Human Machine Interface (HMI) GOT

Logging (Historical Trend Graph)

This online training system (e-learning) is intended for those who operate the historical trend graph of the GOT2000 series for the first time.

This course is intended for those who have completed the "Logging (Basic Setting)" course. In this course, we will learn how to create a historical trend graph.

In this course, we will learn the procedure from creating a historical trend graph using the screen design software GT Designer3 to displaying the GOT's logging data in the graph. We will use the logging settings configured in the "Logging (Basic Settings)" course.

This course requires the basic knowledge of Human Machine Interface (HMI) Graphic Operation Terminal (GOT) and GT Works3. Complete the following courses in advance.

- FA Equipment for Beginners (HMIs)
- GOT2000 Basics (GOT Introduction)
- GT Works3 (GT Designer3) Basics (Screen Design Introduction)
- GT Works3 (GT Designer3) Basics (Elementary Screen Design (GOT))
- Logging (Introduction)
- Logging (Basic Setting)

This course also requires the basic knowledge of MELSEC iQ-R programmable controllers (PLCs). It is recommended to complete the following courses in advance.

- FA Equipment for Beginners (PLCs)
- PLC MELSEC iQ-R Series Basics
- PLC Programing Basic (Ladder)

The contents of this course are as follows.
We recommend that you start from Chapter 1.

Chapter 1 Overview

The overview of this course is provided.

Chapter 2 Creating a Historical Trend Graph

We will learn how to create a historical trend graph using GT Designer3.

Chapter 3 Checking the Created Historical Trend Graph

We will learn how to check the historical trend graph created in Chapter 2 with the GOT.

Chapter 4 Other Settings

Various setting items for convenient operation and display of the historical trend graph are introduced.

Chapter 5 Template Screens

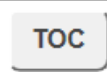The template screens for the historical trend graph are introduced.

Chapter 6 Sample Screens

The sample screens for the historical trend graph are introduced.

Final Test

Passing grade: 60% or higher.

Following is an explanation of how to use the graphical user interface.

Go to the next page	**>**	Go to the next page.
Back to the previous page	**<**	Back to the previous page.
Move to the desired page	**TOC**	"Table of Contents" will be displayed, enabling you to navigate to the desired page.
Exit the learning	**X**	Exit the learning. Window such as "Contents" screen and the learning will be closed.

Safety precautions

When you learn based on using actual products, please carefully read the safety precautions in the corresponding manuals.

Chapter 1   Overview

In this course, we will learn the procedure from creating a historical trend graph using the screen design software GT Designer3 to displaying the GOT's logging data in the graph.
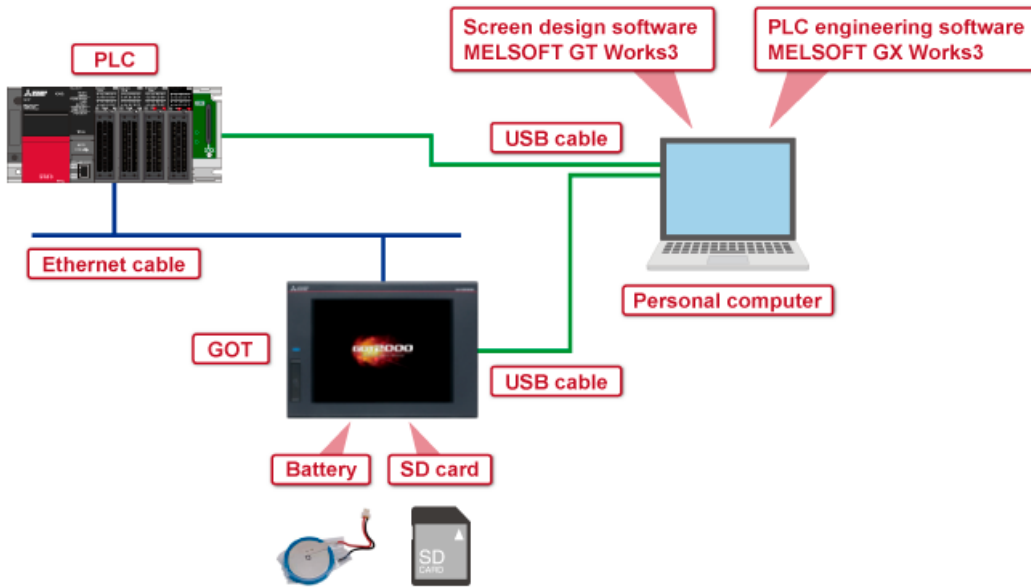We will use the logging settings configured in the "Logging (Basic Settings)" course.

1.1 Configuration of the learning equipment

1.2 Learning equipment list

1.3 Screen used for learning

The following diagram shows the configuration of the learning equipment.

PLC

Screen design software
MELSOFT GT Works3

PLC engineering software
MELSOFT GX Works3

USB cable

Personal computer

Ethernet cable

GOT

USB cable

Battery   SD card

Photo/illustration	Name	Application/setting
	Personal computer	Used to create GOT project data and transfer the data to the GOT. Also used to create a sequence program to check the operation of the created GOT project data, and write the program to the PLC.
	GOT Screen Design Software MELSOFT GT Works3	Includes GT Designer3 (software for creating project data) and GT Simulator3 (software for simulating the GOT operation). Install GT Designer3 on the personal computer. (Model: SW1DND-GTWK3-E)
	PLC engineering software MELSOFT GX Works	Engineering tool for setting, programming, debugging, and maintenance for PLCs including MELSEC iQ-R, MELSEC iQ-F series. Install the software on the personal computer.
	GOT	Used to display the created project data on the screen and monitor/operate the PLC. (Model: GT2710-VTBD)
	USB cable	Used to connect the GOT and the personal computer. (Model: GT09-C30USB-5P)
	PLC	Used to run the sequence program. (Model: R04CPU)
	Ethernet cable	Used to connect the GOT and the PLC. * Use a commercially available Ethernet cable that meets the 100BASE-TX standard. (It is recommended to use a Category 5 or higher shielded cable.)

Photo/illustration	Name	Application/setting
	SD card	Used to save logging data. Install it on drive A of the GOT. (Model: NZ1MEM-16GBSD)
	Battery	Used to keep the logging data in the buffering area even while the GOT is powered off (power failure backup). (Model: GT11-50BAT)

In this course, we will learn how to create a historical trend graph like the one below.

■ Displaying the logging data of the PLC devices (D0, D1, and D2) chronologically in a historical trend graph
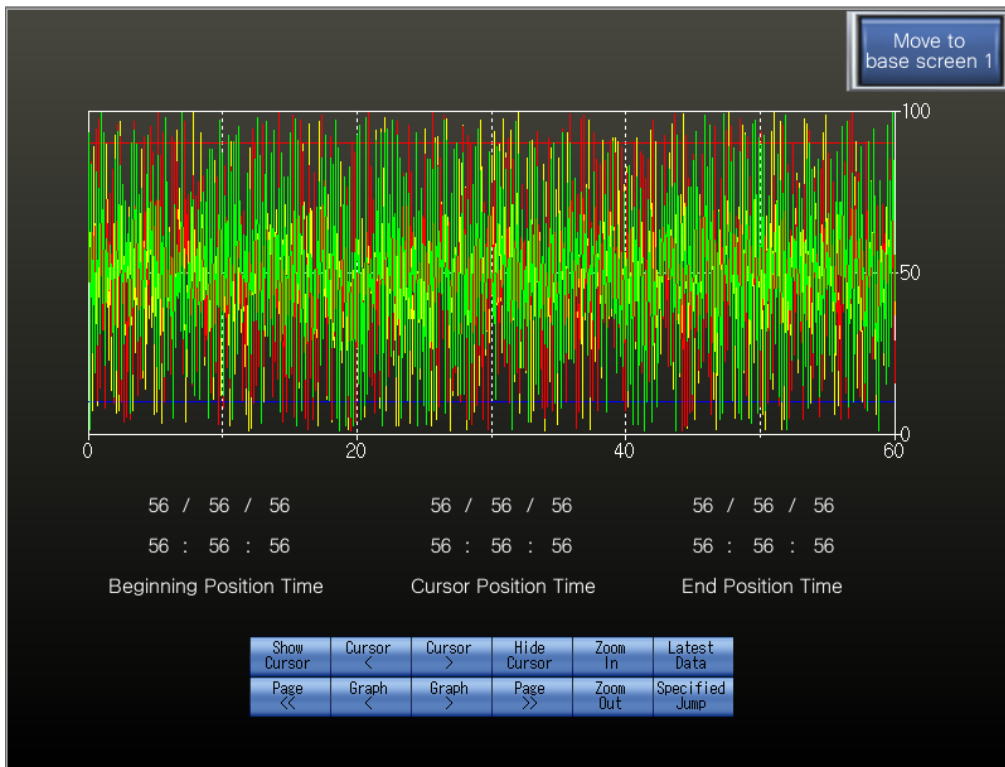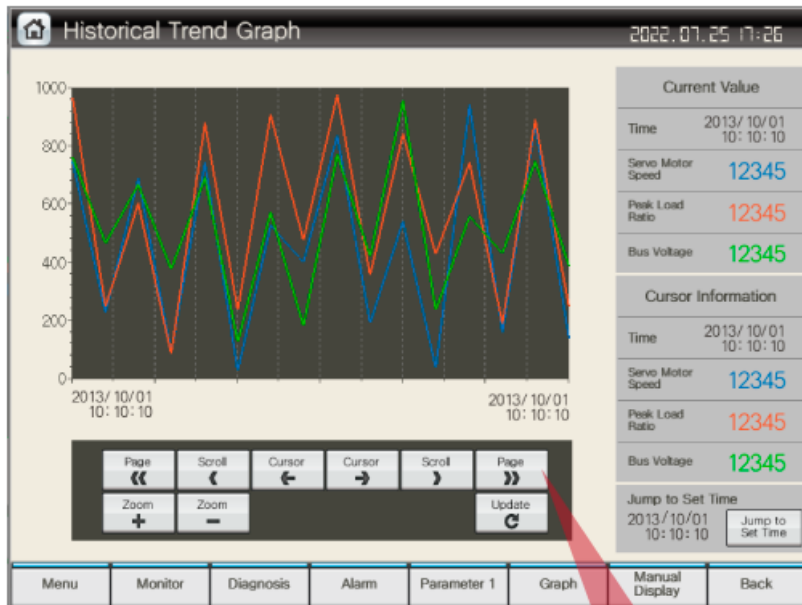
Chapter 2 | Creating a Historical Trend Graph

In this chapter, we will learn how to create a historical trend graph.

The historical trend graph function displays device data (logging data) collected by the logging function chronologically in a graph.
Unlike the trend graph function, the historical trend graph function can also display past data that is outside the display range of the horizontal axis.
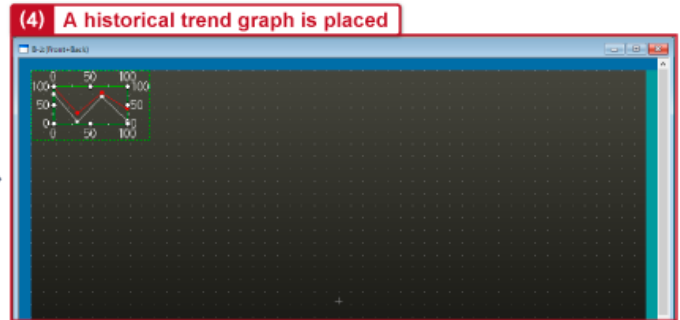

Past data can be checked by touching [Page]

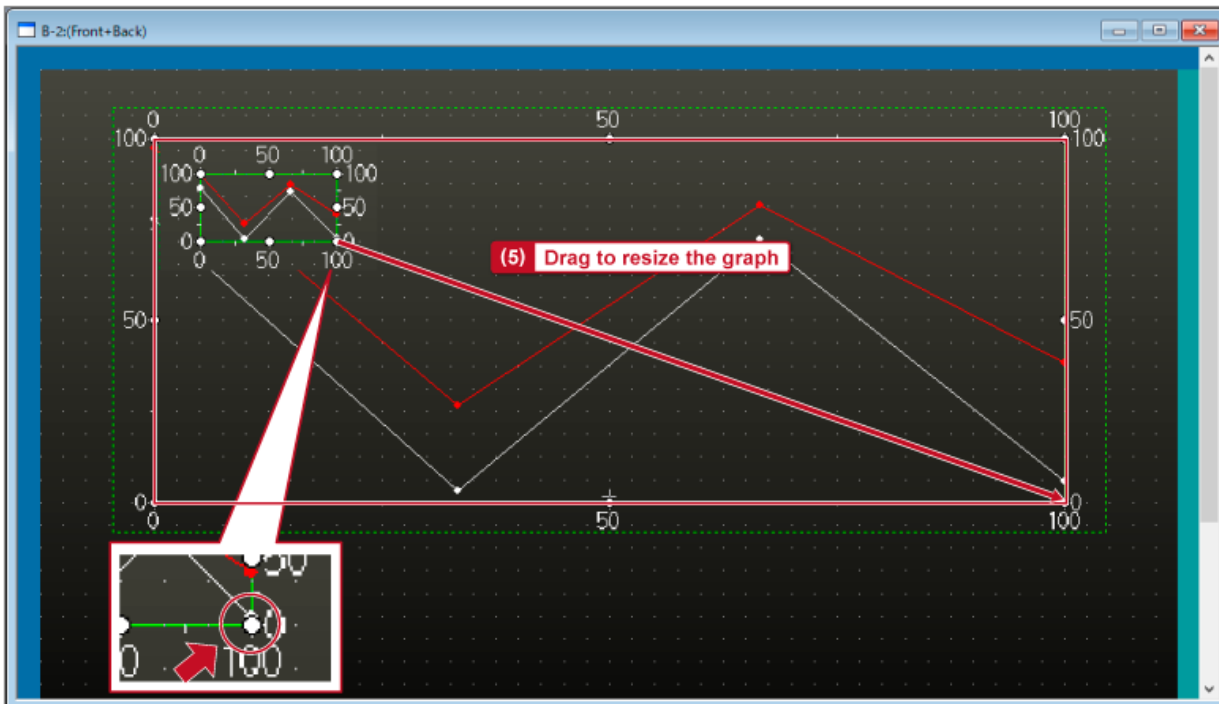Display the [Historical Trend Graph] dialog in GT Designer3 and start to create a historical trend graph.

(1) Start GT Designer3 and open the project created in the "Logging (Basic Setting)" course.
(2) Open the logging setting dialog and click [Create a new historical trend graph].
(3) Select screen number 2 or [A new screen will be created.] from the pull-down menu in the [Screen Selection] dialog, and click [OK].
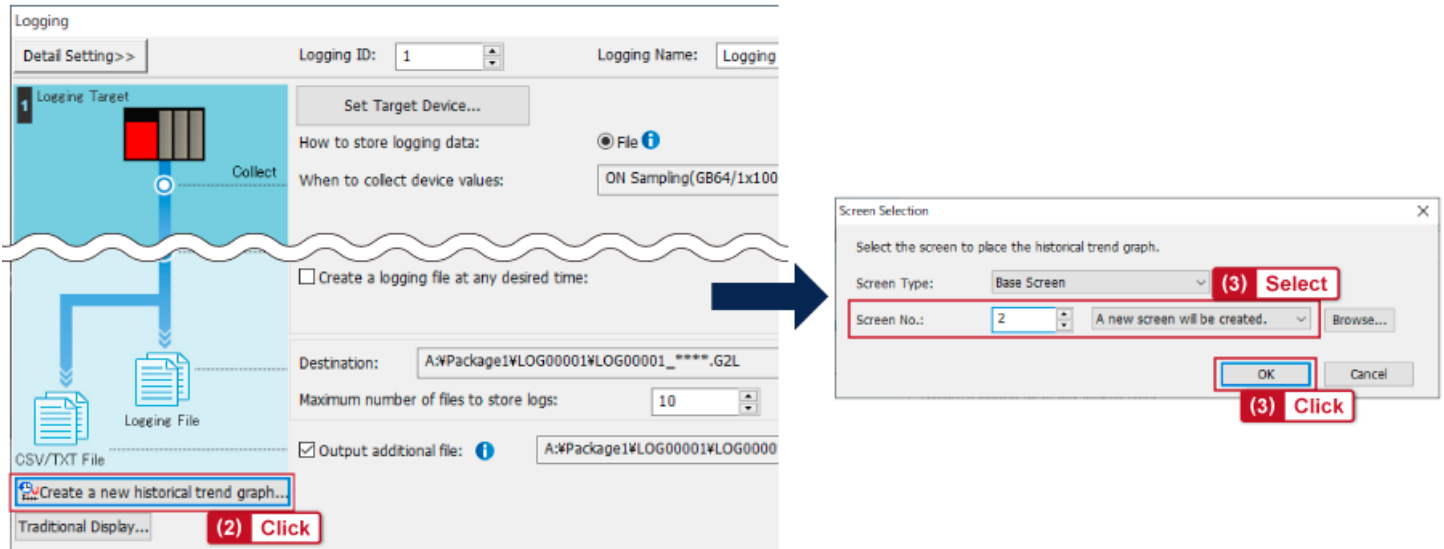
(4) Click [OK] in the [Screen Property] dialog to place a historical trend graph at the top left of base screen 2.
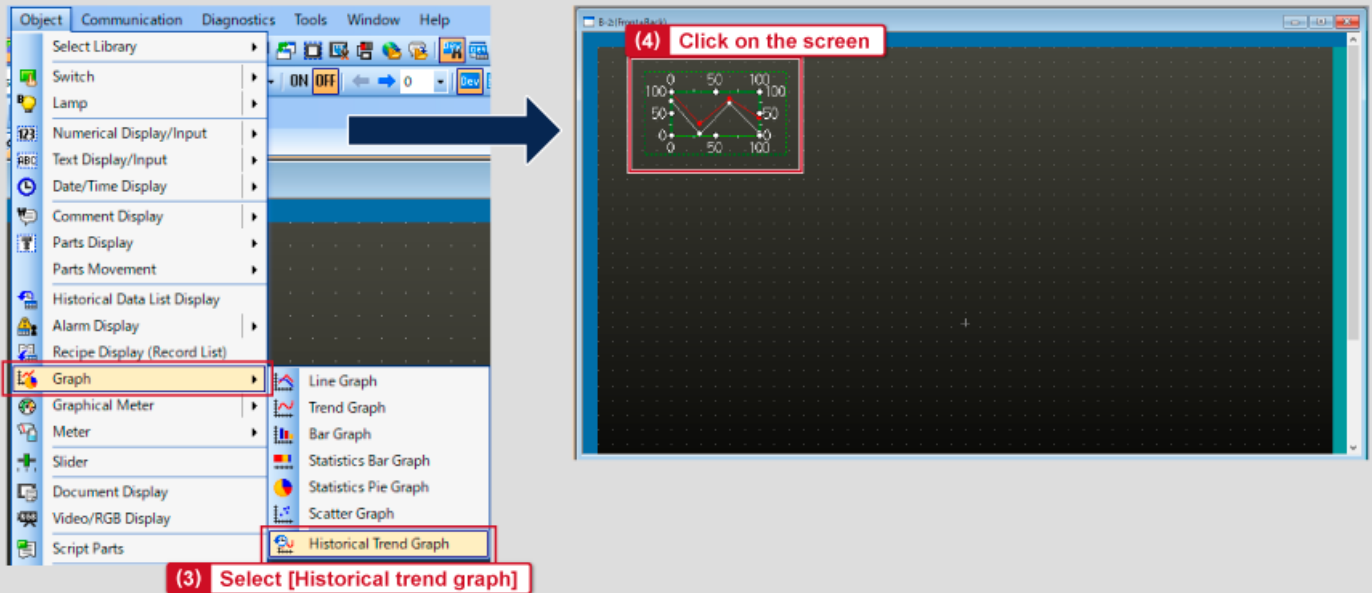

(4)   A historical trend graph is placed

(4)   **Click**
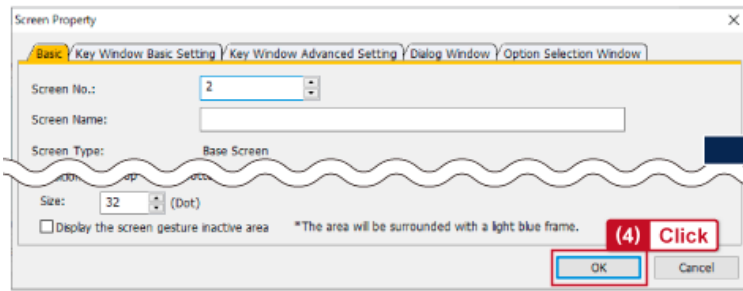
(5) Adjust the graph position and drag the point at the bottom right of the graph to resize the graph.

(5)   Drag to resize the graph

A historical trend graph can also be created from the menu bar.

(1) Start GT Designer3 and open the project created in the "Logging (Basic Setting)" course.

(2) Select [Screen] → [New] from the menu and create base screen 2.

(3) Select [Object] → [Graph] → [Historical Trend Graph] from the menu.

(4) Click an intended point on base screen 2 to place the historical trend graph object.

(5) Drag the point at the bottom right of the graph to resize the graph.

(4) Click on the screen

(3) Select [Historical trend graph]

Double-click the historical trend graph object to display the [Historical Trend Graph] dialog. Set [Number of Pens], [Points], and [Point Type] for the historical trend graph in the [Data] tab.

(1) Set "3" for [Number of Pens].
(2) Set "600" for [Points].
(3) Select [Line] from the [Point Type] pull-down menu.
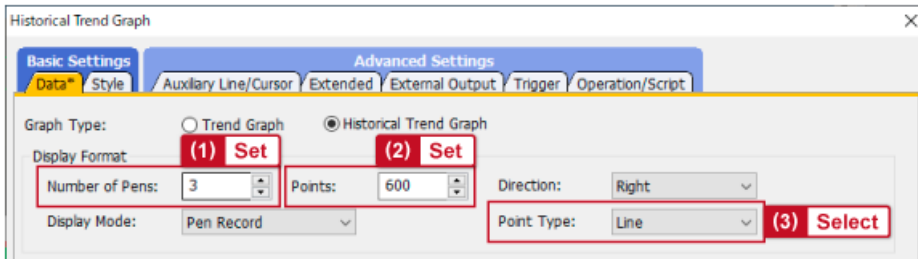
Item	Setting example
Number of Pens	3
Points	600
Point Type	Line

Set the number of graph lines to "3" to display the logging data of the PLC devices "D0, D1, and D2".
Set the points to "600" to display the 60 seconds' worth of data in the graph out of the data collected at 0.1 second intervals.

Set the logging ID, logging devices, and line attributes.

(1) Check that [Logging ID] is "1" (default) and the logging name is "Logging 1".
(2) Click [...] for [Logging Device] to display the [Device List] dialog. Click the [Selection] column and select the device to be displayed in the graph.

Item	Setting example
Logging ID	1
Logging Name	Logging 1
Logging Device	D0, D1, D2

(3) Click "▼" of [Line Attribute] to display the [Line Attribute] dialog, and set a line color.
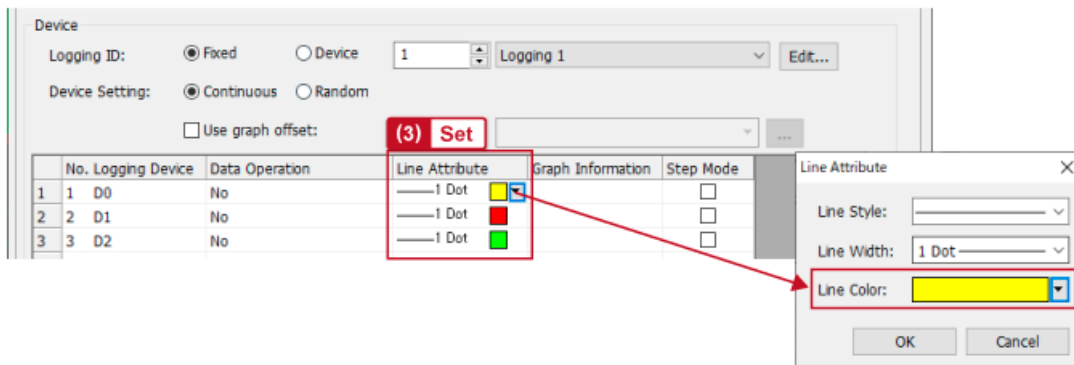
Item		Setting example
Line Attribute	D0	Yellow
	D1	Red
	D2	Green

Set main scale marks and sub scale marks in the [Style] tab. In this course, we will set scale marks on the right and at the bottom of the graph.

Upper limit value

Scale values
(Three values in the graph on the left)

Lower limit value

Main scale marks

Sub scale marks

Scale marks between the main scale marks
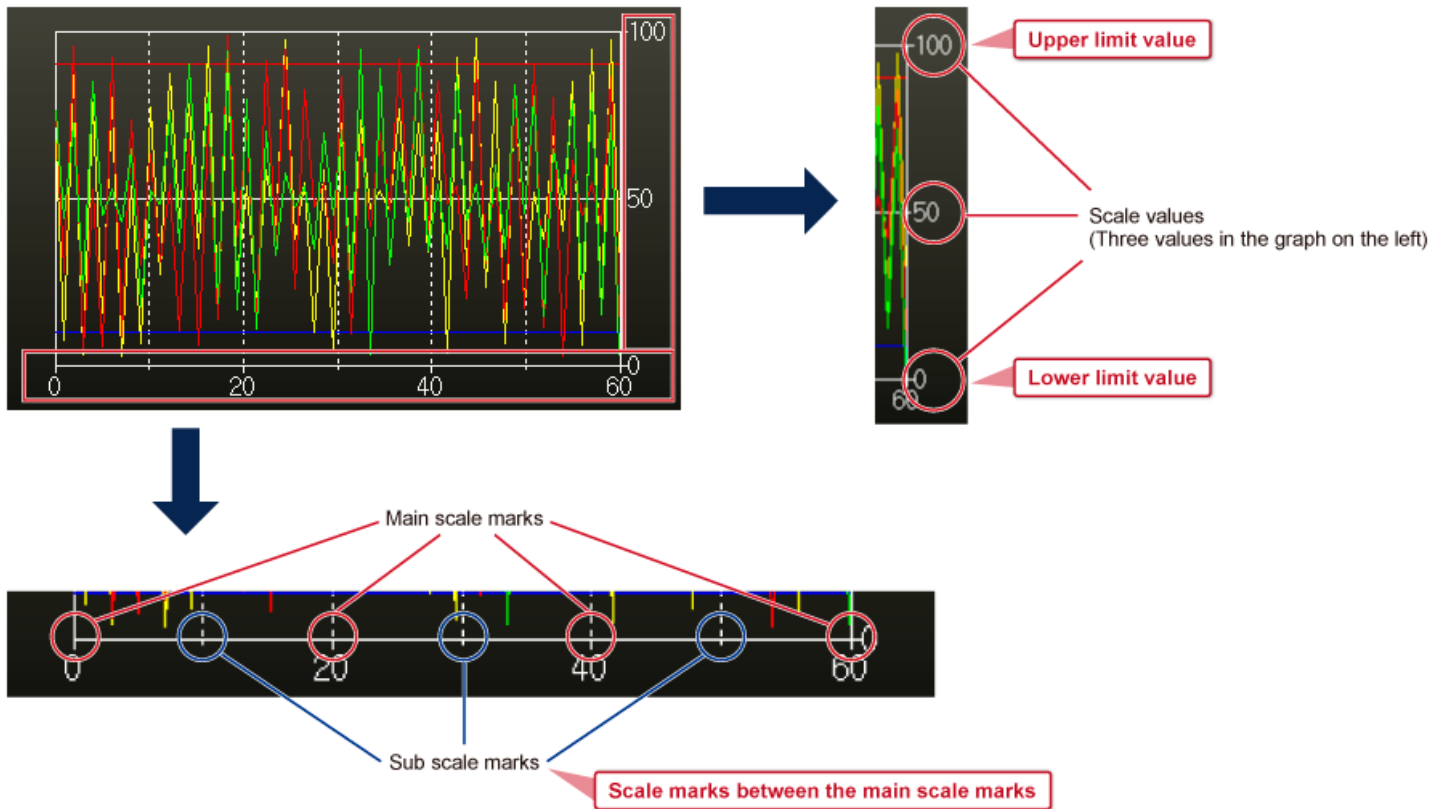
(1) Select [Right] axis position.
(2) Set [Scale Points] for [Main Scale] and [Scale Points] for [Sub Scale].
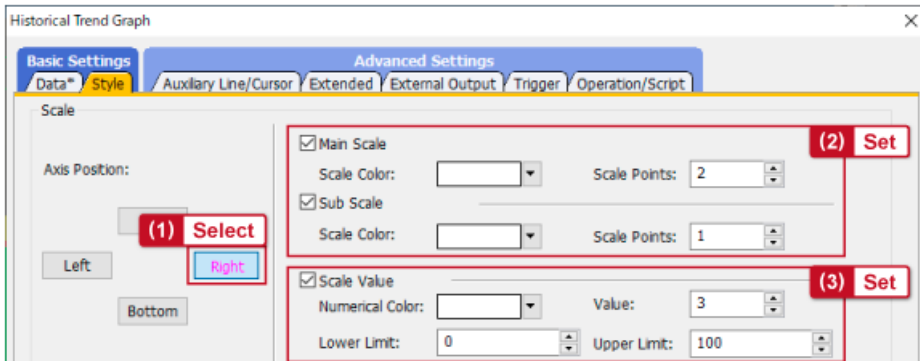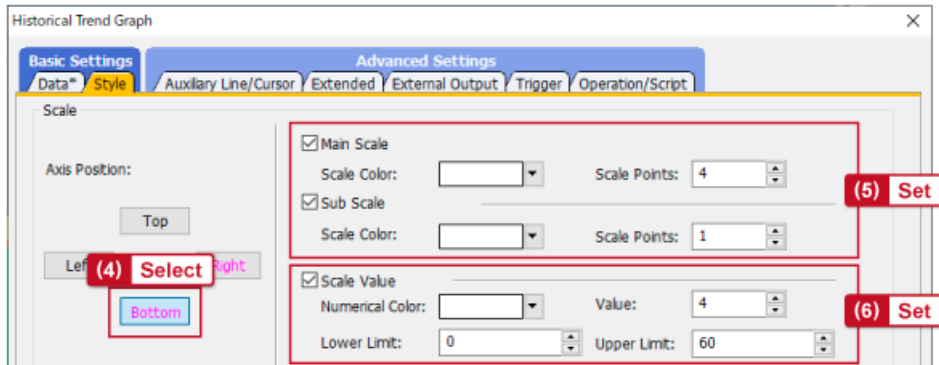(3) Set [Value], [Lower Limit], and [Upper Limit] for [Scale Value].

Item		Setting example
Main Scale	Scale Points	2
Sub Scale	Scale Points	1
Scale Value	Value	3
	Lower Limit	0
	Upper Limit	100

(4) Select [Bottom] axis position.
(5) Set [Scale Points] for [Main Scale] and [Scale Points] for [Sub Scale].
(6) Set [Value], [Lower Limit], and [Upper Limit] for [Scale Value].

Item		Setting example
Main Scale	Scale Points	4
Sub Scale	Scale Points	1
Scale Value	Value	4
	Lower Limit	0
	Upper Limit	60

(7) Deselect each setting for [Left] and [Top] axis positions.
(8) Select [Vertical Grid], [Horizontal Grid], and [Display the graph frame].
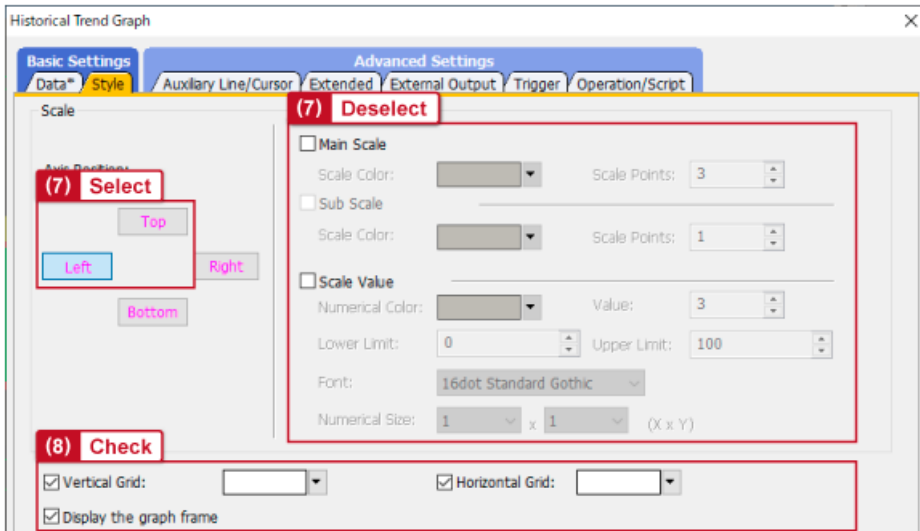
Set auxiliary lines that indicate the reference, upper limit, and lower limit in the graph in the [Auxiliary Line/Cursor] tab.

Upper limit line (red)

Reference line (white)

Lower limit line (blue)
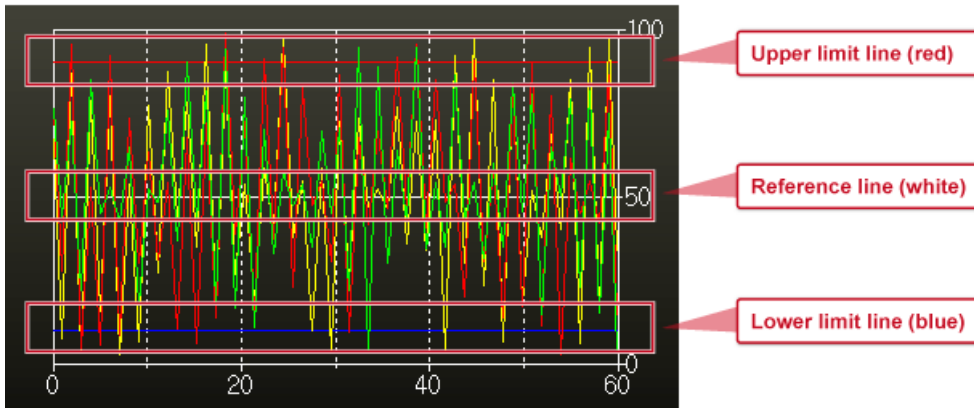
(1) Select [Reference Line] and set a fixed value "50".
(2) Select [Lower Limit Line] and set a fixed value "10".
(3) Select [Upper Limit Line] and set a fixed value "90".
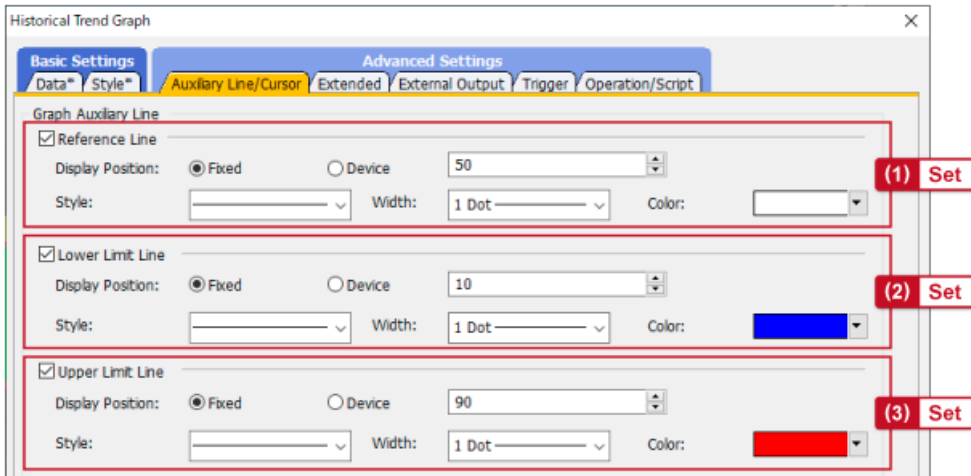
Item		Setting example
Reference Line	Fixed value	50
Lower Limit Line	Fixed value	10
Upper Limit Line	Fixed value	90

Configure the setting to display a cursor by touching of the screen in the [Extended] tab.
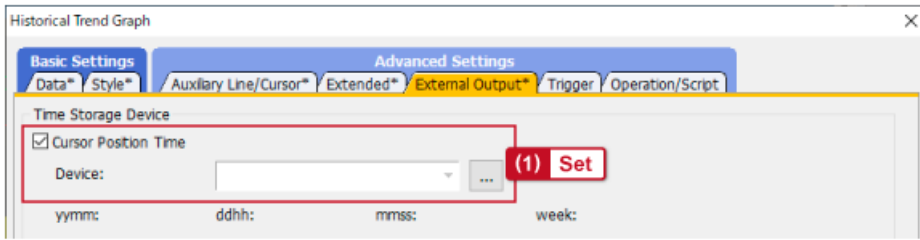
(1) Select [Single Touch Operation].
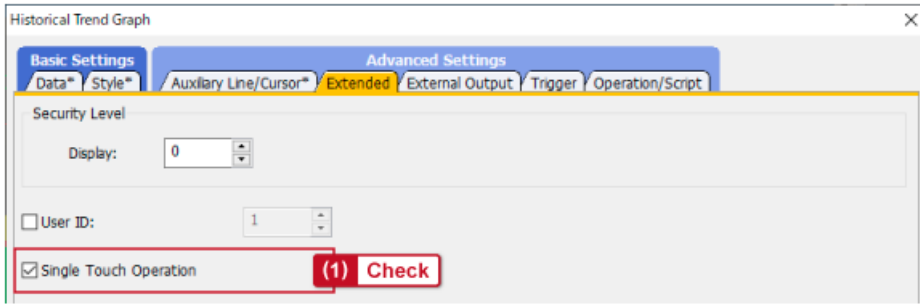
Item	Setting example
Single Touch Operation	Selected

Set Single Touch Operation to display a cursor at the touched position on the screen.

Set devices that display the graph's time information in the [External Output] tab. The display method is described in Section 2.8.

(1) Select [Cursor Position Time] and set a device "GD140".

(2) A device is automatically assigned to each unit of time.
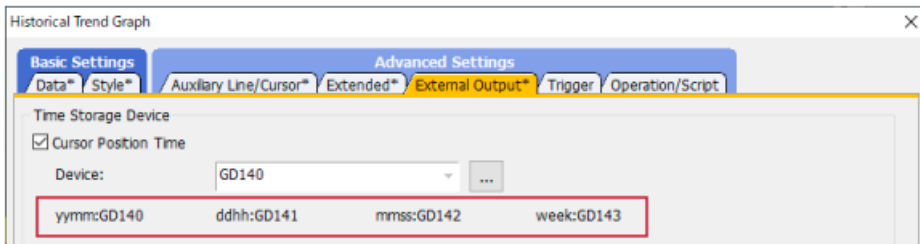
The time of the cursor display position, display range beginning position, and display range end position of the graph can be stored to the device by using the time storage device.

Set a device also for the display beginning position time and display end position time.

(1) Select [Beginning Position Time] and set a device "GD150".
(2) Select [End Position Time] and set a device "GD160".

(3) Select [Always update beginning position time/end position time].
Then, the latest position time can always be displayed when the graph is scrolled.

Item		Setting example
Cursor Position Time	Device	GD140
Beginning Position Time	Device	GD150
End Position Time	Device	GD160
Always update beginning position time/end position time		Selected

Place numerical display objects or figures on the screen to display the values in the time devices (GD140 to GD142, GD150 to GD152, and GD160 to GD162) set in Section 2.7.

Numerical display object

Figure

Cursor Position Time
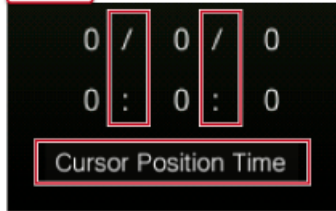
Place the objects or figures so that the display beginning position time, the cursor position time, and the display end position time can be displayed as shown below.

| Beginning Position Time | Cursor Position Time | End Position Time |

Place objects for the cursor position time.

(1) Select [Object] → [Numerical Display/Input] → [Numerical Display] from the menu.
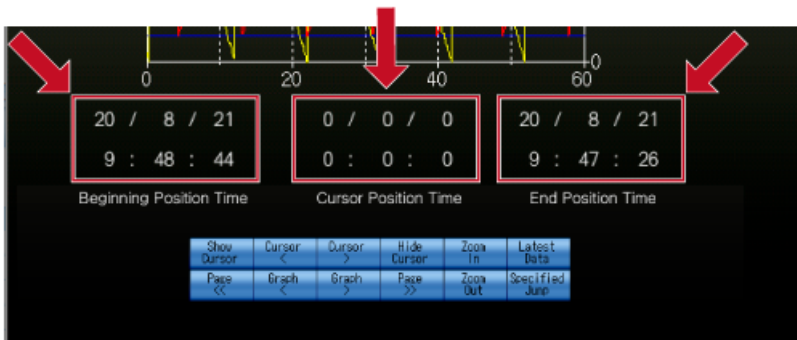(2) Click an intended point on the base screen to place the numerical display object.
(3) Double-click the object to open the [Device] tab in the [Numerical Display] dialog.
(4) Set a time device. (The following shows an example when "GD140" is set.)
(5) Select [BCD16] from the [Data Type] pull-down menu.
(6) Set "2" for [Digits (Integral)].
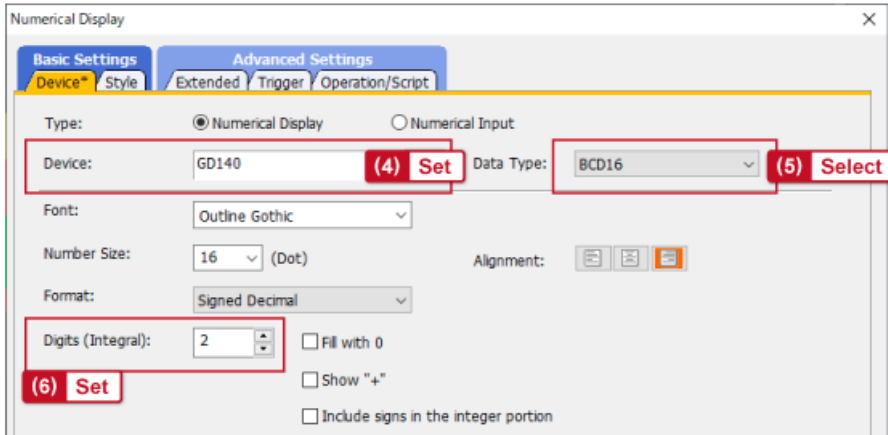
Item	Setting example
Device	GD140
Data Type	BCD16
Digits (Integral)	2

(7) Set the devices (GD140 to GD142) for [Cursor Position Time] to numerical display objects using the steps (1) to (6), and place the objects as shown below.
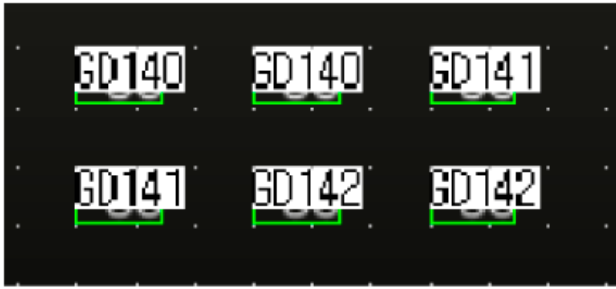
(8) Select [Figure] → [Text] and enter "Cursor Position Time", "/", and ":".

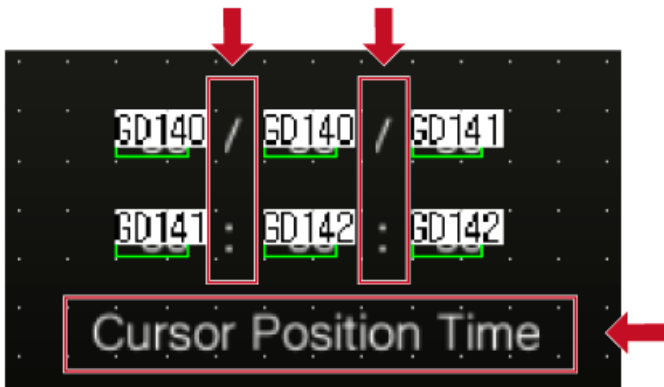(9) Also set the devices (GD150 to GD152) for [Beginning Position Time] and the devices (GD160 to GD162) for [End Position Time] using the same steps as (1) to (8).

Item	Setting example	Description
Month and year	GD140, GD150, GD160	• b15 to b8: The year data is stored. • b7 to b0: The month data is stored.
Date and time	GD141, GD151, GD161	• b15 to b8: The day data is stored. • b7 to b0: The time (hour) data is stored.
Minute and second	GD142, GD152, GD162	• b15 to b8: The time (minute) data is stored. • b7 to b0: The time (second) data is stored.

(10) Open the [Operation/Script] tab of each numerical display object and set [Bit Mask] and [Bit Shift].

Year, day, and minute settings
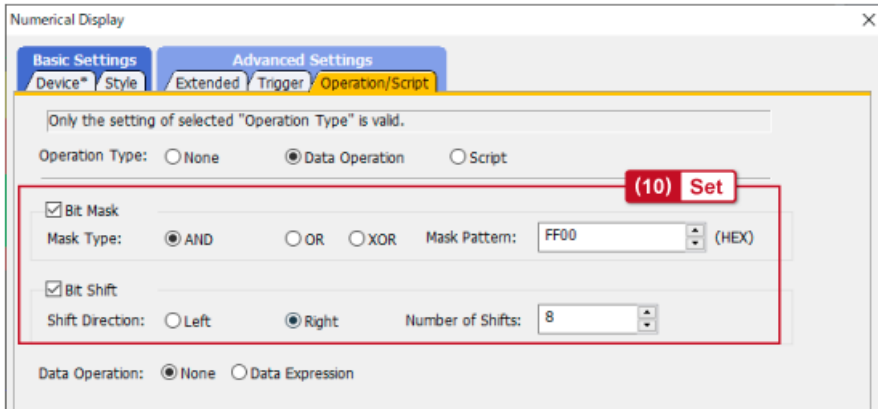
In the numerical display, set the device's lower eight bits (b7 to b0) to be masked and the upper eight bits (b15 to b8) to be shifted to the right by eight bits.

Year, day, and minute		
Item		**Setting example**
Bit Mask	Mask Type	AND
	Mask Pattern	FF00 (HEX)
Bit Shift	Shift Direction	Right
	Number of Shifts	8

Month, hour, and second settings
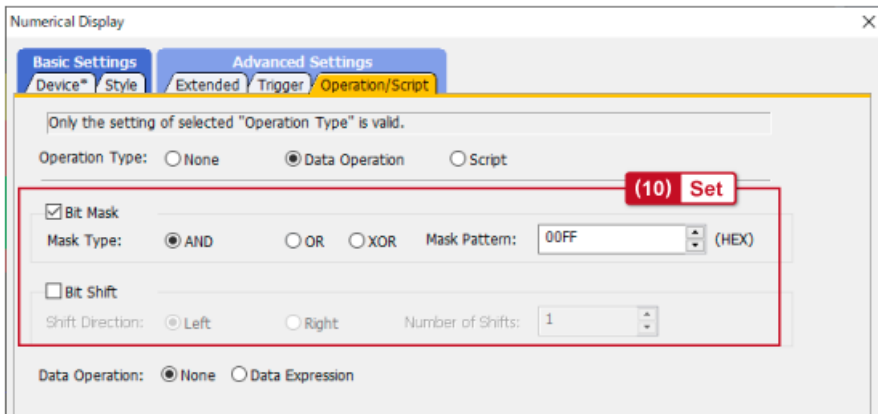
In the numerical display, set the device's upper eight bits (b15 to b8) to be masked.

Month, hour, and second		
Item		**Setting example**
Bit Mask	Mask Type	AND
	Mask Pattern	00FF (HEX)
Bit Shift	—	None

Instead of creating a numerical display object to display the value of the time device, you can copy and paste the relevant data from the template screen introduced at the end of this course.

(1) Select [Object] → [Select Library] → [Library List] from the menu.

(2) Double-click [Historical (Graph+List)] in [System Library] → [Search by Function] → [TemplateScreen(VGA)(ENG)].

(3) Select a template screen.

(4) Click an intended point on the base screen to place the template screen.

(5) Copy the year, month, day, hour, minute, and second data on the template screen and paste the data onto the screen being created. Correct the device number if necessary.

Screen being created

Template screen

* Multiple objects can be selected at once by clicking each object while holding down the Shift key.

Select a set of operation switches for the historical trend graph from the library, and place the set on the screen.

(1) Select [Object] → [Select Library] → [Library List] from the menu.
(2) Select [System Library] → [Search By Function] → [HistoricalGraph Key] → [FA Metal_N HistoricalGraph Key 1(ENG)].
(3) Select a set of operation switches and click an intended point on base screen 2 to place the set.
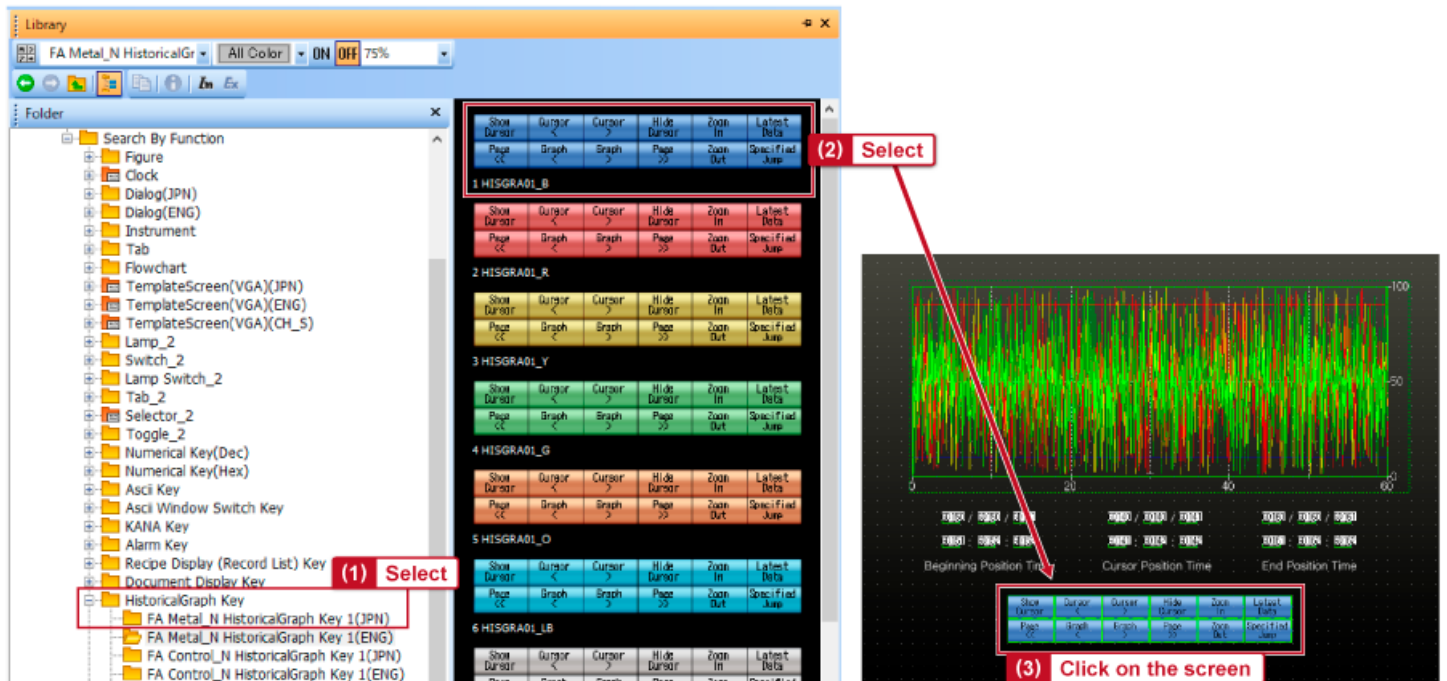
Place a Go To Screen switch on base screen 1 created in the "Logging (Basic Setting)" course and another on base screen 2 created in Chapter 2, and save the project data.

(1) Create a Go To Screen switch on base screen 1.
(2) Create a Go To Screen switch on base screen 2.
(3) Save the GOT project data.
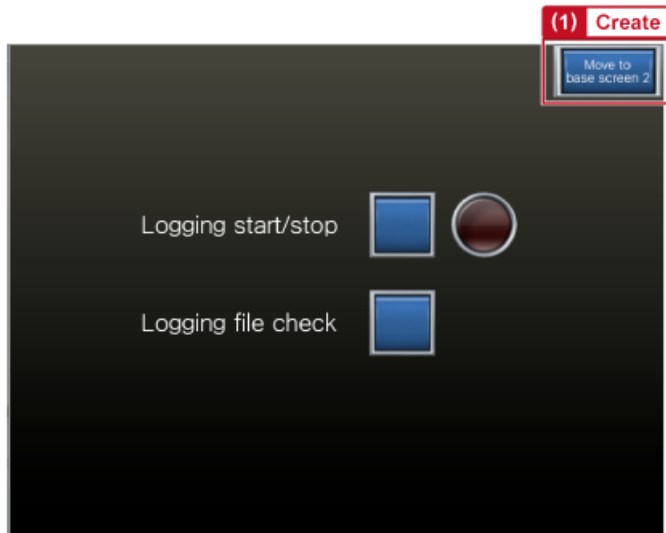
Base screen 1
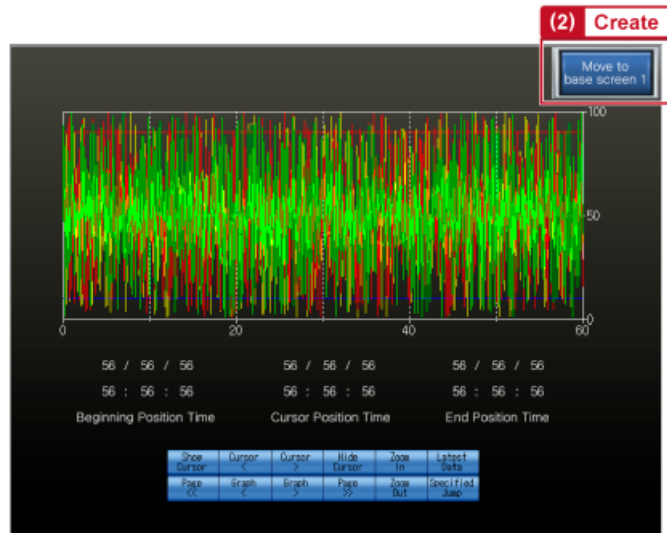
Base screen 2

In this chapter, we will learn how to check the historical trend graph created in Chapter 2 with the GOT.

In this chapter, we will transfer the GOT project data created in Chapter 2 to the GOT and the PLC project data created in the "Logging (Basic Setting)" to the PLC.
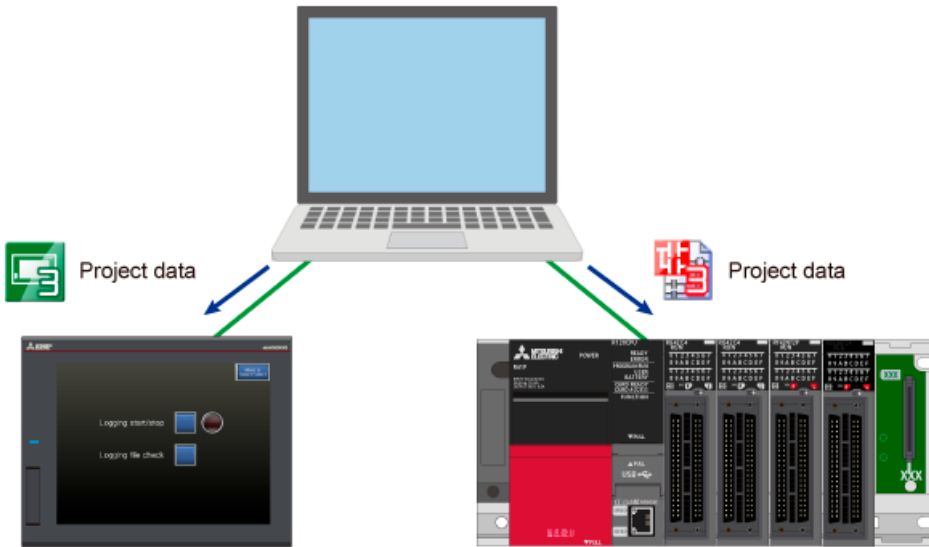
Start logging and display the historical trend graph.

(1) Touch the [Logging start/stop] switch on base screen 1 to start logging.
(2) Display the historical trend graph on base screen 2.
(3) When the historical trend graph is touched, a cursor is displayed at the touched position and the cursor position time is displayed at the bottom center of the graph.
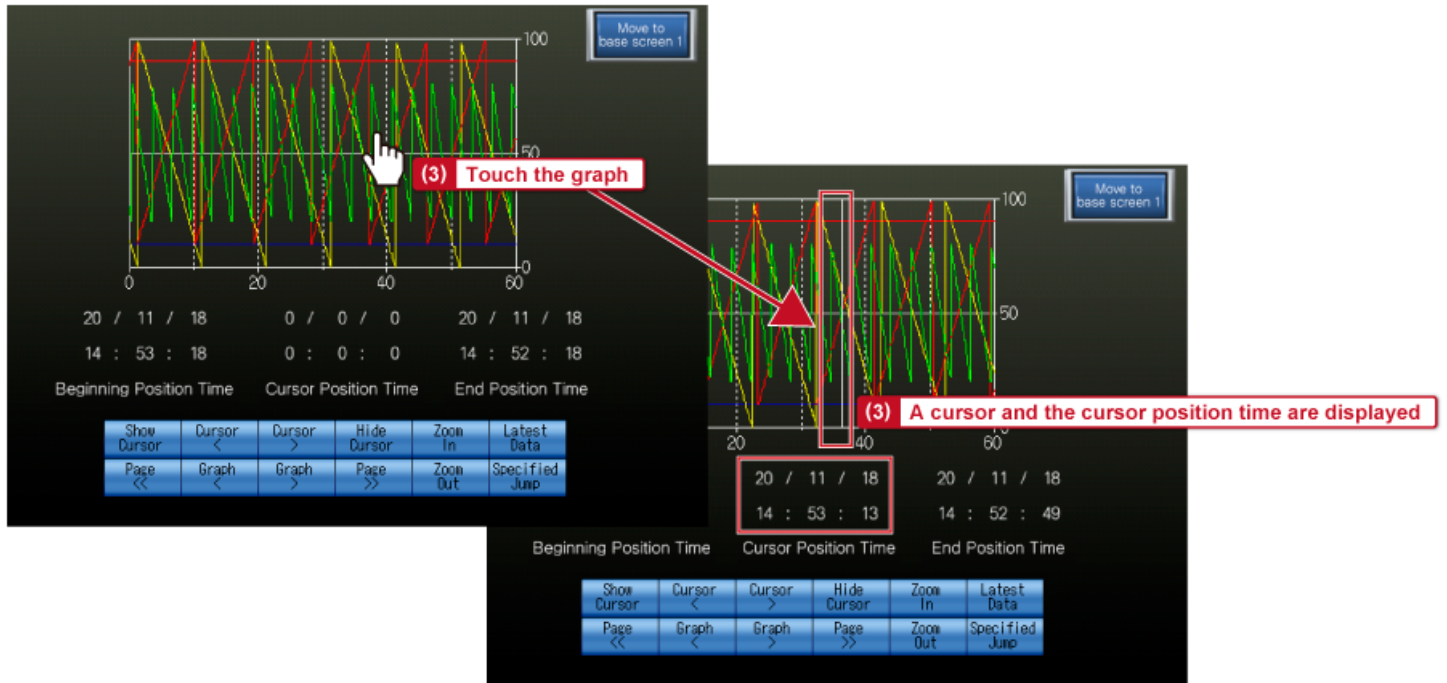
The historical trend graph operation switches can also be used for operations such as displaying a cursor, moving the graph, and zooming in or out.

This chapter introduces various setting items for convenient operation and display of the historical trend graph.

4.1 Screen configuration and setting items

The following settings are available for convenient operation and display of the graph. For the setting method, refer to GT Designer3 (GOT2000) Screen Design Manual.
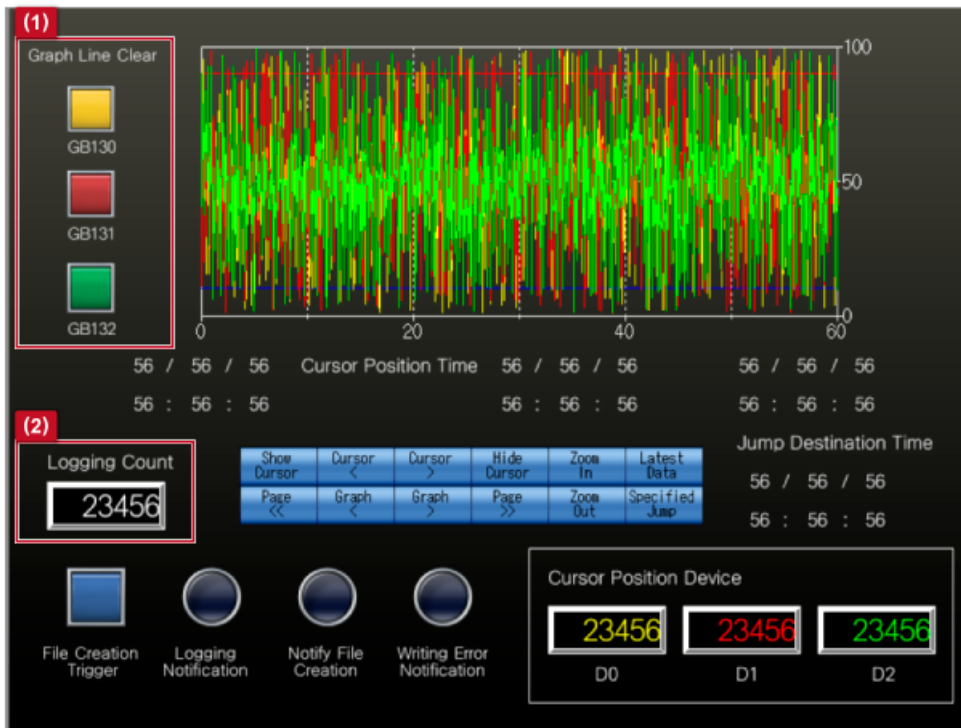
No.	On-screen item	GT Designer3 setting	Description
(1)	Graph Line Clear	Graph Line Clear Device	Set this item when clearing graph lines using a device.
(2)	Logging Count	Logging Count Device	Notifies the number of device value collections after the GOT is started. You can check that the logging operates normally with this device.

The following settings are available for convenient operation and display of the graph. For the setting method, refer to GT Designer3 (GOT2000) Screen Design Manual.

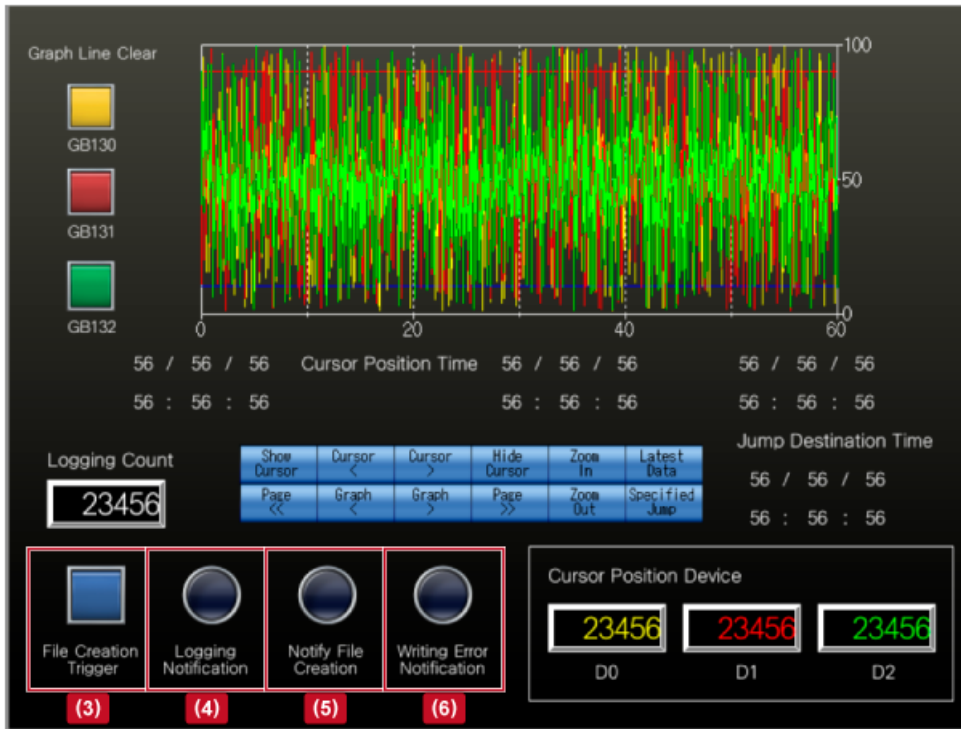| No.	On-screen item	GT Designer3 setting	Description
(3)	File Creation Trigger	Create a logging file at desired timing	A logging file is created at desired timing and the file stores logging data.
(4)	Logging Notification	Logging Notification Device	Notifies that the device values of the controller are being collected to the buffering area.
(5)	Notify File Creation	File Creation Notification Device	Notifies that logging data is being saved to a file when the condition of the file creation trigger is satisfied.
(6)	Writing Error Notification	Writing Error Notification Device	Notifies that an error has occurred while logging data is being written to a data storage or file server.

The following settings are available for convenient operation and display of the graph. For the setting method, refer to GT Designer3 (GOT2000) Screen Design Manual.
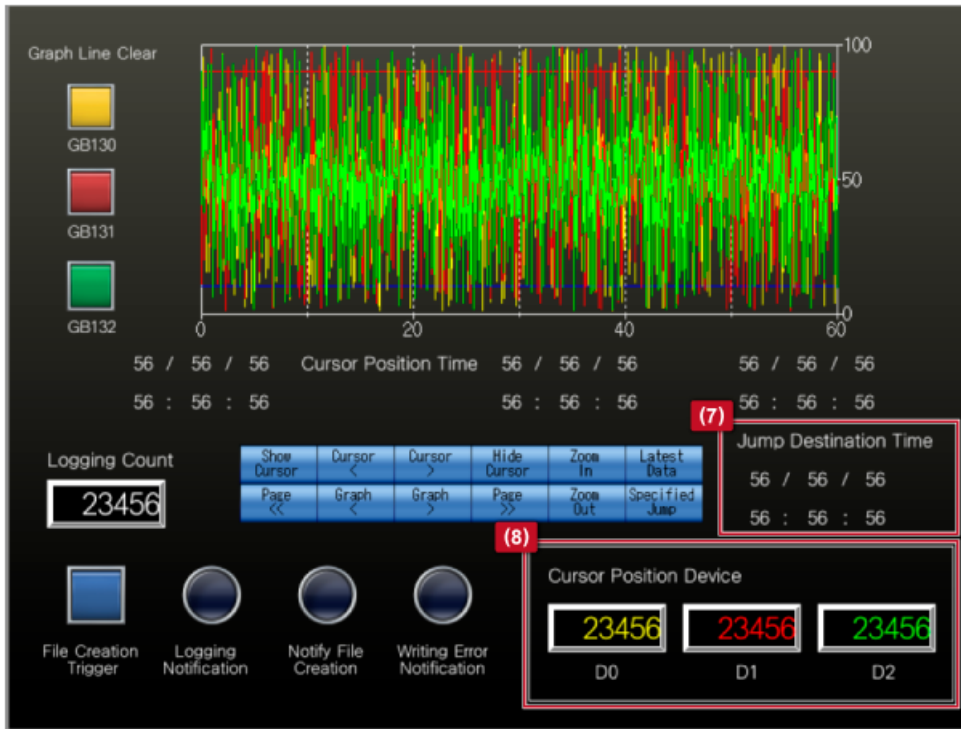

No.	On-screen item	GT Designer3 setting	Description
(7)	Jump Destination Time	Display Position Time Device	Set this item when displaying the specified time data in the center of the graph.
(8)	Cursor Position Device	Cursor Position Data (Graph Information)	Set this item when storing the value of the cursor position device.

Chapter 5 Template Screens

This chapter introduces the template screens for the historical trend graph.

The template screens for GT Designer3 (GOT2000) can be utilized when creating a historical trend graph screen. Select a template screen for the historical trend graph from the library and place it on the base screen.

(1) Select [Object] → [Select Library] → [Library List] from the menu.
(2) Double-click [Historical (Graph+List)] in [System Library] → [Search by Function] → [TemplateScreen(VGA)(ENG)].
(3) Select a template screen.
(4) Click the upper left of the base screen to place the template screen.
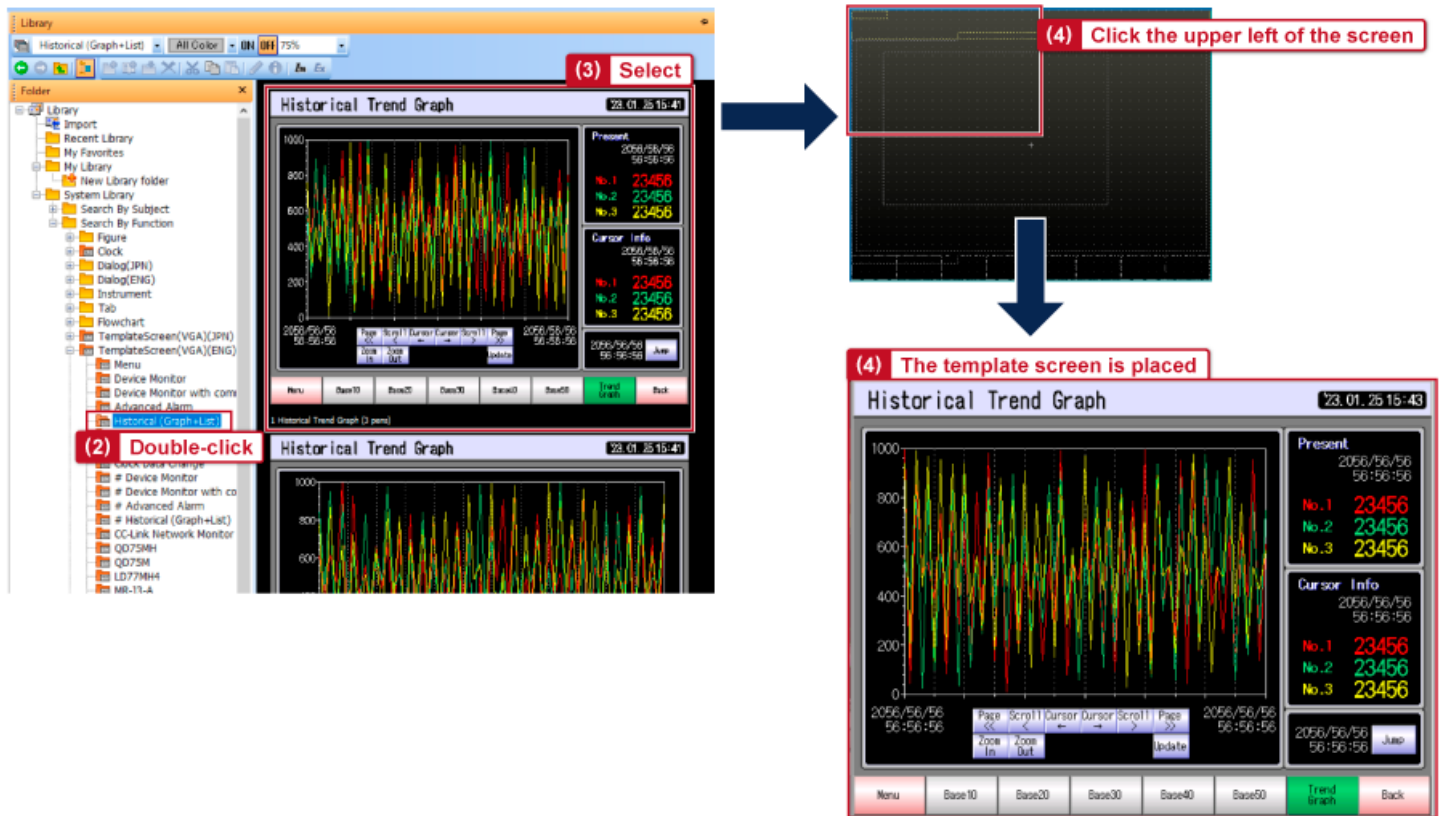
When utilizing a template screen for the historical trend graph, check the logging devices to be monitored.
The logging devices used in this course are the same as those of the template screen, so the template screen can be utilized as-is. Correct the other data if necessary.

(1) [Logging Device]: D0 to D2 are set. Correction is unnecessary.
(2) [Points]: Correct "61" to "600".
(3) [Upper Limit]: Correct "1000" to "100". (Also correct [Upper Limit] for [Scale Value] in the [Style] tab to "100".)
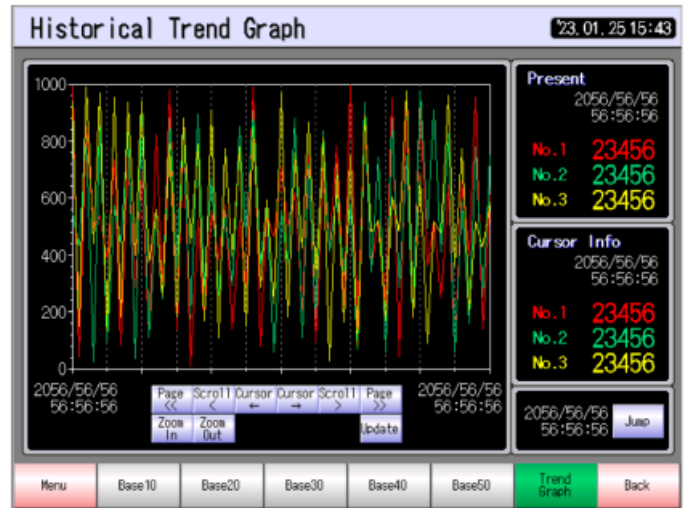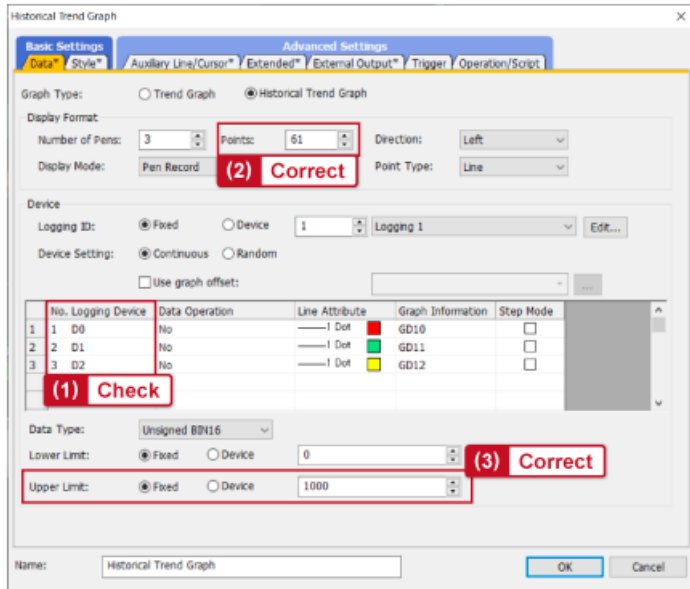
This chapter introduces the sample screens for the historical trend graph.

The sample screens for GT Works3 can be utilized when creating a historical trend graph screen.
Install the sample screens from the GT Works3 DVD or contact your local sales office for details.
The following shows the steps to install the sample screens from the GT Works3 DVD.

(1) Select [Screen] → [Utilize Data] from the menu.
(2) Select [Sample project] for [Target] and [Want to display a graph] for [Category].
(3) Select a sample screen and click the [Utilize] button.
(4) The Utilize Data wizard appears. Follow the on-screen instructions and click [Next], and the sample screen can be utilized.

When utilizing a sample screen for the historical trend graph, check the logging devices to be monitored.
The logging devices used in this course are the same as those of the sample screen, so the sample screen can be utilized as-is.
Correct the other data if necessary.

(1) [Logging Device]: D1 to D7 are set, and the first D0 to D2 are the same as those of the monitored devices. Correction is unnecessary.
(2) [Number of Pens]: Correct "8" to "3".
(3) [Upper Limit]: Correct "1000" to "100". (Also correct [Upper Limit] for [Scale Value] in the [Style] tab to "100".)
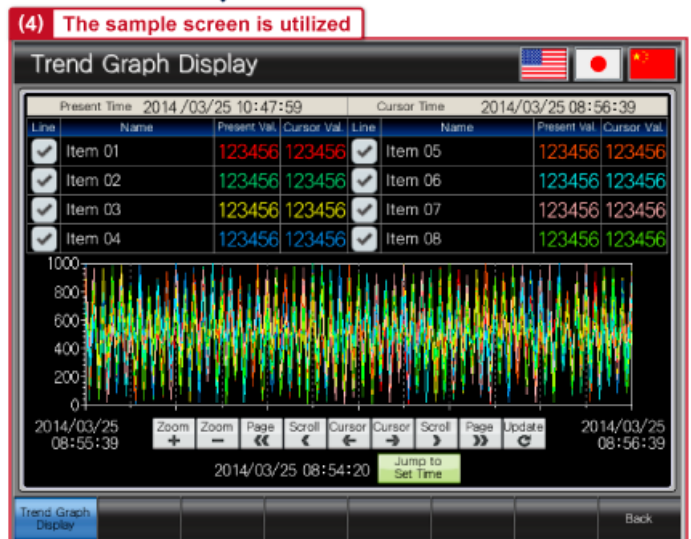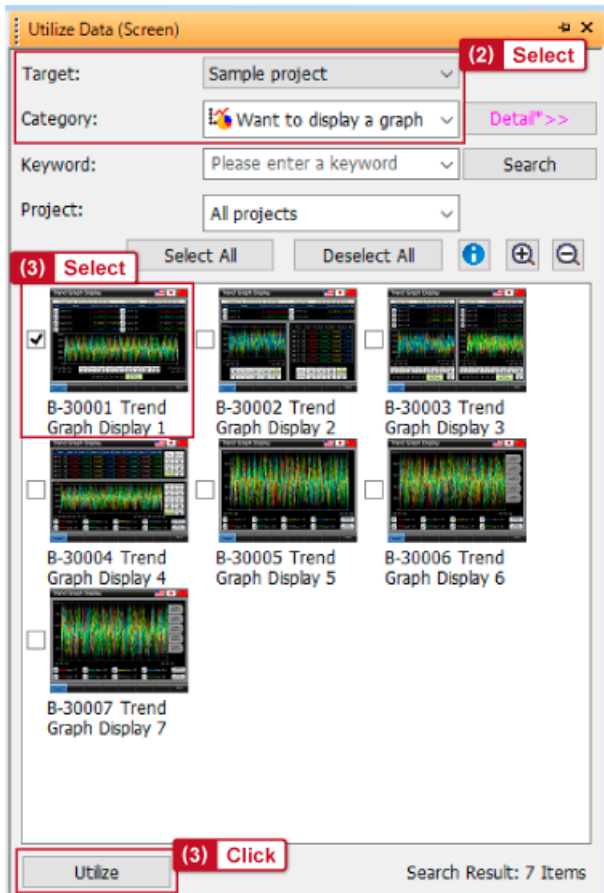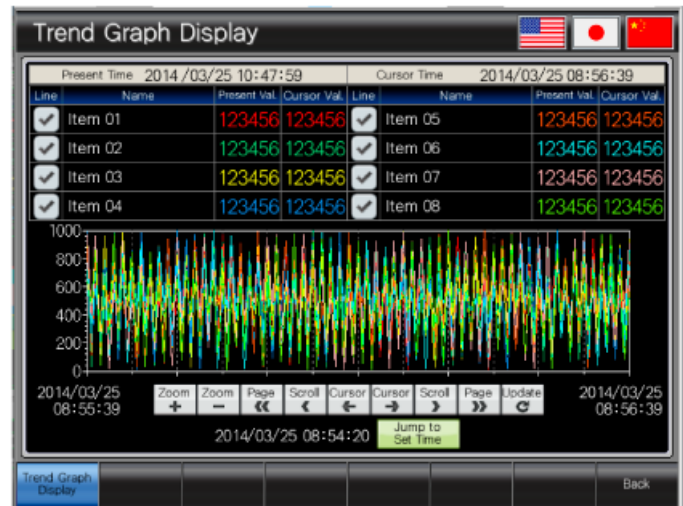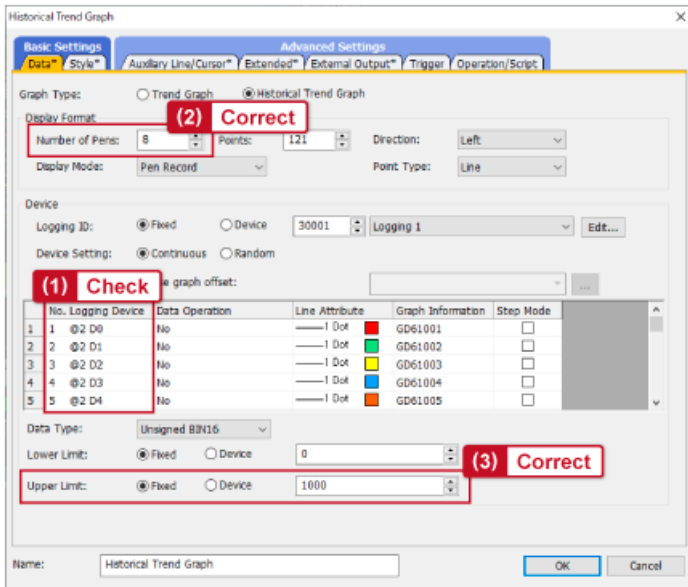
Now that you have completed all of the lessons of the **Logging (Historical Trend Graph)** course, you are ready to take the final test. If you are unclear on any of the topics covered, please take this opportunity to review those topics.

There are a total of 3 questions (4 items) in this Final Test.

You can take the final test as many times as you like.

Score results

The number of correct answers, the number of questions, the percentage of correct answers, and the pass/fail result will appear on the score page.

		1	2	3	4	5	6	7	8	9	10	
Retry	Final Test 1	✔	✔	✔	✘							Total questions: **28**
	Final Test 2	✔	✔	✔	✔							
	Final Test 3	✔										Correct answers: **23**
	Final Test 4	✔	✔									
	Final Test 5	✔	✔									Percentage: **82** %
Retry	Final Test 6	✔	✘	✘	✘							
	Final Test 7	✔	✔	✔	✔							
	Final Test 8	✔	✔	✔	✔	✔						To pass the test, **60%** of correct
	Final Test 9	✔										answers is required.
Retry	Final Test 10	✘										

Complete the following sentence.

The historical trend graph function displays device values ([Q2]) collected by the [Q1] chronologically in a graph.

Q1 Logging function ⌄

Q2 Logging data ⌄

Complete the following sentence.

The historical trend graph function can also display [Q3] that is outside the display range of the horizontal axis.

Q3

○ **Future data**

◉ **Past data**

○ **Estimated data**

Complete the following sentence.

A cursor can be displayed by touching of the graph. The [Q4] of the cursor position can also be displayed.

Q4

○ **Time**	○ **Frequency**
○ **Frame color**	

You have completed the Final Test. You results area as follows.
To end the Final Test, proceed to the next page

		1	2	3	4	5	6	7	8	9	10
	Final Test 1	✓	✓								
	Final Test 2	✓									
	Final Test 3	✓									

Total questions: **4**

Correct answers: **4**

Percentage: **100** %

Clear

You have completed the Logging (Historical Trend Graph) course.

Thank you for taking this course.

We hope you enjoyed the lessons and the information you acquired in this course will be useful in the future.

You can review the course as many times as you want.

Review

Close