can set a shape, color to an individual switch.

5 In [Select Shape], select the Switch shape.

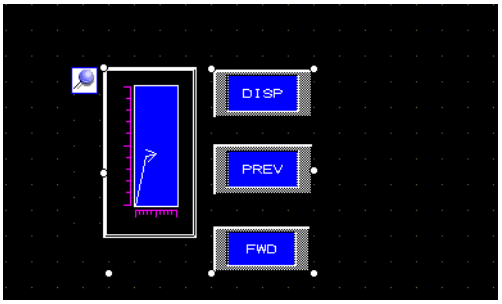
6 Select the Switch Label [Font Type] and [Display Language]. Set the [Text Color].



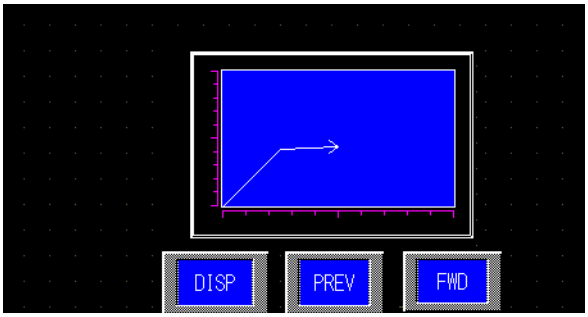
7 In [Select Switch], choose the switch and enter the text in [Label]. Type a label for each of the switches.



8 Select the switch color and click [OK]. (Some colors cannot be set depending on the selected switch shape.)
The switches are placed on the top right of the Historical Trend Graph.



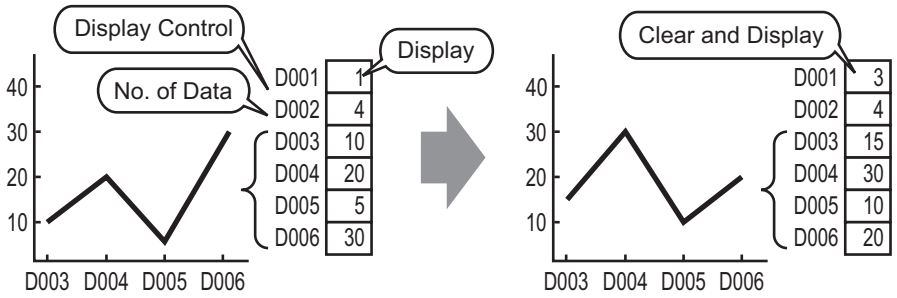
9 Select the Graph display part and an individual switch independently and move it anywhere within the screen.



17.6 Displaying Multiple Addresses Concurrently (Block Display)

17.6.1 Introduction

Display Multiple Addresses Concurrently (Block Display)



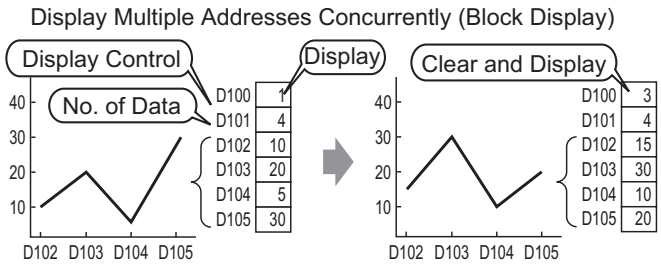
You can display multiple values from consecutive word addresses on a single Line Chart. You can compare the values and state of multiple data points.

17.6.2 Setup Procedure

NOTE

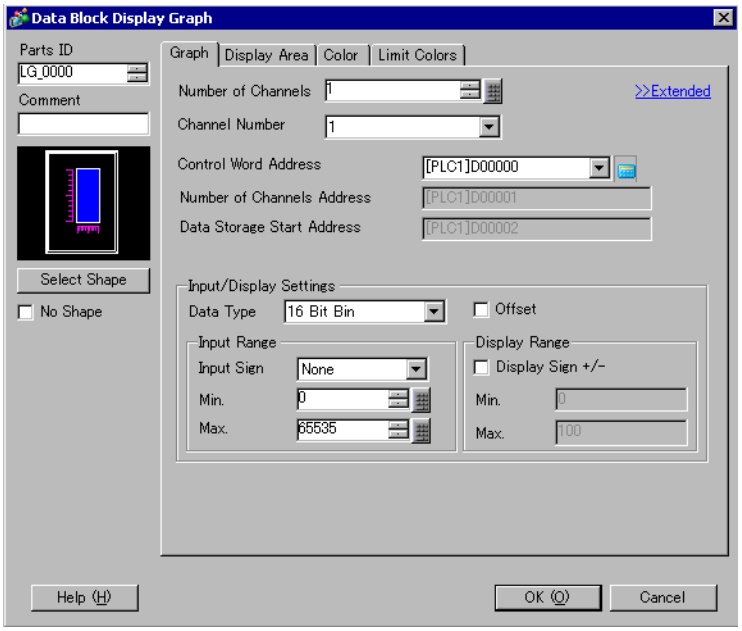
- Please refer to the settings guide for details.
  ☞ “17.7.3 Data Block Display Graph Settings Guide” (page 17-55)
- For details about placing parts or setting addresses, shapes, or colors, please refer to the "Part Editing Procedure".
  ☞ “9.6.1 Editing Parts” (page 9-38)

When bit 0 of a word address (D100) is turned on, and a Graph is created, displaying the Line Chart of data from 4 consecutive words in block display.



1 From the [Parts (P)] menu, select [Data Block Display Graph (L)] or click  . Place the Graph on the screen.

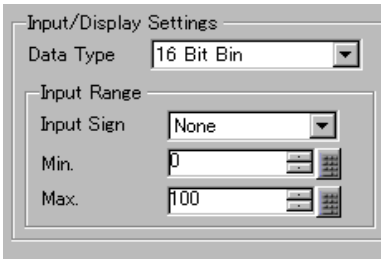
2 Click the new Graph. The following dialog box appears.



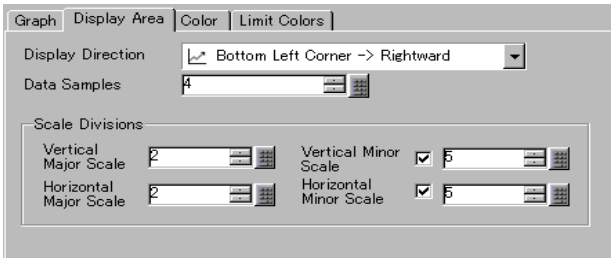
3 In [Select Shape], select the Graph shape.

4 In [Control Word Address], set the address (D100) to control the graph display.
The address (D101) used to store the number of data displayed on the graph "4" is displayed in [Number of Channel Data Storage Address].

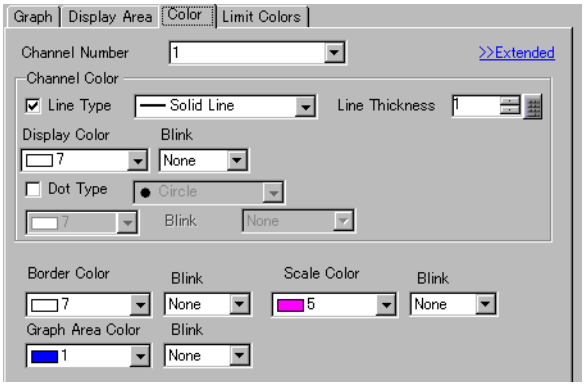
5 In the [Min] and [Max] fields, set the range of data stored in that address. If you are storing negative values, set the [Input Sign] to [2's Complement] or [MSB Sign].



6 On the [Display Area] tab, set [Display Direction]. Set the [Data Samples] to 4.



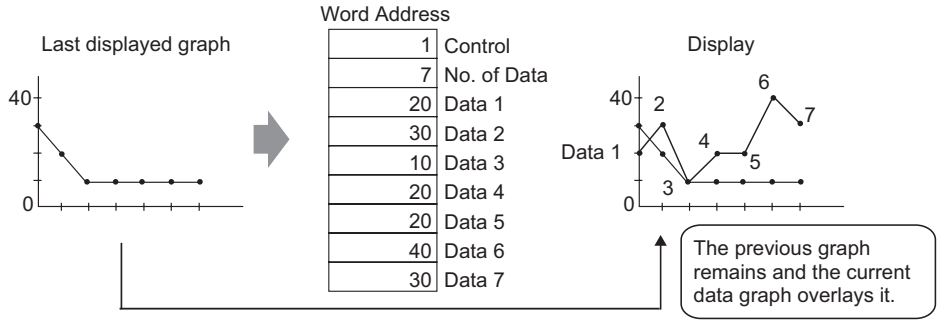
7 On the [Color] tab, set the color and type of the line to be displayed, and the color of the Graph Display Area. Next click [OK].



17.6.3 Displaying/Clearing a Data Block Display Graph

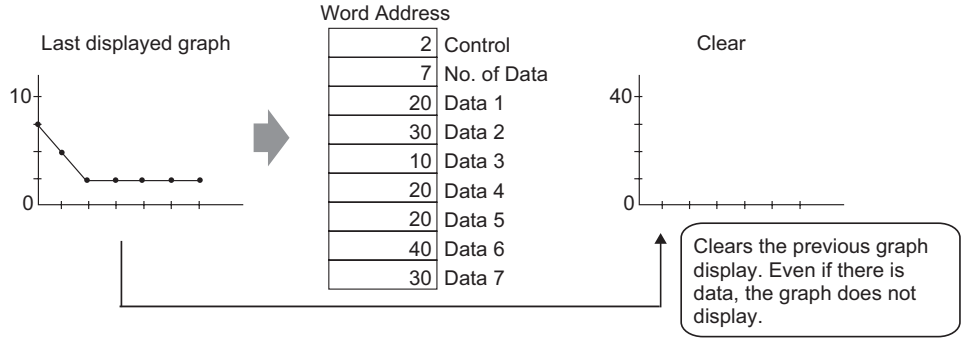
◆ Disp.

Store the number of data that will display on the graph in [Number of Channel Data Storage Address] and set the data channels after [Data Storage Start Address]. Then write "1" to the [Control Word Address] (turn ON bit 0).



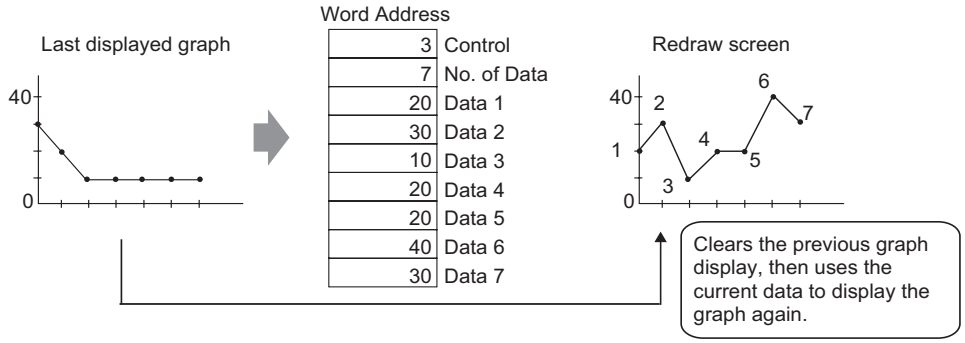
◆ Clear

Write "2" to the [Control Word Address] (turn ON bit 1). The displayed graph is cleared.



◆ Clear and Display

Write "3" to the [Control Word Address] (turn ON bit 0 and bit 1). After the displayed graph is cleared, the graph is redisplayed with the currently stored data.

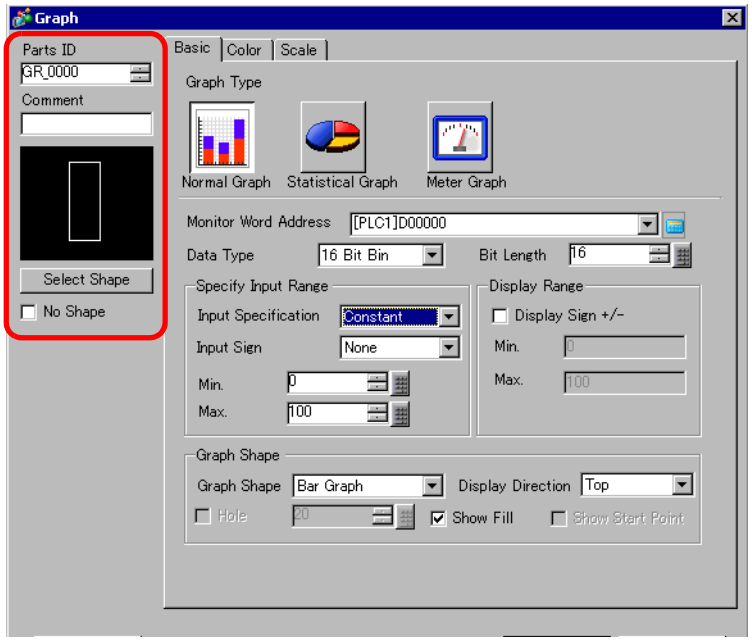


IMPORTANT

- To display the graph, delay the Control Address' display bit (bit 0) by a time longer than the communication cycle time or 50 ms (whichever is larger), after storing the data count and data values.
- Control address data is set to zero after the graph is displayed. To display the graph again, restore the data to the control address with a time longer than the communication cycle time or 50 ms (whichever is longer).
- The communication cycle time is stored in GP internal device special relay (LS2037).

17.7 Settings Guide

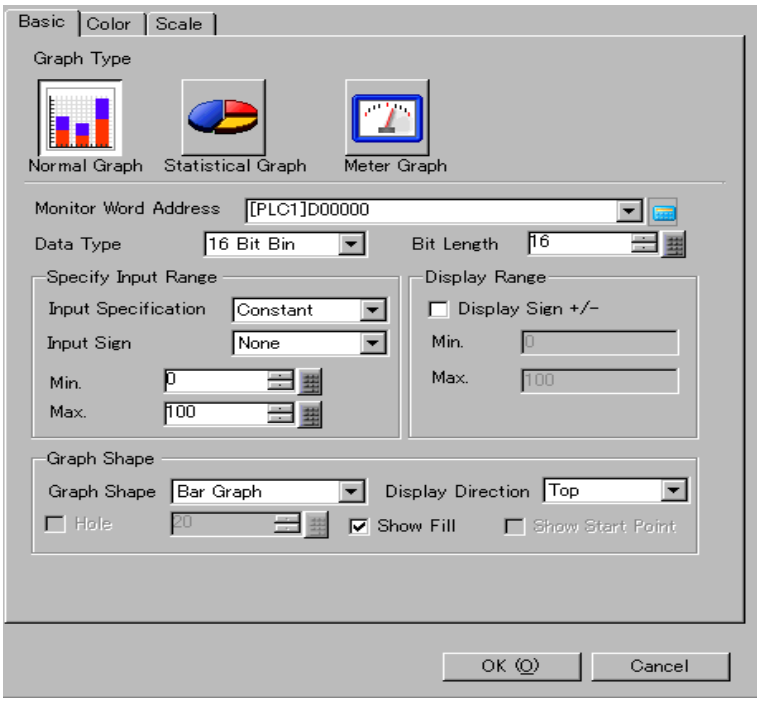
17.7.1 Graph Part Settings Guide

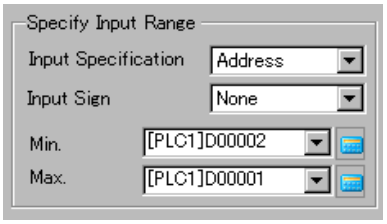


Setting	Description
Part ID	Placed parts are automatically assigned an ID number. Graph ID: GR_**** (4 digits) The letter portion is fixed. The number portion can be modified from 0000 to 9,999.
Comment	The comment for each Part can be up to 20 characters long.
Part Shape	Displays the shape that you chose for the part with [Select Shape].
Select Shape	Open the Select Shape dialog box to choose the Part shape.
No Shape	Select whether or not the part will be transparent with no shape. This can only be set when the [Graph Type] set to [Normal Graph] or [Statistical Graph].
Graph Type	Select the Graph type. • Normal Graph Displays a specified address' current value in the graph. ☞ "17.7.1 Graph Part Settings Guide ■ Normal Graph" (page 17-25) • Statistical Graph Statistics are taken from data stored in multiple consecutive addresses starting from a set address and displayed on the graph. ☞ "17.7.1 Graph Part Settings Guide ■ Statistical Graph" (page 17-34) • Meter Graph Displays a specified address' current value with a moving needle. ☞ "17.7.1 Graph Part Settings Guide ■ Meter Graph" (page 17-36)

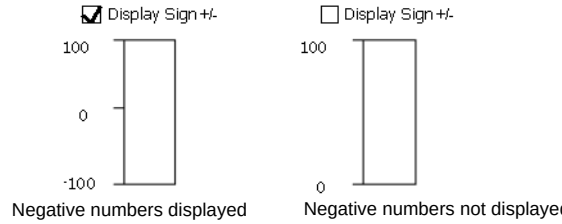
■ Normal Graph

◆ Basic Settings



Setting		Description
Monitor Word Address		The data stored in this Word Address is displayed in the graph.
Data Type		Select the graph display data type from [16 Bit Bin], [16 Bit BCD], [32 Bit Bin], [32 Bit BCD], or [32 Bit Float].
Bit Length		If [Data Type] is [16 Bit Bin], set the data's enabled bit length from 1 to 16.
Specify Input Range	Input Specification	Choose how the input range's max and min values is specified. • Constant Designate a set constant as the Min/Max. • Address Designate the address where the Min/Max values are stored. 

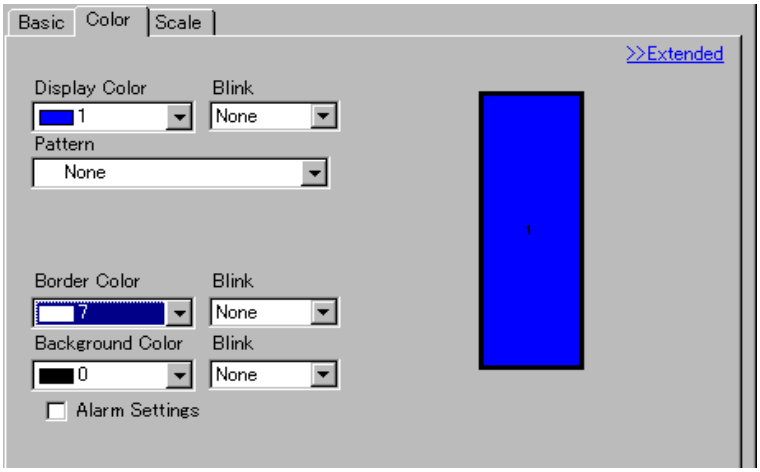
Continued

<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td rowspan="2">Specify Input Range</td><td>Input Sign</td><td>Set whether graph display data can handle negative numeric data. This can only be set when the [Data Type] is [16 Bit Bin] or [32 Bit Bin].
• None
Only positive numeric data will be handled.
• 2's Complement
Negative numbers are handled with 2's complement.
• MSB Sign
Negative numbers are handled with MSB sign.</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>Select the input range for graph display data. If [Input Specification] is [Constant], set a min value/max value. If [Address] is set, specify the Word Address where the min value/max value are stored.
Each [Data Type] and [Input Sign] has a different size range.
<table>
<tr><th>Data Type</th><th>Input Sign</th><th>Range</th></tr>
<tr><td rowspan="3">16 Bit Bin</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32,768 to 32,767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td rowspan="3">32 Bit Bin</td><td>None</td><td>0 to 4294967295</td></tr>
<tr><td>2's Complement</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>MSB Sign</td><td>–214748364 7 to 2147483647</td></tr>
<tr><td>16 Bit BCD</td><td>–</td><td>0 to 9999</td></tr>
<tr><td>32 Bit BCD</td><td>–</td><td>0 to 99999999</td></tr>
<tr><td>32 Bit Float</td><td>–</td><td>–9.9e^{16} to 9.9e^{16}</td></tr>
</table>
NOTE
• Word address data is convert to correspond to the input range, and is displayed on the graph as a value between 1 and 1,000.</td></tr>
<tr><td rowspan="2">Display Range</td><td>Display Sign +/-</td><td>Specify whether or not negative numbers can be displayed. This can be set when the [Data Type] is [Bin] or [Float].
e.g.: For a Bar Graph
 
</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>Shows the display range's Min and Max. If [Display Sign +/-] is set, the Min is displayed as "-100". If it is not set, the Min is displayed as "0". The Max is fixed as "100".</td></tr>
</table>

Continued

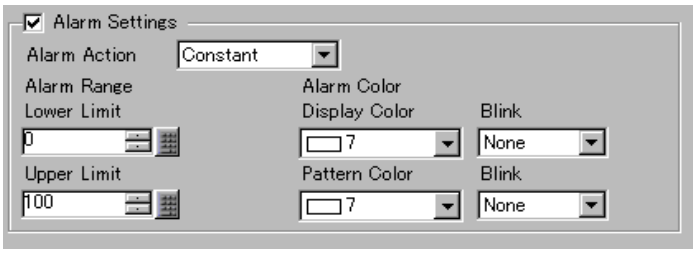
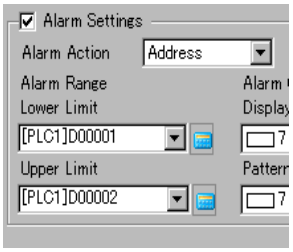
Setting		Description
Graph Type	Graph Shape	Choose the graph shape from [Bar Graph], [Circle Graph], [Semicircle Graph], and [Tank Graph].
	Display Direction	Set a direction for the graph display. If the [Graph Shape] is [Bar Graph] or [Tank Graph], choose from [Top], [Bottom], [Left], or [Right]. For [Circle Graph] and [Semicircle Graph], the starting point is fixed at the top and rotates clockwise.
	Hole	When the [Graph Shape] is [Circle Graph] or [Semicircle Graph], set the radius of the inner circle. **NOTE** • If you set the radius of the inner circle to less than 20 dots, the graph may not be properly displayed.
	Show Fill	Set whether or not to display a fill in the graph. If you do not want to display a fill, the graph is set to a Meter Graph.
	Show Start Point	If the [Graph Shape] is [Circle Graph] or [Semicircle Graph] and [Show Fill] is not set, select whether or not to display the start point.

◆ Color/Basic



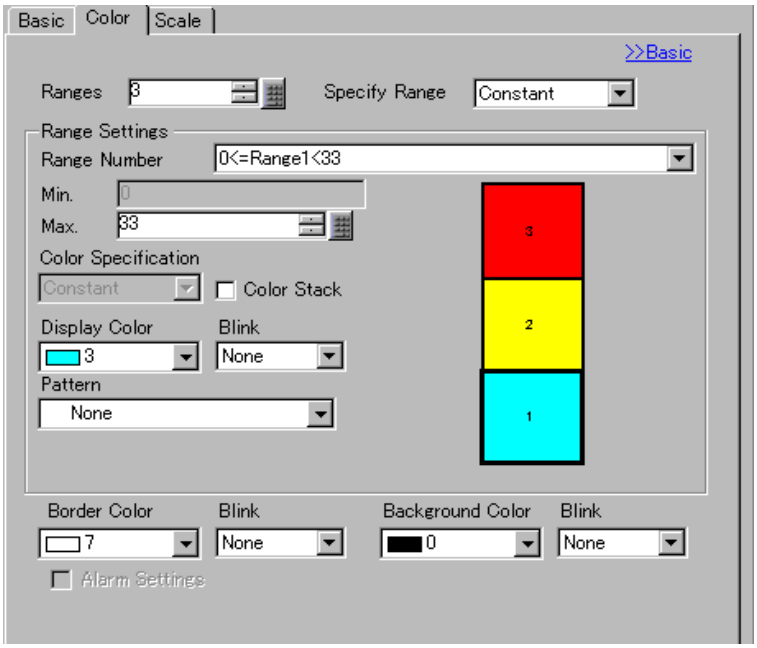
Setting	Description
Display Color	Select the display color for the graph. If [Show Fill] is not selected and a Meter Graph is used, the color set becomes the needle color.
Pattern	Select the graph pattern.
Pattern Color	Select the pattern color.
Border Color	Select a color for the graph border. **NOTE** • Some settings cannot be set depending on the part shape.
Background Color	Select the background color for the graph. **NOTE** • Some settings cannot be set depending on the part shape.
Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the [Display Color], [Pattern Color], [Border Color], and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Graph Display Sample	Displays a sample of how the graph appears with the [Display Color].

Continued

Setting		Description
Alarm		Set the graph's color changes when the value goes outside of the set range.  **NOTE** • This cannot be set when the detail settings' [Ranges] is 2 or more. • This cannot be set when detail settings' [Color Specification] is set to [Address].
	Alarm Action	Choose how the alarm range's upper and lower limit value are specified. • Constant Designate a set constant as the Min/Max value. • Address Designate the address where the Upper/Lower Limit values are stored. 
	Upper Limit/ Lower Limit	Set the upper and lower limits for the Alarm Range from 0 to 100 (with [Display Sign +/-] selected, from –100 to 100). If [Alarm Action] is [Constant], enter an upper/lower limit value. If [Address] is set, specify the Word Address where the upper/lower limit value are stored.
	Display Color	Select the graph display color for when the alarm is displayed.
	Pattern Color	Select the pattern color for when the alarm is displayed.
	Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the alarm display's [Display Color] and [Pattern Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

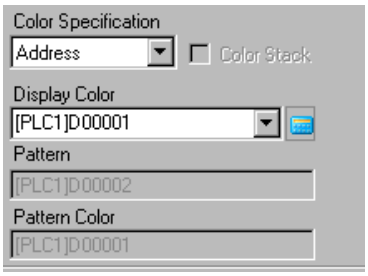
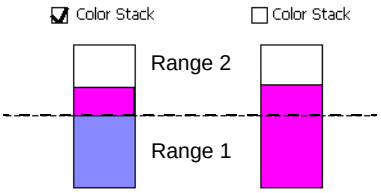
◆ Color/Extended

You can set the data range and have the Graph's color change according to that range.



Setting		Description
Ranges		Set the number of ranges the graph display is divided into, from 1 to 16.
Specify Range		Select the method to designate the Min. and Max. of each range if [Ranges] is more than 2. If [Ranges] is 1, this value is automatically set to [Constant]. • Constant Designate a set constant as the Min/Max. • Address Designate the address where the Min/Max values are stored.
	Range Number	Select the set range for Min. and Max and color within the range specified in [Ranges]. You can select by clicking the range you want to specify on the graph display sample. Display as "(Min.) <= Range No. <= (Max.)".
	Min. Value/ Max. Value	Set the Min. and Max. value range selected in [Range Number] between 0 to 100 percentage value. (If the [Display Sign +/-] is specified, between -100 to 100.) If [Specify Range] is specified as [Constant Input], input the Min. value and Max. value. If [Specify Range] is specified as [Address], specify the word address storing the Min. value and Max. value. Default sets the Min. and Max. values to equalize each range.

Continued

Setting		Description
Range Settings	Color Specification	Select the designation method of the display color and pattern for the range selected with [Range Number]. If the [Ranges] is 2 or greater or [Color Stack] is set, this will be fixed as [Direct]. • Constant Individually designate the display color and pattern. • Address Set the address which will store the color code and pattern code.  ☞ " ◆ Changing the Graph Color from a Device/PLC" (page 17-32)
	Color Stack	Specify whether or not each range is color-coded when displayed. This can only be set if the [Ranges] is "2" or more. Ranges = 2  Range 1 and Range 2 are displayed with a unique color. Both Range 1 and Range 2 are displayed with Range 2's color.

◆ Changing the Graph Color from a Device/PLC

In the address set in [Display Color], the lower 16 bits store the color code, and the upper 16 bits store the pattern color.
In the next address after the [Display Color], the lower 16 bits store the pattern code.

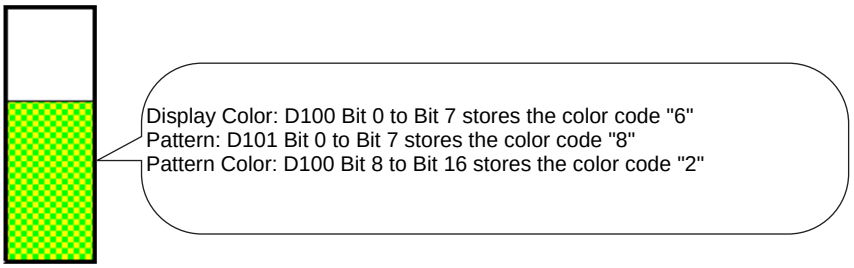
	15	8 7	0
Designated Display Color Address	Pattern Color	Display Color	
+1	(0 Fixed)	Pattern	

- Color Code
  The color code is the number displayed on the color palette.
  ☞ "9.5.1 Setting Colors ■ Defining Colors" (page 9-35)

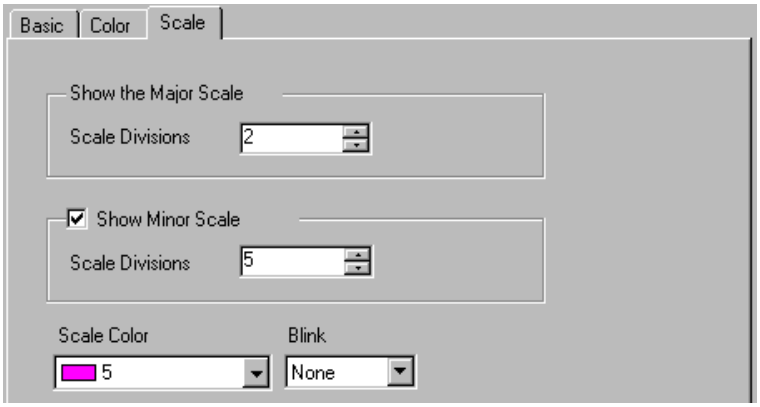
- Pattern Code

Stored Value	0	1	2	3	4	5	6	7	8
Pattern									

For example, Display Color: D100



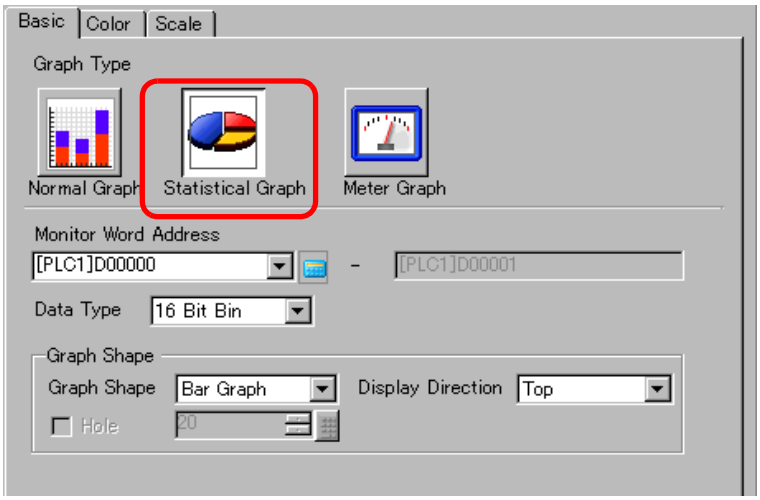
◆ Scale



Setting		Description
Show the Major Scale		Shows the Major Scale.
	Scale Divisions	Set the number of scale divisions to be displayed from 1 to 100.
Show Minor Scale		Designate whether or not to display a small scale to further divides the large scale.
	Scale Divisions	Set the number of scale divisions to be displayed from 2 to 100.
Scale Color		Select the display color for the scales.
Blink		Select whether or not the [Scale Color] blinks and the blink speed. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

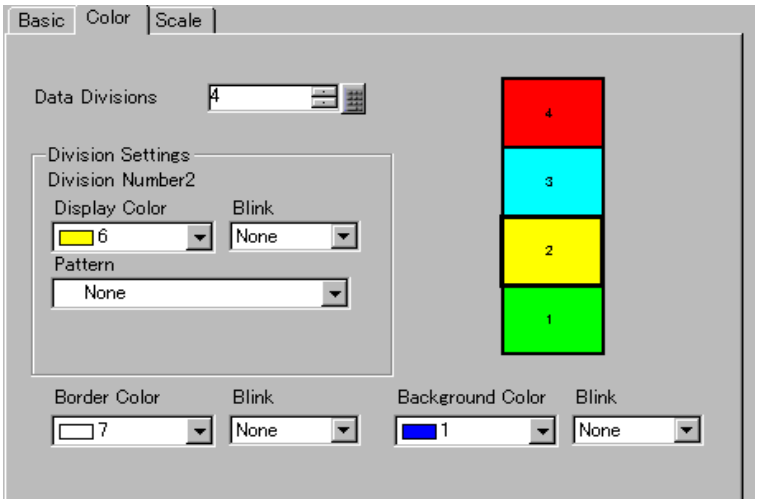
■ Statistical Graph

◆ Basic Settings



Setting	Description
Monitor Word Address	Select the top Word Address from where the statistical data is taken. Addresses from this address to the portion designated in the [Color] tab's [Data Divisions] are automatically allotted and that address range is displayed.
Data Type	Select the graph display data type from [16 Bit Bin], [16 Bit BCD], [32 Bit Bin], [32 Bit BCD], or [32 Bit Float]. **NOTE** • Different data formats can not be used within the same Statistical Graph.
Graph Shape	Choose the Graph shape from [Bar Graph] or [Circle Graph].
Display Direction	Set a direction for the graph display. If the [Graph Shape] is [Bar Graph], you can choose from [Top], [Bottom], [Left], or [Right]. **NOTE** • For [Circle Graph], the starting point is fixed at the top and rotates clockwise. If you want to change the starting point, rotate the part.
Hole	When the [Graph Shape] is [Circle Graph], set the radius of the inner circle. **NOTE** • If you set the radius of the inner circle to less than 20 dots, the graph may not be properly displayed.

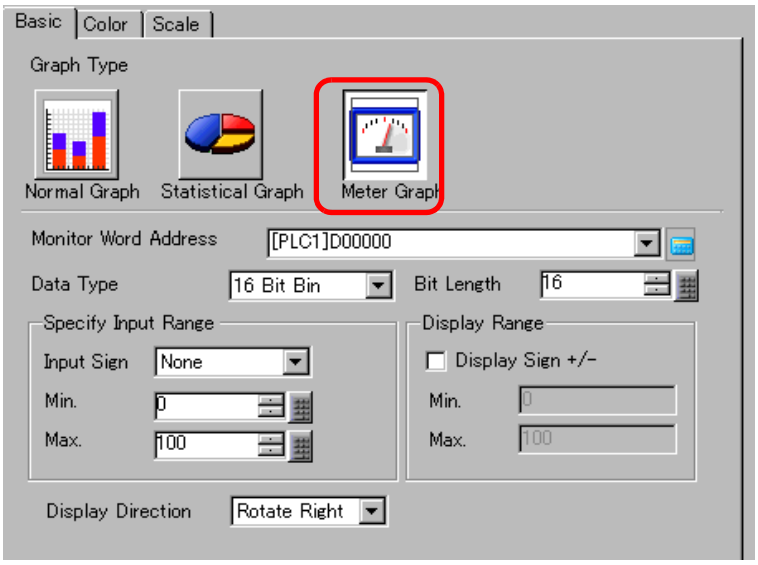
◆ Color



Setting		Description
Data Divisions		Set the number of sections for displaying your data on the graph from 1 to 16. Statistics are taken from consecutive address data starting from the address set in [Monitor Address] for the set number of sections.
Division Settings	Division Number	Displays the division number selected in the Graph Display Sample. The Division Number depends on the Display Direction, and is assigned automatically in order from the top address.
	Display Color	Set a color for each division by clicking each numbered section in the graph displayed on the right side.
	Pattern	Select the pattern for each division from among 9 types.
	Pattern Color	Select a pattern color for each division.
Border Color		Select a color for the graph border. **NOTE** • Some settings cannot be set depending on the part shape.
Background Color		Select the background color for the graph. This color will be displayed when all data is 0. **NOTE** • Some settings cannot be set depending on the part shape.
Blink		Select whether or not the Lamp blinks and the blink speed. You can choose different blink settings for the [Display Color], [Pattern Color], [Border Color], and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Graph Display Sample		Displays a sample of how the graph appears with the [Display Color].

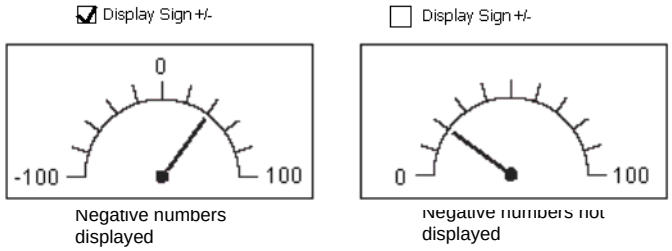
■ Meter Graph

◆ Basic Settings



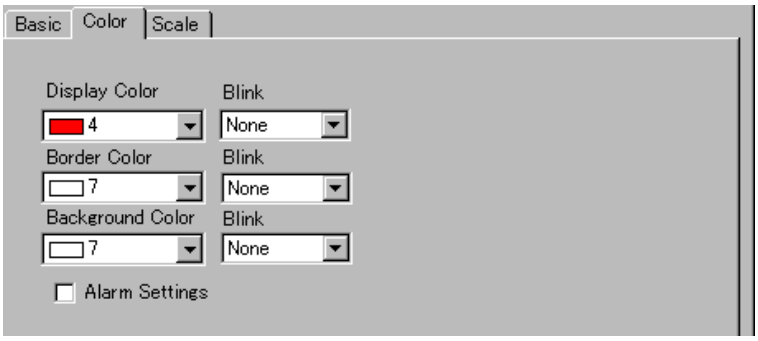
Setting		Description
Monitor Word Address		The data stored in this Word Address appears in the Meter Graph.
Data Type		Select the graph display data type from [16 Bit Bin], [16 Bit BCD], [32 Bit Bin], [32 Bit BCD], or [32 Bit Float].
Bit Length		If [Data Type] is [16 Bit Bin], set the data's enabled bit length from 1 to 16.
Specify Input Range	Input Sign	Set whether graph display data can handle negative numeric data. This can only be set when the [Data Type] is [16 Bit Bin] or [32 Bit Bin]. • None Only positive numeric data will be handled. • 2's Complement Negative numbers are handled with 2's complement. • MSB Sign Negative numbers are handled with MSB sign.

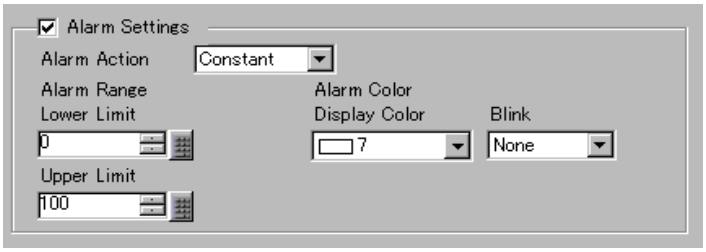
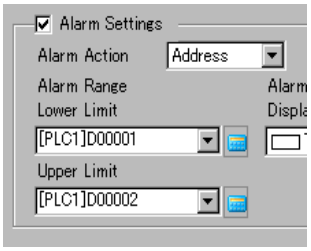
Continued

<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td>Specify Input Range</td><td>Min. Value/ Max. Value</td><td>Select the input range for graph display data. Each [Data Type] and [Input Sign] has a different size range.
<table>
<tr><td>Data Type</td><td>Input Sign</td><td>Range</td></tr>
<tr><td rowspan="3">16 Bit Bin</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32,768 to 32,767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td rowspan="3">32 Bit Bin</td><td>None</td><td>0 to 4294967295</td></tr>
<tr><td>2's Complement</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>MSB Sign</td><td>–2147483647 to 2147483647</td></tr>
<tr><td>16 Bit BCD</td><td>–</td><td>0 to 9999</td></tr>
<tr><td>32 Bit BCD</td><td>–</td><td>0 to 99999999</td></tr>
<tr><td>32 Bit Float</td><td>–</td><td>–9.9e16 to 9.9e16</td></tr>
</table>
NOTE
• Word address data is convert to correspond to the input range, and is displayed on the graph as a value between 1 and 1,000.</td></tr>
<tr><td rowspan="3">Display Range</td><td>Display Sign +/-</td><td>Set if the graph should display positive or negative numeric data. This can only be set when the [Data Type] is [16 Bit Bin], [32 Bit Bin], or [32 Bit Float].
 

Negative numbers displayed
Negative numbers not displayed</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>Shows the display range's Min and Max. If [Display Sign +/-] is set, the Min is displayed as "-100". If it is not set, the Min is displayed as "0". The Max is fixed as "100".</td></tr>
<tr><td>Display Direction</td><td>Select the graph display direction from [Rotate Right] or [Rotate Left].</td></tr>
</table>

◆ Color



Setting		Description
Display Color		Select the color for the needle.
Border Color		Select a color for the graph border.
Background Color		Select the background color for the graph.
Blink		Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the [Display Color], [Border Color], and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Alarm		Set whether or not the needle color changes when the value moves from one range to another range. 
Alarm Range	Alarm Action	Choose how the alarm range's upper and lower limit value are specified. • Constant Designate a set constant as the Min/Max value. • Address Designate the address where the Upper/Lower Limit values are stored. 

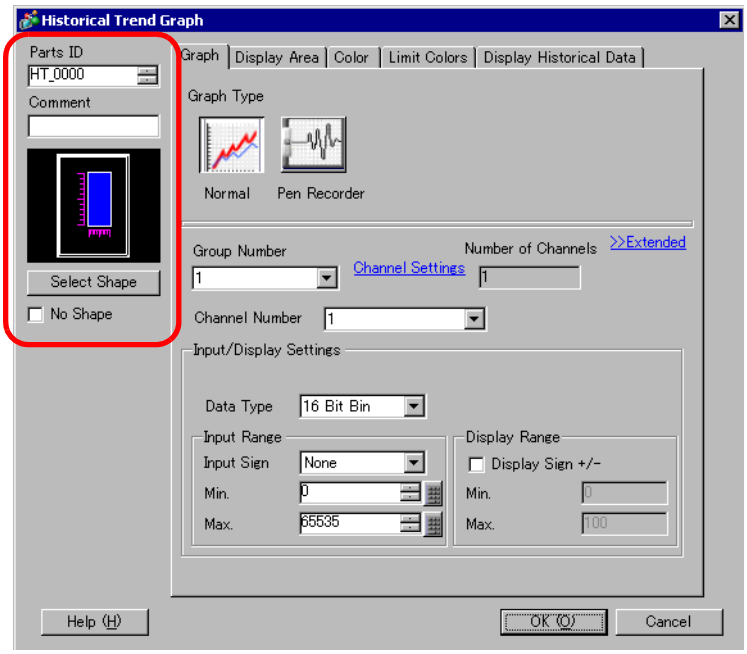
Continued

Setting		Description
Alarm Range	Upper Limit/ Lower Limit	Set the upper and lower limits for the Alarm Range from 0 to 100 (with [Display Sign +/-] selected, from -100 to 100). If [Alarm Action] is [Constant], enter an upper/lower limit value. If [Address] is set, specify the Word Address where the upper/lower limit value is stored.
	Display Color	Select the needle color displaying the alarm.
	Blink	Select whether or not the [Display Color] blinks when the alarm appears and the blink speed. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

17.7.2 Historical Trend Graph Settings Guide

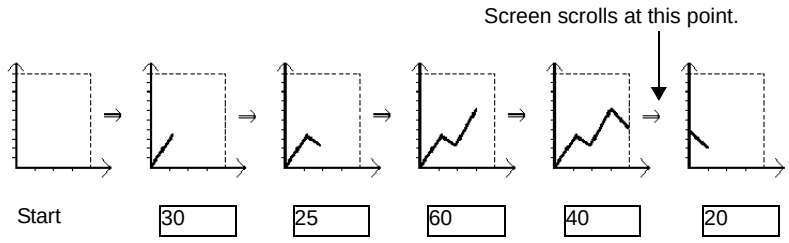
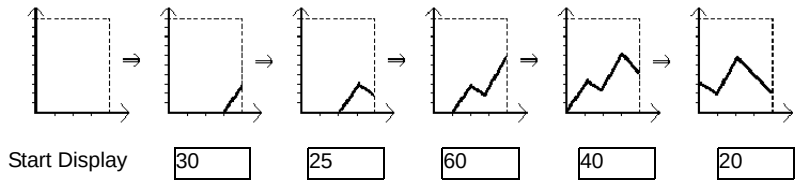
Sampled data taken at regular or random intervals can be displayed on a Line Chart.

☞ "24.8.1 Common [Sampling] Settings Guide" (page 24-37)



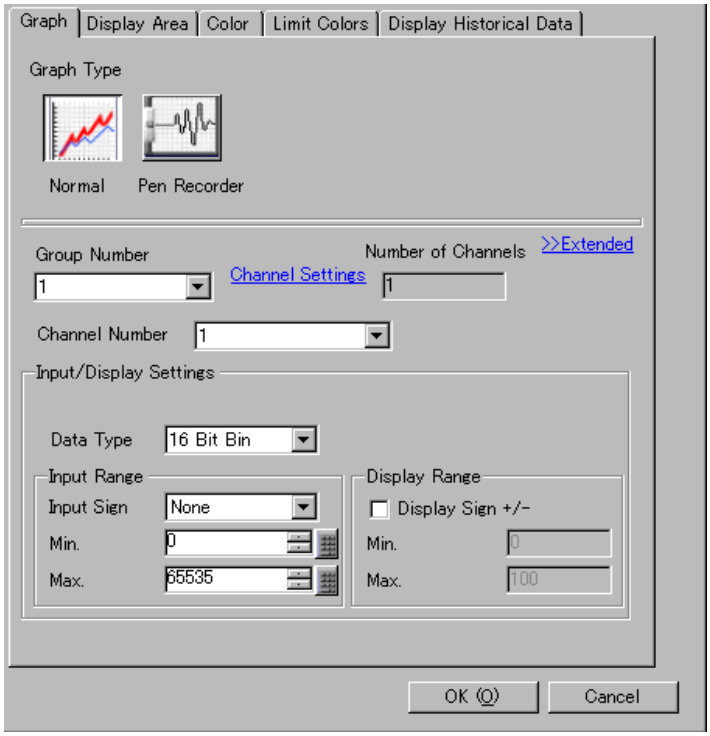
Setting	Description
Part ID	Parts in the window are automatically assigned an ID number.Historical Graph ID: HT_**** (4 digits) The letter portion is fixed. The number portion can be modified from 0000 to 9,999.
Comment	The comment for each Part can be up to 20 characters long.
Part Shape	Displays the shape that you chose for the part with [Select Shape].
Select Shape	Open the Select Shape dialog box to choose the Part shape.
No Shape	Select whether or not the part will be transparent with no shape.

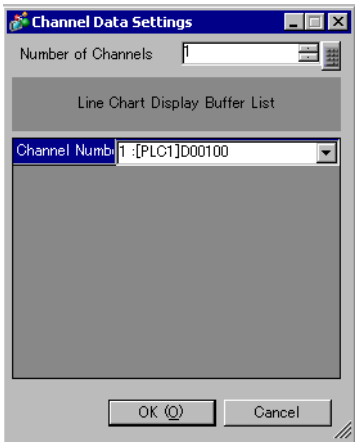
Continued

Setting	Description
Graph Type	Select the line shape from [Normal] or [Pen Recorder]. • Normal The specified word address data changes are displayed over time in a Line Chart. Data at the start time is "0". As each sampling period elapses, the latest data is added in the specified [Display Direction]. When the graph line reaches the limit of the Display Area, the graph is shifted in the display direction for the number of units set in [Samples to Scroll]. e.g.: Display Direction: Bottom Left→Rotate Right, Data Samples: 4, Samples to Scroll: 4  • Pen Recorder The specified word address data changes are displayed over time in a Line Chart. Data at the start time is "0". The latest data always appears at the edge of the Display Area. Each time sampling occurs, the whole graph scrolls 1 spot in the set [Display Direction]. e.g.: Display Direction: Bottom Left→Rotate Right, Data Samples: 4 

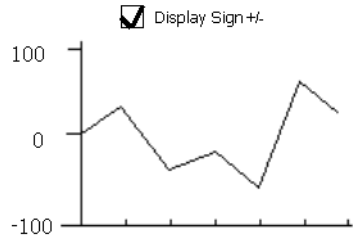
■ Normal/Pen Recorder

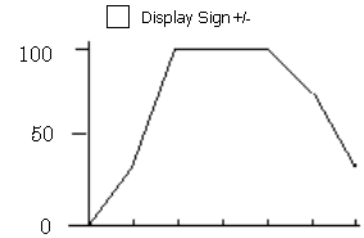
◆ Graph/Basic



Setting	Description
Sampling Group	The sampling group number from 1 to 64 of the graph to display.
Channel Settings	Open the [Channel Data Settings] dialog box appears. From among the designated sampling group, set the address and number of addresses (Number of Channels) of the line you want to display. The Number of Channels can be from 0 to 20. 
Number of Channels	The set Number of Channels appears in the [Channel Data Settings] dialog box. The number of channels is displayed as lines on the Graph Display Area.

Continued

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Channel</td><td>Select the Channel to process Input/Display.</td></tr>
<tr><td>Data Type</td><td>Select the graph display data type from [16 Bit Bin], [16 Bit BCD], [32 Bit Bin], [32 Bit BCD], or [32 Bit Float].</td></tr>
<tr><td>Input Sign</td><td>Set whether graph display data can handle negative numeric data. This can only be set when the [Data Type] is [16 Bit Bin] or [32 Bit Bin].
• None
Only positive numeric data will be handled.
• 2's Complement
Negative numbers are handled with 2's complement.
• MSB Sign
Negative numbers are handled with MSB sign.</td></tr>
<tr><td>Min. Value/Max. Value</td><td>Select the input range for Line Chart display data.
Each [Data Type] and [Input Sign] has a different size range.
<table>
<tr><th>Data Type</th><th>Input Sign</th><th>Range</th></tr>
<tr><td rowspan="3">16 Bit Bin</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32,768 to 32,767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td rowspan="3">32 Bit Bin</td><td>None</td><td>0 to 4294967295</td></tr>
<tr><td>2's Complement</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>MSB Sign</td><td>–2147483647 to 2147483647</td></tr>
<tr><td>16 Bit BCD</td><td>–</td><td>0 to 9999</td></tr>
<tr><td>32 Bit BCD</td><td>–</td><td>0 to 99999999</td></tr>
<tr><td>32 Bit Float</td><td>–</td><td>$-9.9e^{16}$ to $9.9e^{16}$</td></tr>
</table>
NOTE
• Data collected from the sampling function corresponds to the input range and is displayed on the graph as a value between 1 and 1,000.</td></tr>
<tr><td>Display Sign +/-</td><td>Specify whether or not negative numbers are displayed. This can only be set when the [Data Type] is [Bin].
When the [Data Type] is [BCD], [Display Sign +/-] is not set. For [Float], [Display Sign +/-] is set.
 

Negative numbers displayed
 

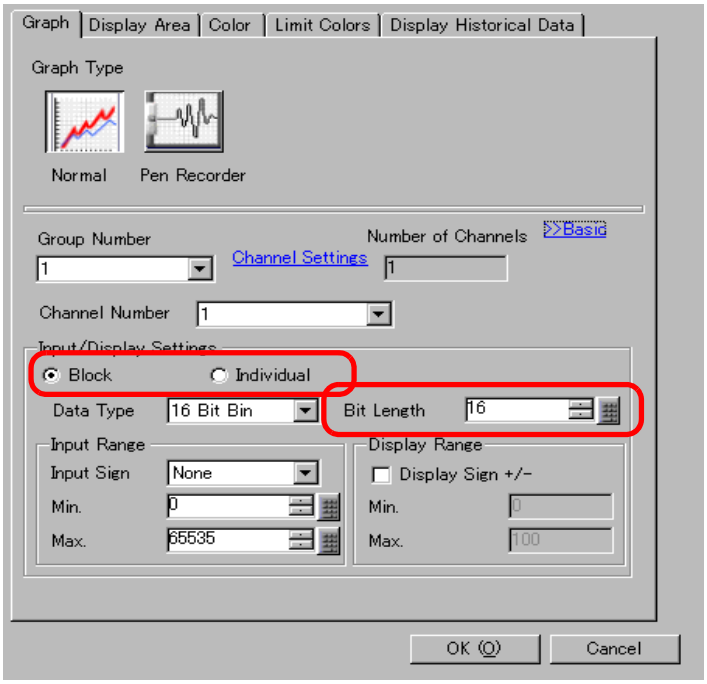
Negative numbers not displayed</td></tr>
</table>

Continued

Setting	Description
Min. Value/Max. Value	Shows the Min and Max for data displayed on the Trend Graph. If [Display Sign +/-] is set, the Min value is "-100". If it is not set, the Min is "0". The Max. Value is "100".

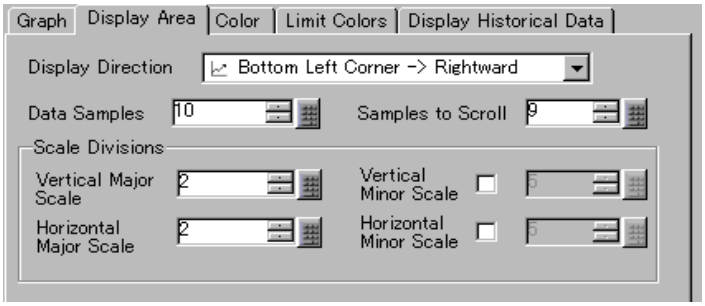
◆ Graph/Extended

You can set Input/Display for each channel.



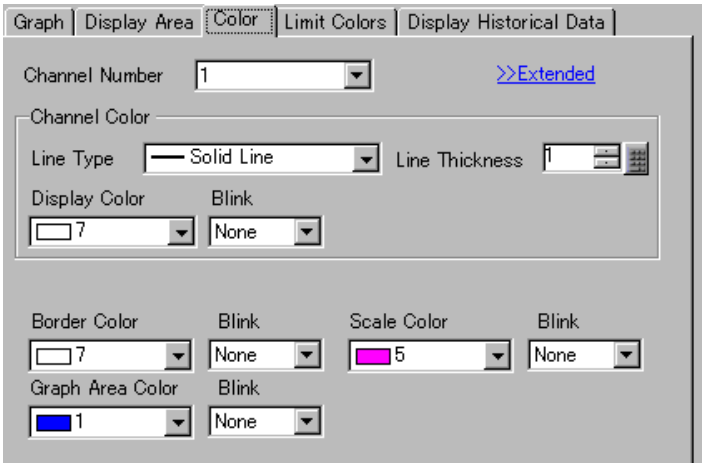
Setting	Description
Block/Individual	Define the [Input/Display] for all the channels as a whole or separately.
Bit Length	If [Data Type] is [16 Bit Bin], set the data's enabled bit length from 1 to 16.

◆ Display Area



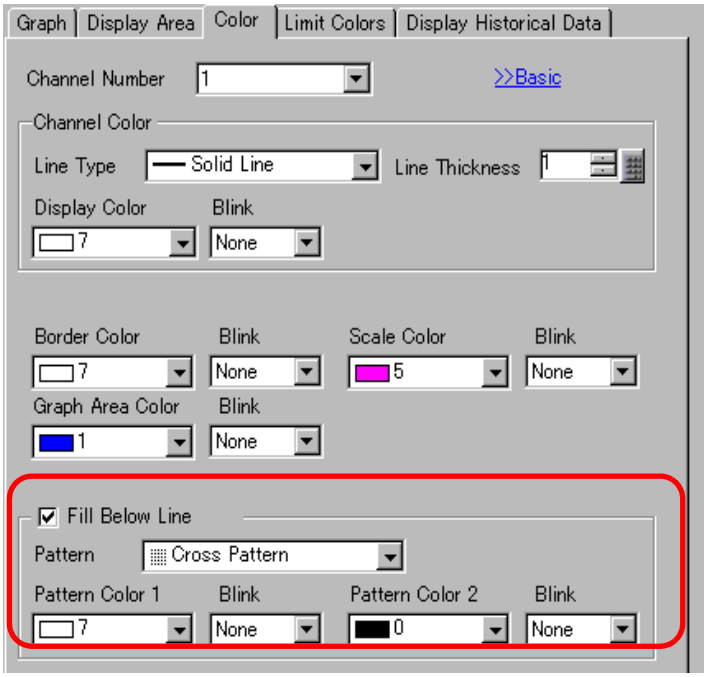
Setting	Description
Display Direction	Select the graph display direction. 
Data Samples	Set the number of data samples to be displayed on a single line. The range depends on the set model's Display Number of Dots. Display Number of Dots / Data Samples 320 x 240 dots (QVGA) / 0 to 319 640 x 480 dots (VGA) / 0 to 639 800 x 600 dots (SVGA) / 0 to 799 1024 x 768 dots (XGA) / 0 to 799 **NOTE** • You can verify the Display Number of Dots with [System Settings] - [Display]. • When [Fill Below Line] is set, the maximum number of [Data Samples] is 97.
Samples to Scroll	Select the number of data to remove when the graph fills the Display Area. This can only be set when the Graph Type is [Normal]. Set this within the range designated by [Data Samples].
Vertical Major Scale/ Minor Scale	Set whether or not to display the major and minor scale on the Line Chart's Y-axis. If so, choose the number of divisions. The number of divisions can be set from 1 to 638 for Major Scale, and from 2 to 638 for Minor Scale.
Horizontal Major Scale/Minor Scale	Set whether or not to display the major and minor scale on the Line Chart's X-axis. If so, choose the number of divisions. The number of divisions can be set from 1 to 638 for Major Scale, and from 2 to 638 for Minor Scale.

◆ Color/Basic



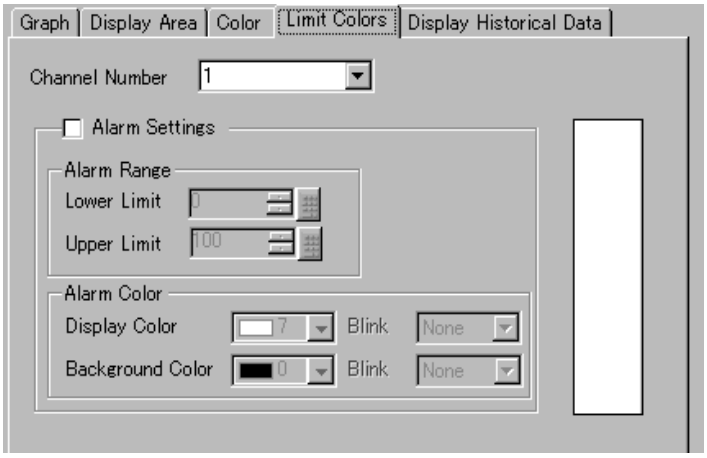
Setting	Description
Channel	Select the Channel to configure.
Line Type	Select the type of line from among 5 kinds: Solid Line, Dashed Line, Dash Line, Chain Line, and Two-Dot Chain Line. **NOTE** • When the data display spacing is less than 16 dots, line types other than the solid line may not display correctly.
Line Thickness	Set the line thickness from 1 to 2.
Display Color	Set the line color.
Background Color	Set the line's background color.
Border Color	Set the border color of the Historical Trend Graph. **NOTE** • Some settings cannot be set depending on the part shape.
Scale Color	Select the graph's scale color. **NOTE** • Some settings cannot be set depending on the part shape.
Graph Area Color	Select a color for the Graph Display Area.
Blink	Select whether the Part blinks and the blink speed. You can choose different blink settings for [Display Color], [Background Color], [Border Color], [Scale Color], and [Graph Area Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

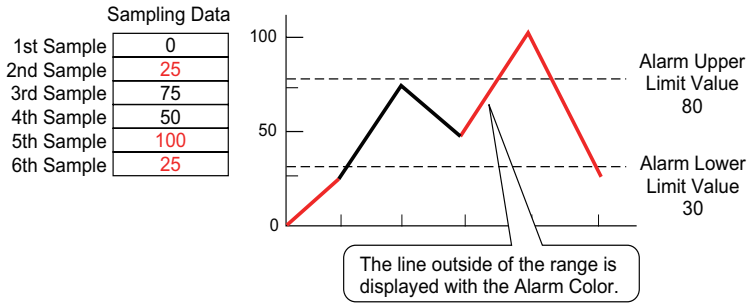
◆ Color/Extended



Setting	Description
Fill Below Line	Select whether or not to fill in the area under the Line Chart. This can only be set when [Number of Channels] is 1. **NOTE** • This can not be set when alarms are being used.
Pattern	Select a pattern for filling the area below the graph line.
Pattern Color 1	Select the pattern color.
Pattern Color 2	Set the pattern's background color.
Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for [Pattern Color 1] and [Pattern Color 2]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

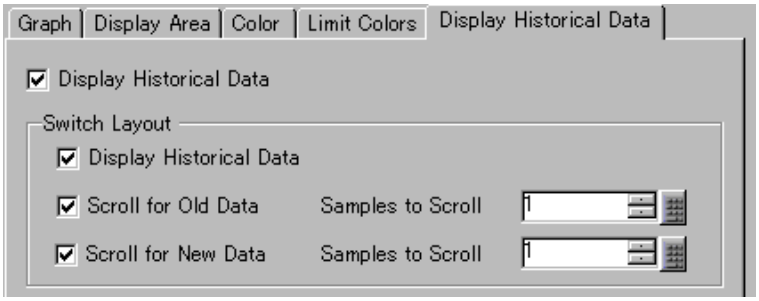
◆ Alarm



Setting	Description
Channel	Select the Channel to configure.
Alarm	If set, the displayed color changes when the value moves outside of a designated range.
Upper Limit/Lower Limit	Set the Alarm Display range from 0 to 100 (with [Display Sign +/-] selected, from -100 to 100).
Display Color	Select the Alarm Display color. The Alarm Display color appears as follows. For example, Upper Limit = 80, Lower Limit = 30 
Background Color	Select the background color for displaying the alarm.
Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the alarm colors [Display Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Color Range Display Bar	Displays a sample of how the color in each range appears. Any alarm ranges specified in [Alarm] are also displayed.

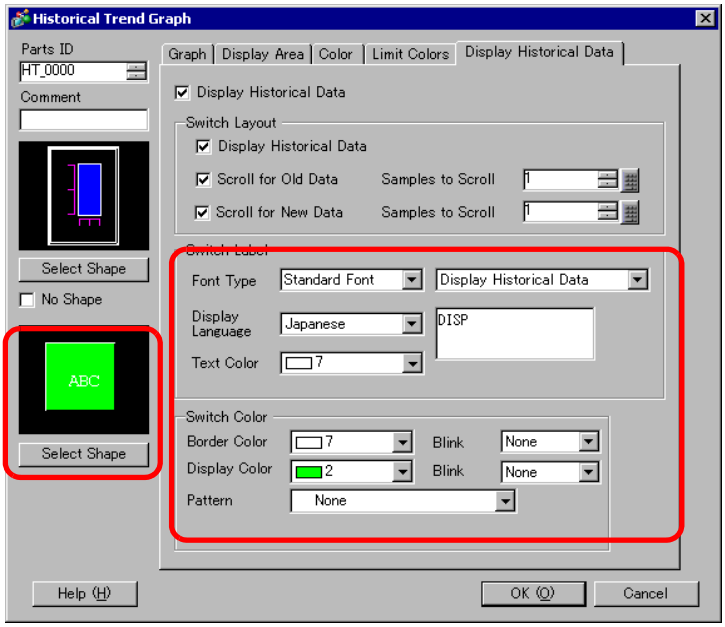
◆ Display Historical Data

Configure settings for displaying Historical Data.



Setting			Description
Display Historical Data			Set whether or not to display historical data.
Switch Layout	Display Historical Data		Set whether or not to place a switch on the screen to display historical data. Pressing the switch displays the Display Historical Data mode. You can scroll back to previous data on the display. Pressing the switch again cancels Display Historical Data mode and the current values are displayed. Only one switch of this kind can be placed on a Graph using Display Historical Data.
	Scroll for Old Data Samples to Scroll		Set whether or not to place a switch to scroll backward from current to historical data. Multiple switches of this kind can be placed on a Graph.
		Samples to Scroll	Set the no. of samples to scroll. The value can be from 1 to 65535.
	Scroll for New Data		Set whether or not to place a switch to scroll forward from historical data to the most current data. Multiple switches of this kind can be placed on a Graph.
		Samples to Scroll	Set the no. of samples to scroll. The value can be from 1 to 65535.

If a switch for Display Historical Data is created, you can set the color and labels for these switches.

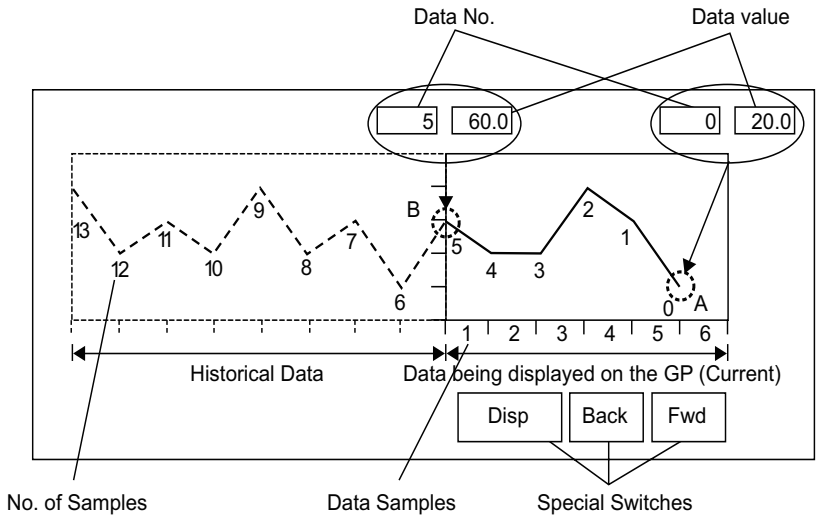


Setting		Description
Switch Label	Font Type	Set the font type for the switch label from [Standard Font] or [Stroke Font].
	Display Language	Select the language that to display on the switch label. Choose from [ASCII], [Japanese], [Chinese (Traditional)], [Chinese (Simplified)], [Korean], [Cyrillic], or [Thai].
	Select Switch	Select the Switch whose label you want to set.
	Label	Enter the text to display on the switch.
	Text Color	Set a color for the label text.
	Blink	Select whether or not the [Text Color] blinks and the blink speed.
Switch Color	Border Color	Set the border color for the switch.
	Display Color	Set the color for the switch.
	Pattern	Set the pattern for the switch.
	Pattern Color	Set the pattern color for the switch.
	Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the [Border Color], [Display Color], and [Pattern Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Select Shape		Open the Select Shape dialog box to choose the switch shape.
Status Display		Displays the shape and status of the switch.

■ Display Historical Data

To execute historical data display on the GP display, you need the historical data operation switch. You can specify the location of the switch on the historical trend graph or use the switch lamp parts [Special Switch].
When using a Historical Trend Graph featuring the Display Historical Data function, the excluded dotted-line portion is displayed on the GP screen. By touching the Display Historical Data Switch, past data stored in the GP can be viewed on the graph display.

For example, Number of Samples Taken: 14, Data Samples (shown): 6



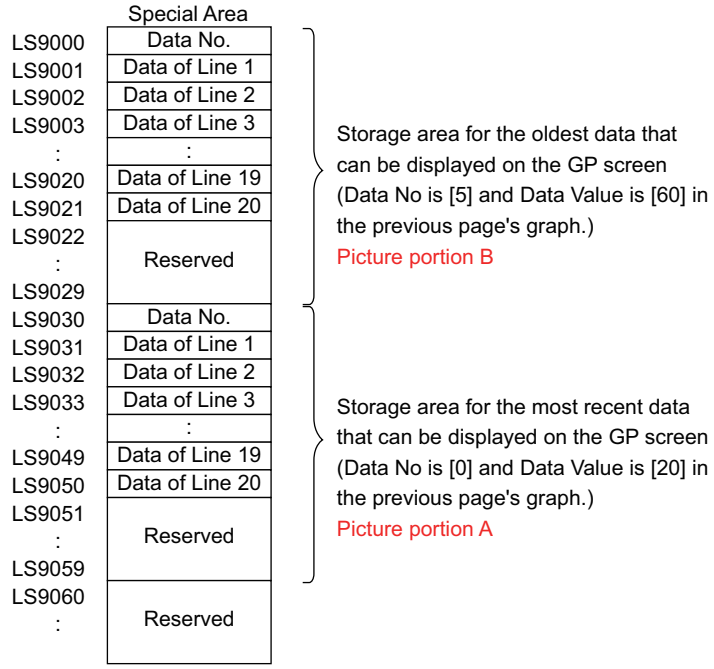
◆ Data Samples

Data samples consist of data numbers and data values. Data Numbers are assigned to data values, with the most recent data value designated as Data Number 0. The data values are stored by data number and are in reverse chronological order, starting with the most recent numbered as "0", followed by "1", "2", "3", etc.

When a Historical Trend Graph with the Display Historical Data function is displayed on the GP, the most recent data samples (picture portion A) and the historical data samples (picture portion B) are automatically stored in the Special Relay Area (LS9000~) in the GP Internal Device. Data numbers are stored in the LS area as binary numbers in the range of 0 to 65,237. The data type is Bin.

To understand the data sampling in the drawing above, the data numbers and data values of portion A and B are displayed below.

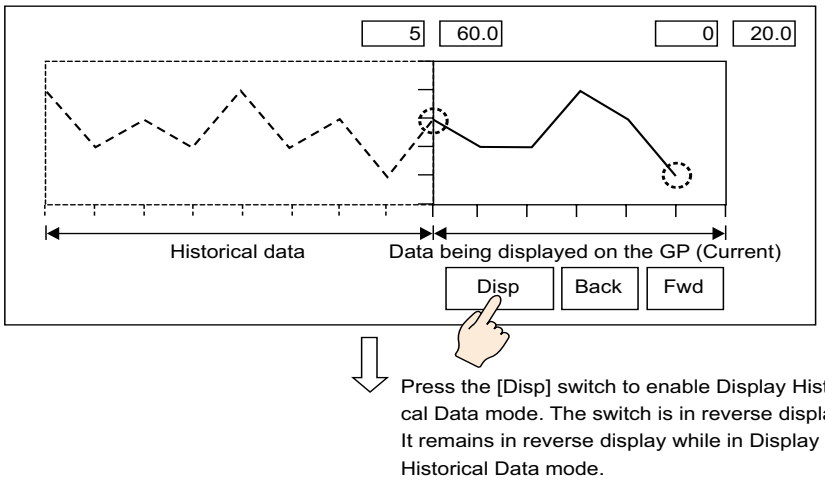
The data samples and data values are stored even if a graph is not in Display Historical Data mode.



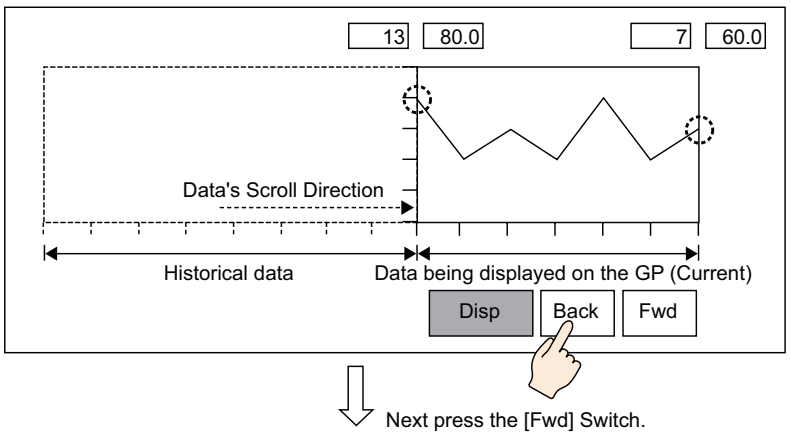
IMPORTANT

- When a screen change occurs, all data samples stored in the Special Area (LS9000+) of the GP internal device are cleared to 0.
- Each inputted data is converted to the display value and saved as a ratio of 1000 (from 0 to 1000). When [Display Sign +/-] is selected, the display value range is -1000 to 1000.
- To display the data value "200" as "20.0" in a Data Display, set the [Decimal Places] to "1".

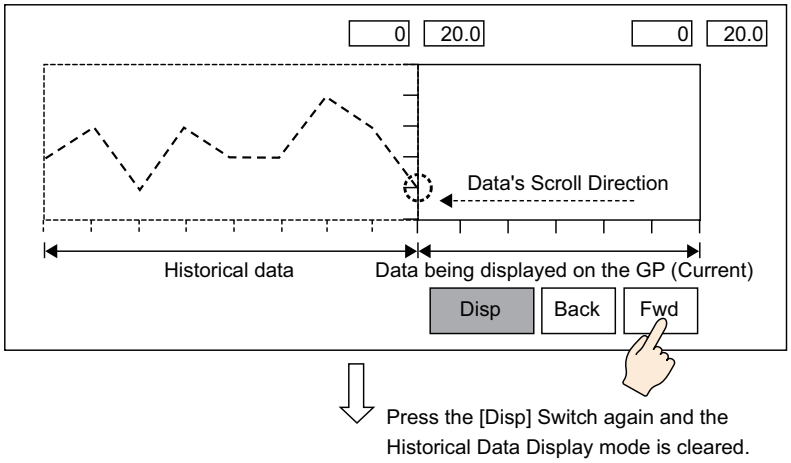
◆ Display Historical Data Examples



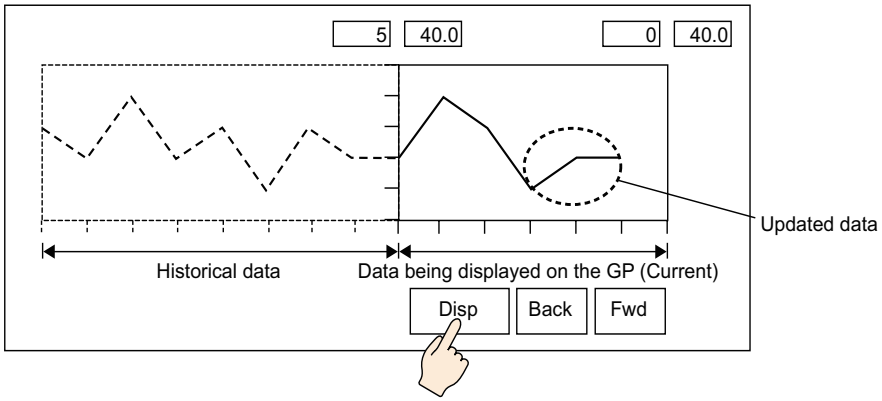
Touching the "Back" switch scrolls the data backward by the predetermined scroll number and displays previous data records.
Touching the "Back" switch while the historical data samples are being retrieved from backup SRAM causes the buzzer to sound three times. The data cannot be scrolled further until the data samples are retrieved.



Touching the "Fwd" switch scrolls the data forwards the recent data samples by the predetermined scroll number.
When you scroll to the most recent data samples after changing to Display Historical Data mode, the graph will appear blank. Touching the [FWD] switch again causes the buzzer to sound three times, indicating data cannot be scrolled further.

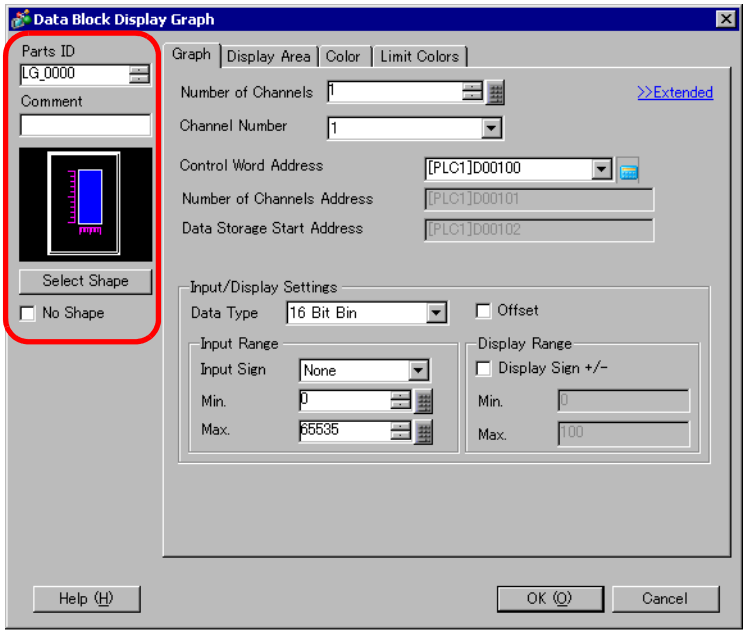


Data samples are still taken in Display Historical Mode.



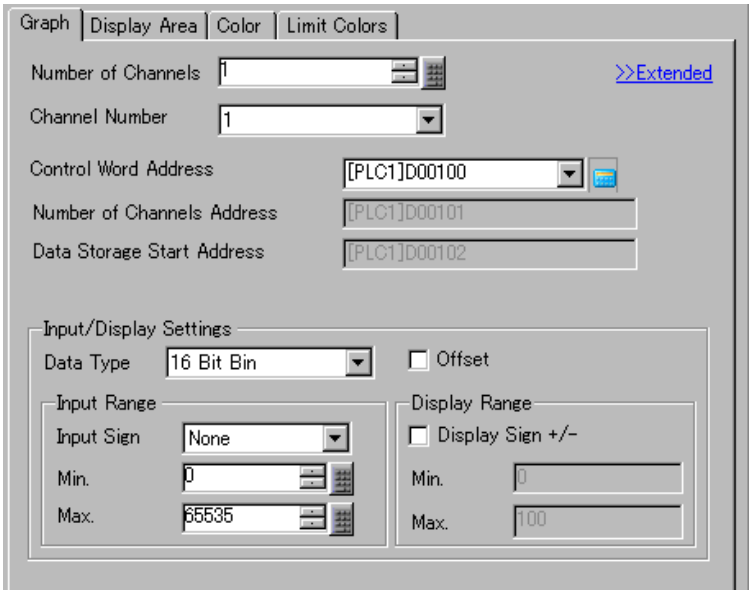
17.7.3 Data Block Display Graph Settings Guide

Displays the current values of multiple addresses on a single graph.



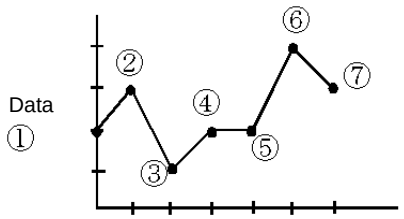
Setting	Description
Part ID	Placed parts are automatically assigned an ID number. Data Block Display ID: LG_**** (4 digits) The letter portion is fixed. The number portion can be modified from 0000 to 9,999.
Comment	The comment for each Part can be up to 20 characters long.
Part Shape	Displays the shape that you chose for the part with [Select Shape].
Select Shape	Open the Select Shape dialog box to choose the Part shape.
No Shape	Select whether or not the part will be transparent with no shape.

■ Graph/Basic



Setting	Description
Number of Channels	Select the number of channels to display on the graph. The value can be from 1 to 20.
Channel	Choose the channel (data line) to configure. Change to the numbers of the channels set in [Number of Channels] and set input/display settings.
Control Word Address	Set the address that controls the displaying/clearing of the graph. This address' bit 0 and bit 1 control when the graph is displayed and cleared. • When "1" is stored in the address (bit 0 is ON), the graph will be displayed. **Control** 15 03 02 01 00 • When "2" is stored in the address (bit 1 is ON), the displayed graph will be cleared. **Control** 15 03 02 01 00 • When "3" is stored in the address (bit 0 and bit 1 are ON), the displayed graph will temporarily be cleared and then displayed again. **Control** 15 03 02 01 00 This can be set to either a device/PLC address or GP internal device address. ☞ "17.6.1 Introduction" (page 17-19)

Continued

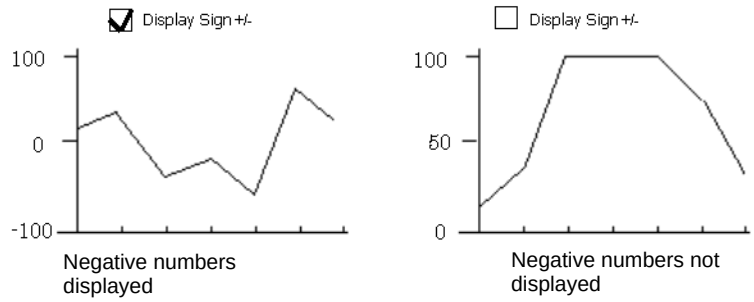
Setting		Description
Number of Channel Data Storage Address		Displays the address at [Control Word Address] + 1. This address stores the number of data lines displayed on the graph. On the graph, this will become the number of data samples. For example, Number of data entries: 7 
Data Storage Start Address/Offset Value Storage Address		Displays the address at [Control Word Address] +2. This address is the start address that stores the data displayed on the graph. When an [Offset] is set, this changes to the [Offset Value Storage Address].
Input/ Basic Settings	Data Type	Select the graph display data type from [16 Bit Bin], [16 Bit BCD], [32 Bit Bin], [32 Bit BCD], or [32 Bit Float]. **NOTE** • If [Individual] is selected in the Detail Settings, individual channels settings can be modified. • If [Show Scale] is selected in the Detail Settings, only [16 Bit Bin] or [32 Bit Bin] can be set.
	Offset	Select whether or not to display an offset on the graph. ☞ " ◆ Data Block Display Graph Mechanism" (page 17-59)
	Input Sign	Set whether graph display data can handle negative numeric data. This can only be set when the [Data Type] is [16 Bit Bin] or [32 Bit Bin]. • None Only positive numeric data will be handled. • 2's Complement Negative numbers are handled with 2's complement. • MSB Sign Negative numbers are handled with MSB sign.

Continued

<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td rowspan="3">Input Display</td><td>Min. Value/ Max. Value</td><td>Select the input range for graph display data.
Each [Data Type] and [Input Sign] has a different size range.

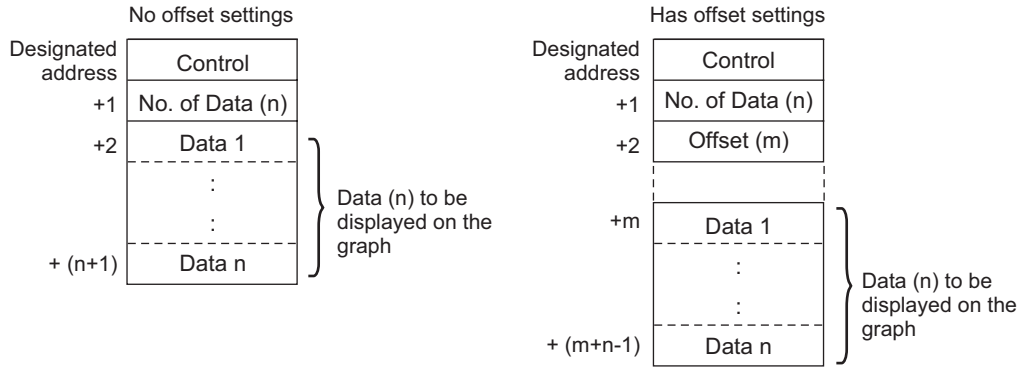
<table>
<tr><td>Data Type</td><td>Input Sign</td><td>Range</td></tr>
<tr><td rowspan="3">16 Bit Bin</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32,768 to 32,767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td rowspan="3">32 Bit Bin</td><td>None</td><td>0 to 4294967295</td></tr>
<tr><td>2's Complement</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>MSB Sign</td><td>–2147483647 to 2147483647</td></tr>
<tr><td>16 Bit BCD</td><td>–</td><td>0 to 9999</td></tr>
<tr><td>32 Bit BCD</td><td>–</td><td>0 to 99999999</td></tr>
<tr><td>32 Bit Float</td><td>–</td><td>– $9.9e^{16}$ to $9.9e^{16}$</td></tr>
</table>

NOTE
• Each word address' data corresponds to the input range and is displayed on the graph as a value between 1 and 1,000.</td></tr>
<tr><td>Display Sign +/-</td><td>Set to display negative numbers. This can only be set when the [Data Type] is [Bin].When the [Data Type] is [BCD], [Display Sign +/-] is not set. For [Float], [Display Sign +/-] is set.

 
</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>Set the range's Min/Max to be displayed on the graph. If [Display Sign +/-] is set, the Min is "-100". If it is not set, the Min is "0". The Max is "100".</td></tr>
</table>

◆ Data Block Display Graph Mechanism

When using the Data Block Display feature, you need to reserve the areas for the number of addresses specified below, beginning from the specified Control Word Address. The Control Word Address can be set to either a device/PLC address or GP internal device address. Configure offset settings and you can set the graph display data in an address shifted down from the address storing the [Data Items].



NOTE

- [Control], [Data Items] and [Offset] are all fixed as 16 bit.
- For 32 bit devices, the lower 16 bits will be enabled. Please enter [0] for the upper 16 bits.

32 bit device

	31 16	15 0
+0	0	Control
+1	0	No. of Data
+2	0	Offset

When you want to control the graph display from a device/PLC, the graph's display speed will differ depending on if you set the [Control Word Address] to a device address or use the GP Internal Read Area.

When setting a device/PLC address

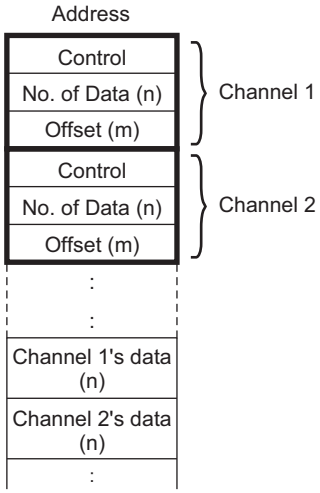
After the "control" display bit (bit 0) turns ON, the time to read data from the device/PLC to GP and displaying on the graph is longer than the time when the GP Internal Device. However, when the graph is not displayed, the time to display the whole screen is less than with the GP Internal Device.

GP Internal Device When Using the Read Area

The Read Area constantly reads data from the device/PLC to the GP, regardless of screen display status. After the "control" display bit (bit 0) turns ON, the time to display the graph is shorter than when using a device/PLC address. However, when the Read Area size is large, the time to display the entire screen is slower than when using a device/PLC address.

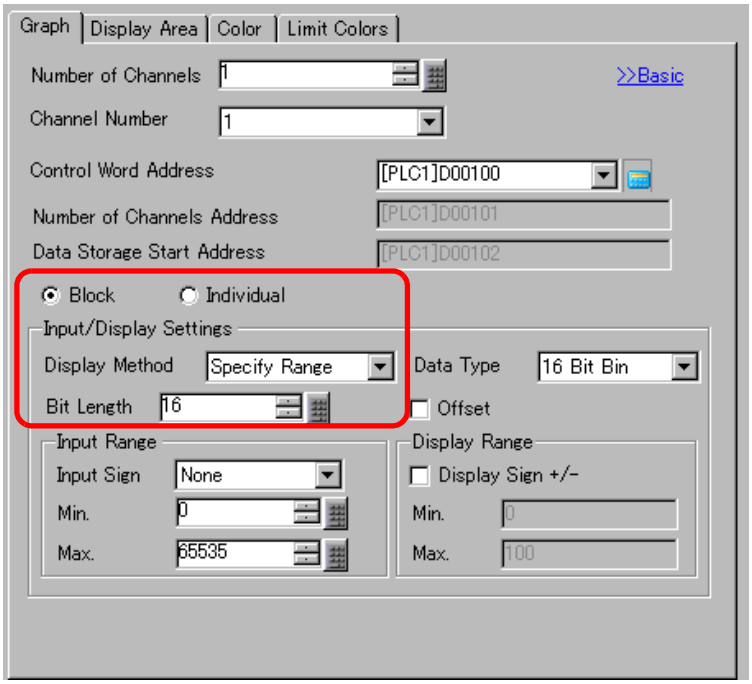
NOTE

- To use the GP Internal Device's Read Area, you need to set the [Read Area Size]. From the [System Settings], click [Display Unit] then check the [System Area]. A maximum of 256 words are allowed.
- When setting a device/PLC address and displaying multiple data lines (channel) with Block Display, enable offset settings to improve the graph display speed. By setting all the data in continuous addresses as in the following, data can be easily read in one communication round.



■ Graph/Extended

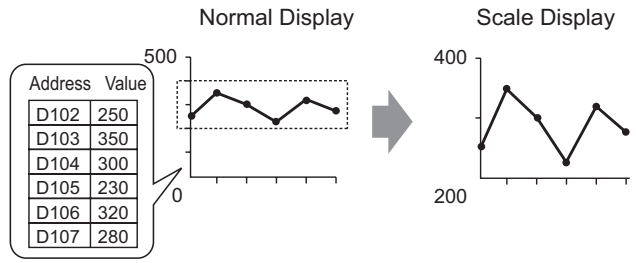
Configure input/display settings for each channel's Data Type, Input Sign, etc.

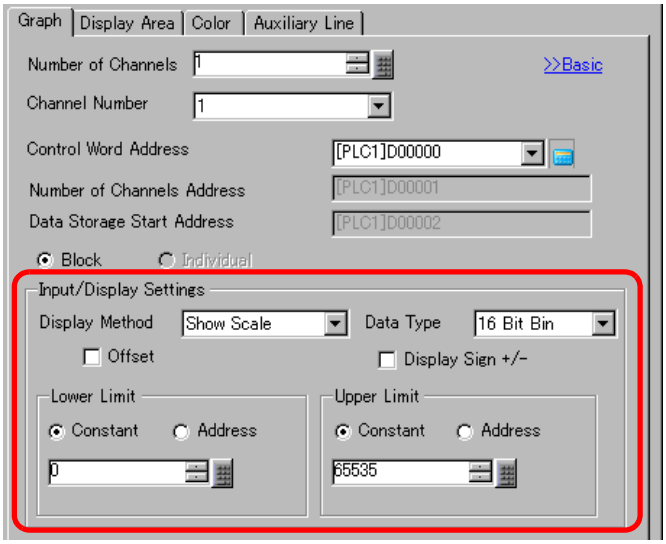


Setting	Description
Block/Individual	For the Data Type, Input Sign, etc., to change the input/display settings for all channels as a whole or separately. When the [Display Method] is selected as [Show Scale], this setting is fixed as [Block].
Display Method	Set to display a specified range of the graph. When [Show Scale] is set, Alarm and the [Color] tab's [Fill Below Line] option cannot be set. ☞ " ◆ Show Scale" (page 17-62)
Bit Length	If [Data Type] is [16 Bit Bin], set the data's enabled bit length from 1 to 16.

◆ Show Scale

Displays only the specified range of the graph. When data is concentrated in a fixed range, this is useful for verifying details.



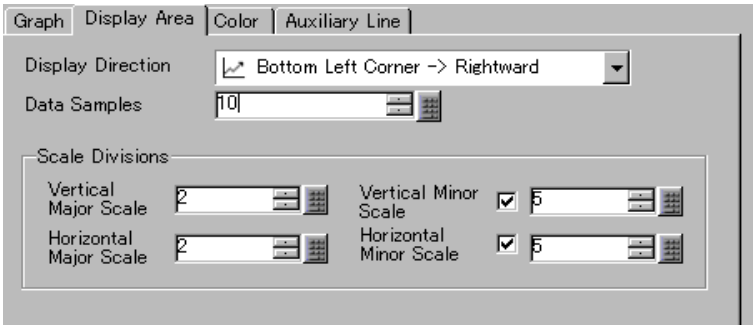


Setting	Description
Data Type	Choose the graph data type from [16 Bit Bin] or [32 Bit Bin].
Offset	Select whether or not to display an offset on the graph. ☞ “ ◆ Data Block Display Graph Mechanism” (page 17-59)
Display Sign +/-	Set to display negative numbers.

Continued

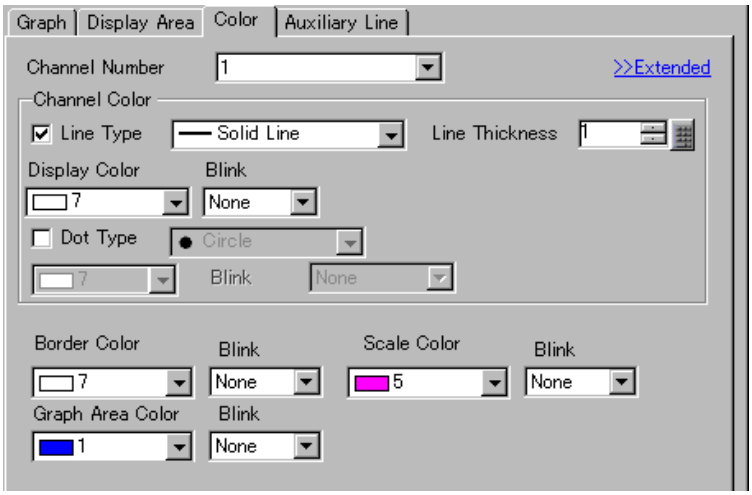
<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Upper Limit/Lower Limit</td><td>Select the method for setting the scale's upper and lower value from [Constant] or [Address], and set the Upper and Lower Limit.
• Constant
Designate a set constant as the Min/Max value.
• Address
Designate the address where the Upper/Lower Limit values are stored.
<table>
<tr><td>Data Type</td><td>Display Sign +/-</td><td>Range</td></tr>
<tr><td rowspan="2">16 Bit Bin</td><td>Unchecked</td><td>0 to 65535</td></tr>
<tr><td>Checked</td><td>–32,768 to 32,767</td></tr>
<tr><td rowspan="2">32 Bit Bin</td><td>Unchecked</td><td>0 to 4294967295</td></tr>
<tr><td>Checked</td><td>–2147483648 to 2147483647</td></tr>
</table>
NOTE
• If [Display Sign +/-] is set, negative numbers are handled with the 2's complement system.</td></tr>
</table>

■ Display Area



Setting	Description
Display Direction	Select the graph display direction. 
Data Samples	Set the number of data samples that to display on a single line. The range depends on the set model's Display Number of Dots. Display Number of Dots / Data Samples 320 x 240 dots (QVGA) / 0 to 319 640 x 480 dots (VGA) / 0 to 639 800 x 600 dots (SVGA) / 0 to 799 1024 x 768 dots (XGA) / 0 to 799 **NOTE** • You can verify the Display Number of Dots with [System Settings] - [Display]. • When [Fill Below Line] is set, the maximum number of [Data Samples] is 97.
Vertical Major Scale/ Minor Scale	Set whether or not to display the major and minor scale on the Line Chart's Y-axis. If so, choose the number of divisions. The number of divisions can be set from 1 to 638 for Major Scale, and from 2 to 638 for Minor Scale.
Horizontal Major Scale/Minor Scale	Set whether or not to display the major and minor scale on the Line Chart's X-axis. If so, choose the number of divisions. The number of divisions can be set from 1 to 638 for Major Scale, and from 2 to 638 for Minor Scale.

■ Color/Basic

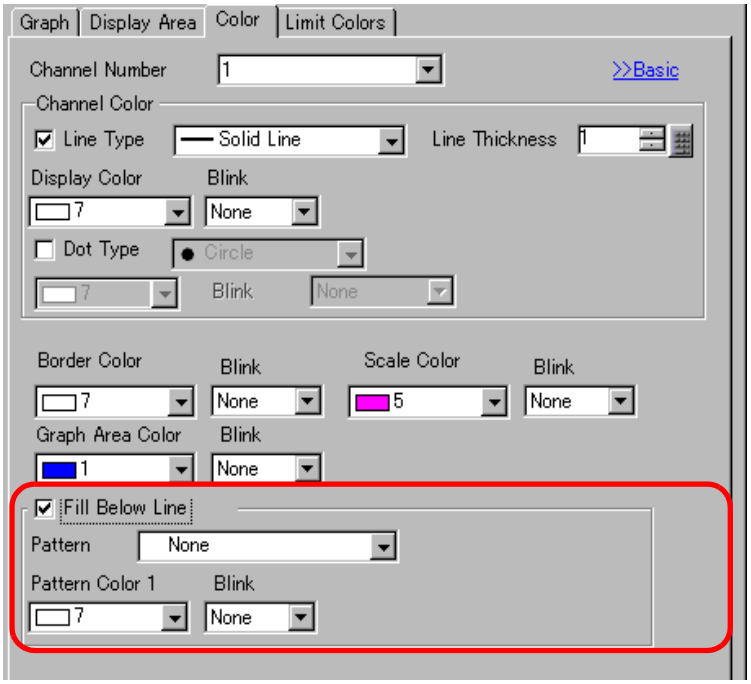


Setting			Description
Channel			Select the Channel to configure color settings.
Channel Color	Line Type		Select to display the lines on the Graph. Choose a line type from among 5 kinds: Solid Line, Dashed Line, Dash Line, Chain Line, and Two-Dot Chain Line. **NOTE** • When the data display spacing is less than 16 dots, line types other than the solid line may not display correctly.
	Line Thickness		Set the line thickness from 1 to 2.
	Display Color		Select the data line color.
	Background Color		Select the data line background color.
	Pixel Size		Select to display dots on the Graph. Choose a dot type from among the 7 patterns: filled circle, filled triangle, filled square, circle, triangle, square, and X. The dot size is fixed at 5 pixels. IMPORTANT • This cannot be used at the same time as the Detail Settings' [Fill Below Line] on the [Color] tab.
		Display Color	Set the dot color. The dot color does change during Alarm Display.
Border Color			Select the border color of the Data Block Display Graph.
Scale Color			Select the graph's scale color.
Graph Area Color			Select the color of the Graph Display Area.

Continued

Setting	Description
Blink	Select the Part blinks and blink speed. You can choose different blink settings for the line's [Display Color] and [Background Color], the dots [Display Color], and the Graph's [Border Color], [Scale Color], and [Graph Area Color]. NOTE • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ “9.5.1 Setting Colors ■ List of Available Colors” (page 9-34)

■ Color/Extended



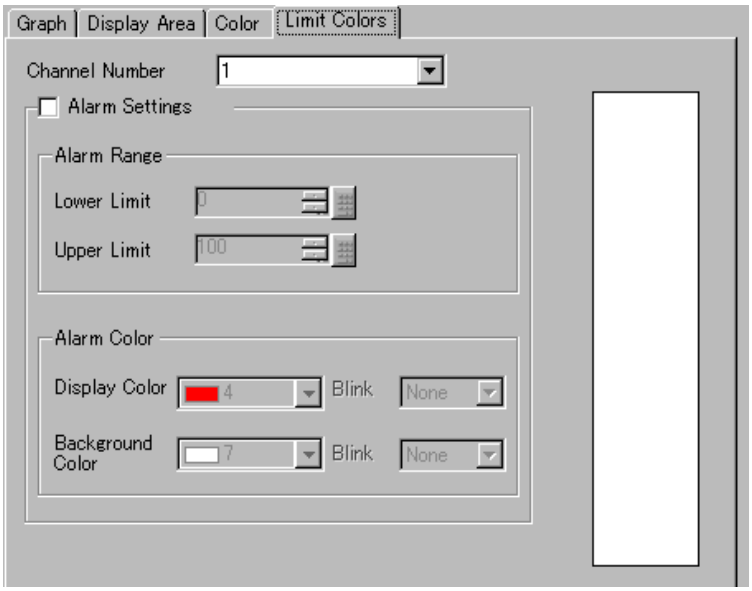
Setting	Description
Fill Below Line	Select to fill in the area under the Line Chart. This can only be set when [Number of Channels] is 1. **NOTE** • This can not be set when alarms are being used. • Can not be used with [Show Scale].
Pattern	Select a pattern for filling the area below the graph line.
Pattern Color 1	Select the pattern color.
Pattern Color 2	Select the pattern background color.
Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for [Pattern Color 1] and [Pattern Color 2]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

■ Alarm

Configure settings to change the line color when values move outside of a set range.

NOTE

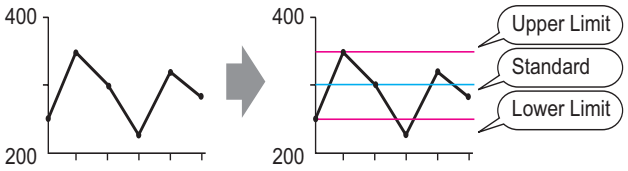
- When [Show Scale] is set, Alarm cannot be used.

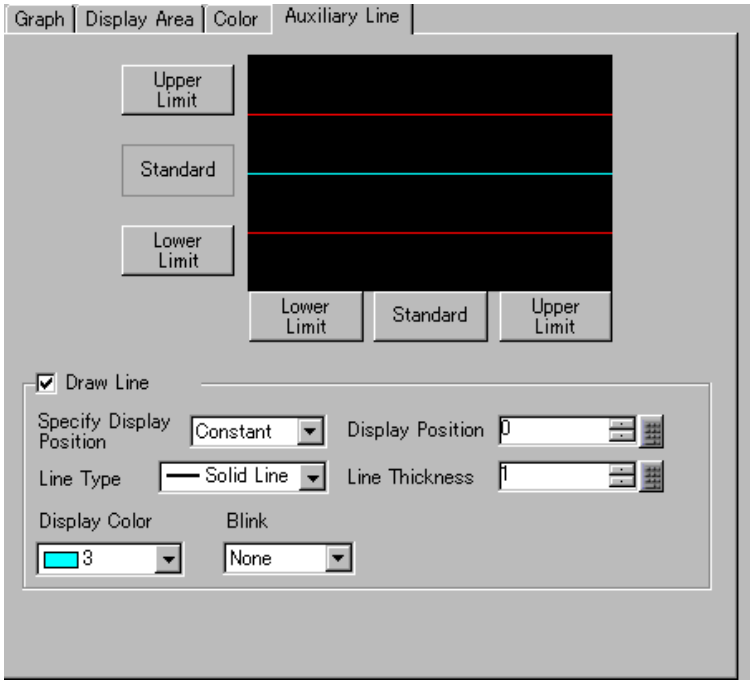


Setting	Description
Channel	Select the Channel to configure Alarm.
Alarm	Select to change the color when the value moves outside of a set range. **NOTE** • This cannot be set if the [Fill Below Line] option is set in the Detail Settings on the Color tab.
Upper Limit/Lower Limit	Set the Alarm Display range from 0 to 100 (with [Display Sign +/-] selected, from -100 to 100).
Display Color	Select the data line color for the alarm.
Background Color	Select the data line background color for the alarm.
Blink	Select whether or not the Part blinks and the blink speed. You can choose different blink settings for the alarm colors [Display Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Color Range Display Bar	Displays a sample for the alarm colors.

■ Auxiliary Line

To use Auxiliary Lines, the [Display Method] must be set to [Show Scale]. This option is located in [Detailed Settings] under the [Graph] tab.
By using auxiliary lines to show the standard value or a range, you can quickly verify which data have moved away from the standard value.



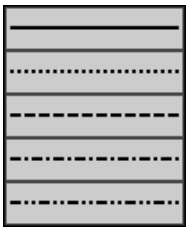


Setting	Description
Upper Limit/ Standard/Lower Limit	Select the auxiliary line to set.
Draw Line	Defines whether or not to draw the [Upper Limit], [Standard], and [Lower Limit] auxiliary lines in the selected positions.
Specify Display Position	Select the designation method of the auxiliary lines' display position from [Constant] or [Address]. • Constant Designate a set constant as the Display Position. • Address Designate the address where the Display Position is stored.

Continued

<table>
<tr><th>Setting</th><th>Description</th></tr>
<tr><td>Display Position</td><td>Set the auxiliary line's Display Position.
The setting range for each auxiliary line on the Y-axis is as follows.

<table>
<tr><th>Data Type</th><th>Display Sign +/ –</th><th>Setting Range</th></tr>
<tr><td>16 Bit Bin
16 Bit Bin
32 Bit Bin
32 Bit Bin</td><td>Unchecked
Checked
Unchecked
Checked</td><td>0 to 65535
–32,768 to 32,767
0 to 4294967295
–2147483648 to 2147483647</td></tr>
</table>

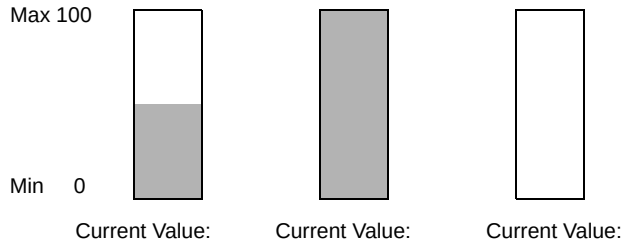
Set each horizontal auxiliary line from 0 to 1,000 (out of 1000%). 500 is the middle position, 1000 is the largest position.</td></tr>
<tr><td>Line Type</td><td>Select the auxiliary line type:
 

NOTE
• If the Graph screen is 16 pixels or less, any pattern other than a solid line may not properly display.</td></tr>
<tr><td>Line Thickness</td><td>Set the auxiliary line thickness from 1 to 2.</td></tr>
<tr><td>Display Color</td><td>Set the auxiliary line color.</td></tr>
<tr><td>Background Color</td><td>If you selected a line type other than the solid line, set the auxiliary line's background color.</td></tr>
<tr><td>Blink</td><td>Select the Part blinks and blink speed. You can choose different blink settings for the [Display Color], and [Background Color].
NOTE
• There are cases where you can and cannot set Blink depending on the Display Unit and System Settings' [Color].
☞ “9.5.1 Setting Colors ■ List of Available Colors” (page 9-34)</td></tr>
</table>

17.8 Restrictions

17.8.1 Restrictions for Graphs

- When a value outside of the set input range is collected, the Graph Display only shows values up to the maximum and down to the minimum.
  For example, When the input range Min = 0, Max = 100



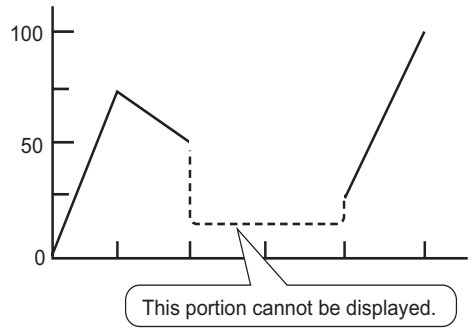
- When corrupt BCD data is collected, it can not be displayed properly. When a value is invalid, the previous state is displayed. If the value is corrupt and no previous value exists, a value is then only displayed once a valid value is collected.

17.8.2 Restrictions for Historical Trend Graphs

- A total of eight Historical Trend Graph parts can be displayed at the same time on a single screen. When you are using a window screen, the eight Historical Trend Graph parts can be displayed on the base screen and window screen together eight. When Data Block Displays are also placed on the same screen, you can have up to eight data black and historical trend graphs.
- The maximum number of channels (number of lines) that can be displayed on a single Historical Trend Graph is 20.
- A maximum of 40 channels can be displayed on a single screen. On a window screen, a maximum of 40 channels can be displayed on the base screen and window screen. The subsequent channels do not appear.
- To draw lines within the display area on the historical trends graph, place the graph on a base screen numbered 9000-9999. If you draw scale lines within the graph display area on a base screen numbered 1-8999, the scale lines will not be displayed on the GP. To display a graph with scale lines on a base screen numbered 1-8999, call up a screen with a number above 9000.
- When the sampling period is designated as 1 second or less, depending on the size of the graph display area used, scroll processing can take almost one second, and communication and tag processing can be affected. In this case, setting the sampling period to two or more seconds should correct the problem.

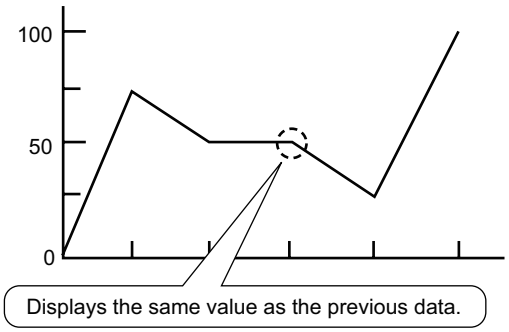
- If an error occurs when reading the data samples, the line on that portion of the graph is not displayed. If the error continues, that period does not appear on the graph. The following data samples appear on the Historical Trend Graph as follows:

	Sampling Data
1st Sample	0
2nd Sample	75
3rd Sample	50
4th Sample	Readout Error
5th Sample	25
6th Sample	100



- When the [Data Type] of the historical trend graph part is specified as [BCD], and the sampled data including A to Fh except BCD (except 0 to 9) is stored and the graph containing the previous sampled data is displayed.
  When the next sampled data is displayed on the historical trend graph, it is displayed as follows.

	Sampling Data
1st Sample	0(0h)
2nd Sample	75(75h)
3rd Sample	50(50h)
4th Sample	-(5Fh)
5th Sample	25(25h)
6th Sample	100(100h)



  The fourth sample, 95(5Fh) is ignored, and the third sample, 50(32h), is shown in its place on the Graph.

- Set the [Data Type] on the Historical Trend Graph to match the data sample bit length. If the [Bit Length] is set to [16 Bit] and the [Data Type] is 32 bit, two Words' data are combined and handled as 32 bit.

		Sampling Data	
Address No.	1	D100	2 words' data is combined and displayed on the graph as 1 data.
	2	D101	
	3	D105	
	4	D200	
	5	D250	Because there is no address No. 6, that portion is handled as "0".

■ Restrictions for Displaying Historical Data

- Only one Historical Trend Graph part with a Display Historical Data function enabled can be placed on a Base screen.
- You cannot use Display Historical Data Settings on a window screen. The Display Historical Data function does not work.
- When you erase data samples stored in the GP, Historical Data cannot be displayed.
- The Number of Data (current data + historical data) that can be displayed in one channel with Display Historical Data is the amount in [Cycles] designated in the sampling settings. For the Historical Trend Graph [Data Samples], set a number less than [Cycles] in the sampling settings.
- The number of sampled data that can be saved on the GP depends on the capacity of the backup SRAM *1 and the intended use, as well as the sampling settings.
  ☞ "24.9.1 Summary ■ Backup SRAM" (page 24-100)
  The table below shows the maximum number of samples when the backup SRAM is used only for backing up the sampling groups used in a line chart.

  The maximum number of samples per Number of Channels

Backup SRAM Size	1 Channel	10 Channels	20 Channel	30 Channels	40 Channels
320KB	65535	16265	8132	5421	4065
128KB	32180	6435	3217	2144	1608

  Setting Contents: Number of Sampling Groups: 1, Blocks: 1, Data Type: 16 Bit,
  Overwrite old data after finishing the specified no. of times, No Date Data,
  No Data Enabled/Disabled Flags
- Switches placed on a Historical Trend Graph are automatically grouped. You can change an individual Switch's size or attributes, but if you delete the Switch, the Graph is also deleted.
- Do not use two different types of switches for the same Historical Trend Graph. One type of switch is the Switch/Lamp: on the [Parts] menu, point to [Switch/Lamp], [Special] and then click [Historical Trend Graph Switch]. The other type of switch is configured directly in the Historical Trend Graph.
- When using a Switch Lamp [Special Switch] - [Historical Trend Graph Switch] for Display Historical Data, place the Special Switch and the trend graph with the Display Historical Data function on the same Base screen. If the Historical Trend Graph is placed on the Base Screen and the Special Switch on the Window Screen, they will not function.
- While in Display Historical Data mode, new samples will not be displayed even if they occur. The display will update when Display Historical Data mode is released. Even while in Display Historical Data mode, data sampling continues.
- Changing screen while in Display Historical Data mode cancels the mode.

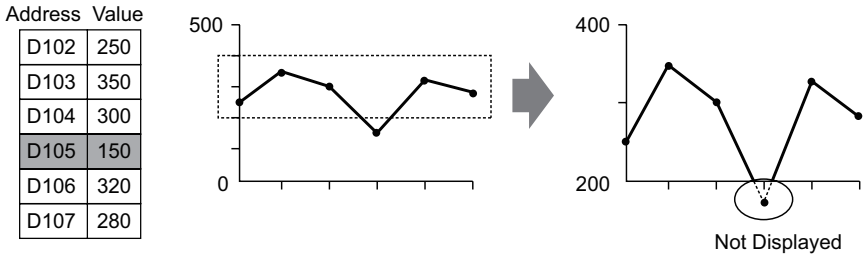
*1 The capacity differs depending on the model. Confirm the capacity: from the [Project (F)] menu, point to [Information] and select [Project Information]. Then select [SRAMInformation].

17.8.3 Data Block Display Graph Restrictions

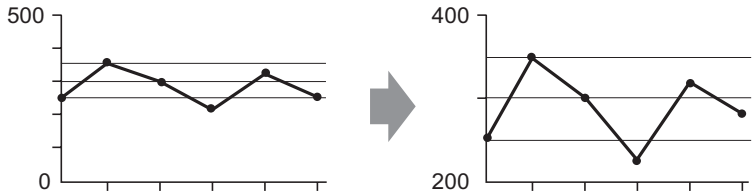
- A total of 8 Data Block Display Graph parts can be displayed at the same time on a single screen. When you are using a window screen, the total number of Data Block Display Graph parts that can be displayed on the base screen and window screen together is 8. When Historical Trend Graphs are also placed on the same screen, the maximum allowed for the two kinds of parts is 8.
- The maximum number of channels (number of lines) that can be displayed on a single Data Block Display Graph is 20.
- The maximum number of channels (number of lines) that can be displayed on a single screen is 40. When you are using a window screen, the total number of channels that can be displayed on the base screen and window screen together is 40. When more than 40 trend graph lines are set up, the 41st and subsequent lines will not function.
- When displaying variables on the data block display graph, specify the Array Size.

■ Restrictions for Show Scale

- Data which is out of the scale's display range will not be shown.



- Show Scale's update timing (the timing of value reading) is the instant when the graph display is cleared or the screen is switched.
- When Show Scale is set, [Alarm] cannot be used.
- When Show Scale is set, [Fill Below Line] cannot be used.
- When auxiliary lines are set, any changes to Show Scale will also affect the horizontal auxiliary lines.



- If a set auxiliary line's value exceeds the graph display range, that auxiliary line is not displayed.
- When auxiliary lines are designated with [Address], the update timing (the timing of value reading) is the instant when the graph display is cleared or the screen is switched.