24 Data Sampling

This chapter explains the workflow of GP-Pro EX "Data Sampling" including how to change the settings.
Start with "24.1 An Introduction to the Sampling Feature" (page 24-2) , and then turn to the corresponding page from "24.2 Settings Menu" (page 24-3) .

24.1 An Introduction to the Sampling Feature....24-2
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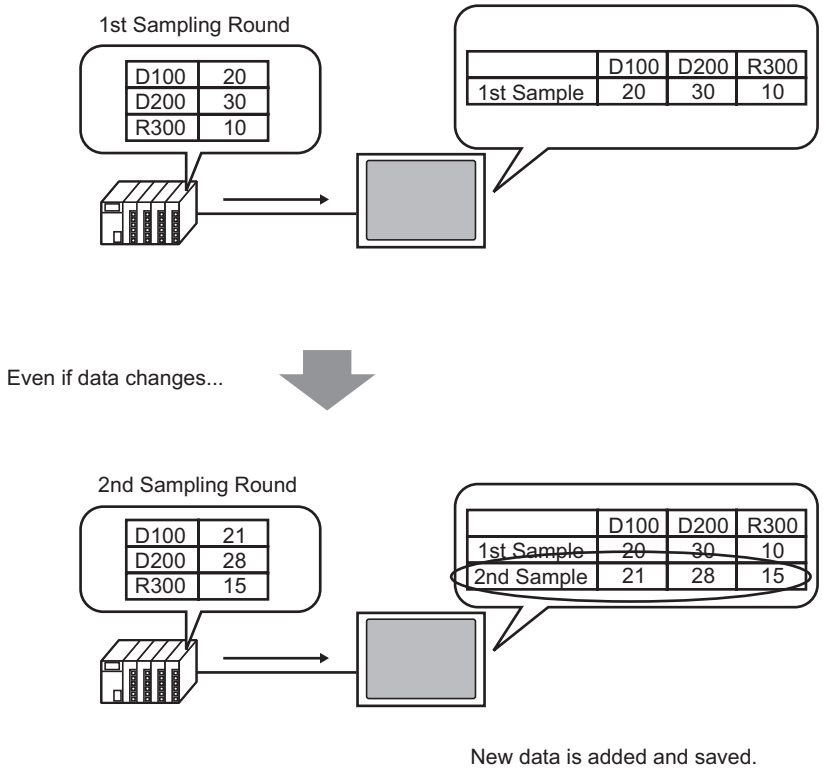
24.1 An Introduction to the Sampling Feature

24.1.1 What is the Sampling Feature?

This feature samples data from the desired address value of the device/PLC at the designated time and then stores it in the GP. This is useful for viewing data history.

At the designated time, data from the device/PLC is read in to the GP.

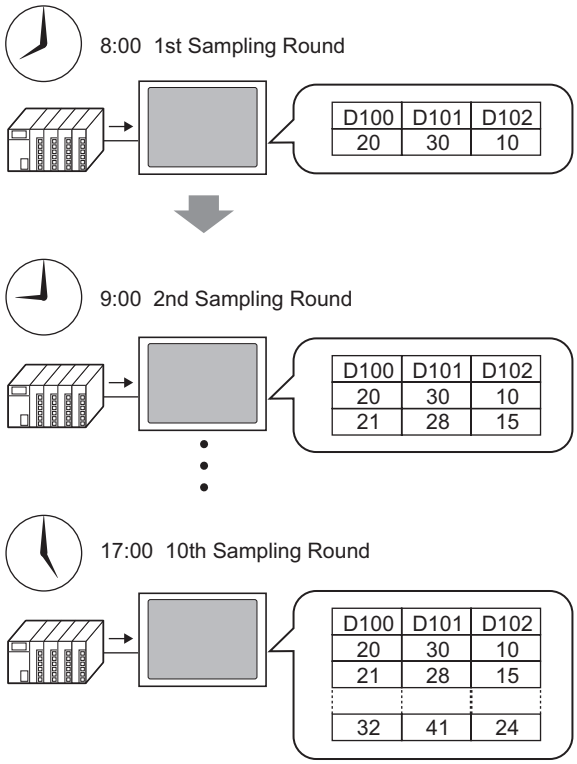


Data collected by the Sampling feature is called "Sampling Data".
Sampled data can be displayed as a line graph on the GP screen and printed from a printer connected to the GP screen. The data can also be saved to a CF Card or USB storage device. You can edit it using general spreadsheet software (such as Microsoft Excel) on the screen because it is saved in CSV format.

24.2 Settings Menu

Sampling Data at Constant Intervals

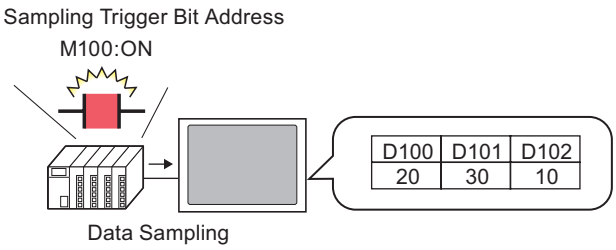
Data is collected from once every hour for 10 times, starting at 08:00



☞ Setup Procedure (page 24-6)
☞ Introduction (page 24-5)

Sampling Data at Specific Periods

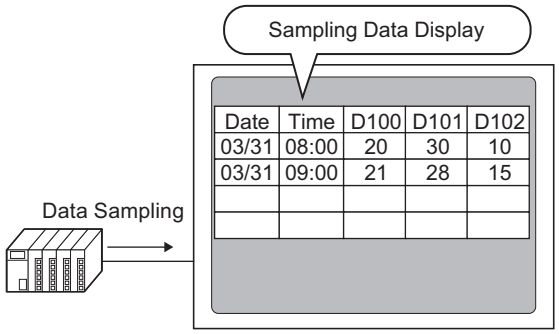
Data is collected every time the designated bit turns ON.



☞ Setup Procedure (page 24-11)
☞ Introduction (page 24-10)

Displaying Sampled Data

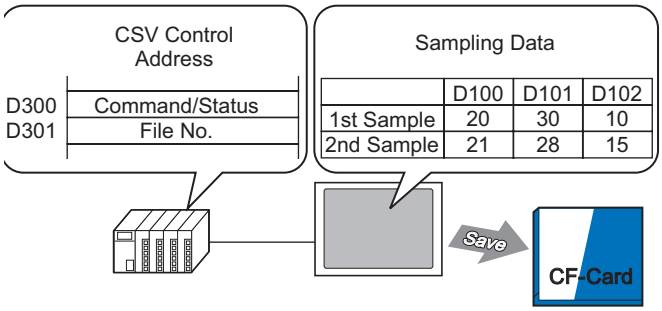
Every time data is collected, it is displayed on a Sampling Data Display on the screen.



☞ Setup Procedure (page 24-15)
☞ Introduction (page 24-14)

Saving Sampling Data to CF Card/USB storage

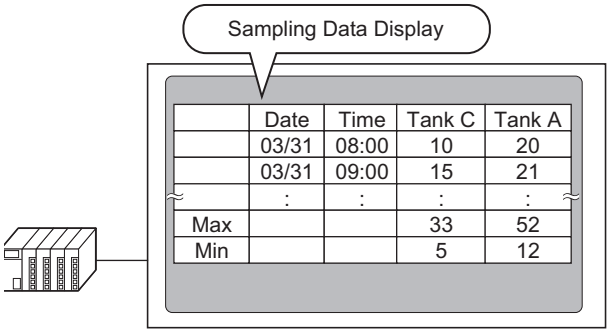
Write a command to the designated Control Address and the GP sampling data is written in CSV format to the CF Card.



☞ Setup Procedure (page 24-21)
☞ Introduction (page 24-20)

Display/Save Sampled Data in CSV with a Custom Format

Create a customized format: display only selected data, change the Item Names, display a calculation row with averages or maximum values.



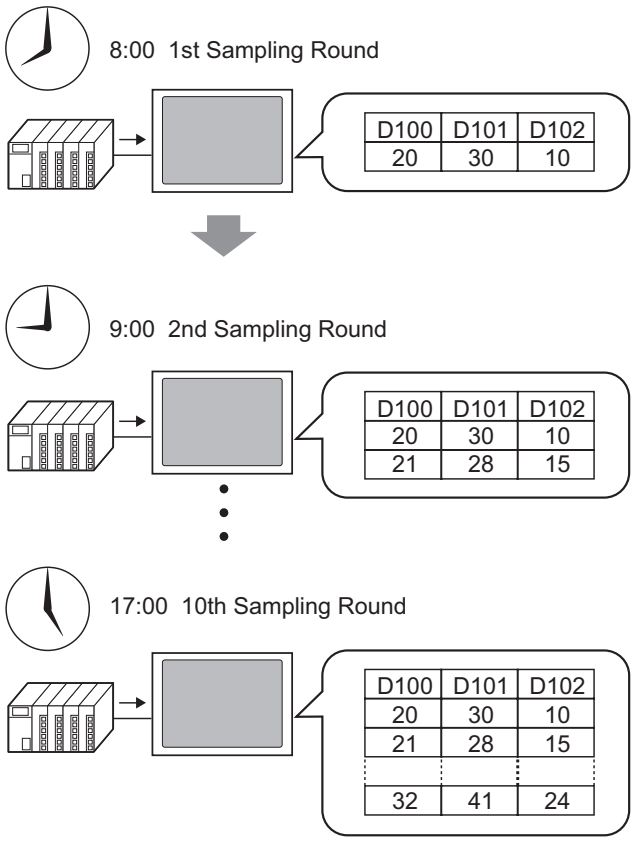
☞ Setup Procedure (page 24-31)
☞ Introduction (page 24-30)

24.3 Sampling Data at Constant Intervals

24.3.1 Introduction

Read the designated address value from the device/PLC at a fixed interval and save that data in the GP.

- Designating the Start Time and sampling data at fixed intervals after that time.
  (For example, Start Time: 08:00, Sampling Cycle: 1 hour, Occurrences: 10)



When you reach the limit defined in the [Cycles] field, you can either continue sampling by overwriting the oldest sample, or stop sampling.

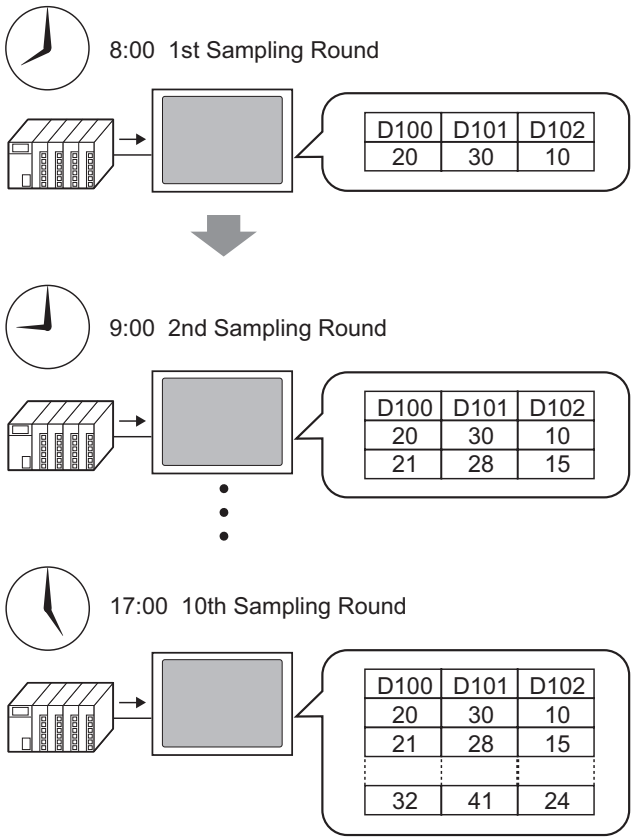
24.3.2 Setup Procedure

NOTE

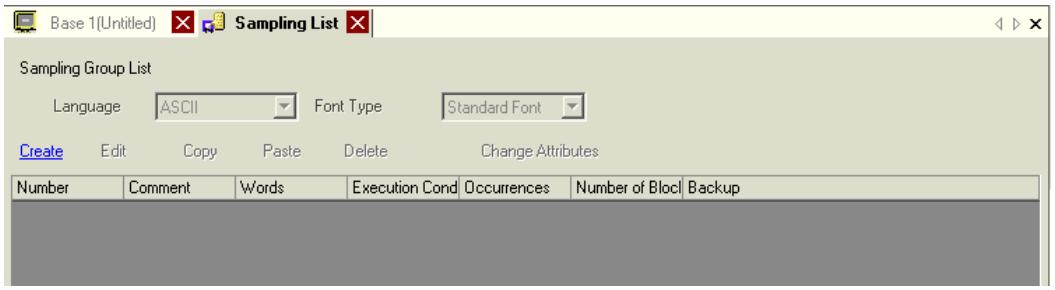
- Please refer to the settings guide for details.

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

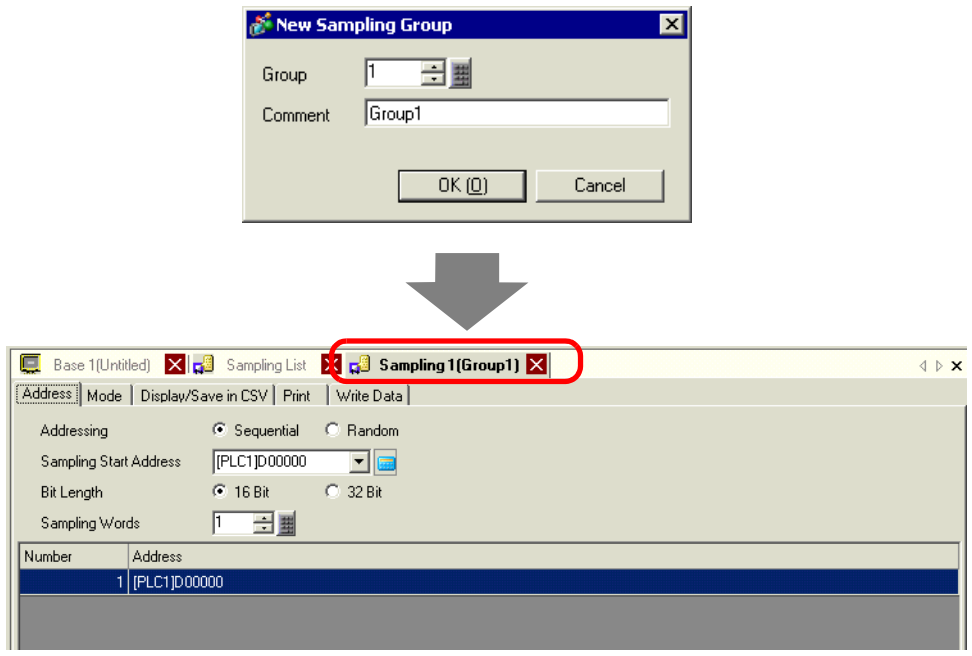
Configure settings to sample the data from D100, D101, and D102 once every hour starting at 8:00 for ten cycles.



1 In the [Common Settings (R)] menu, select the [Sampling (D)] command or click , and the following screen appears.



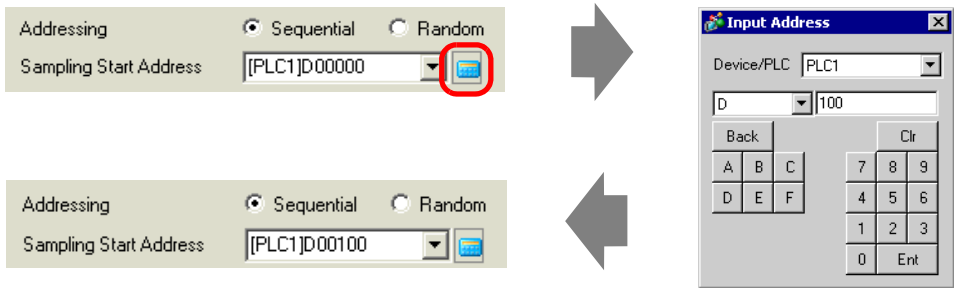
2 Click [Create] and the following dialog box appears. Set the sampling group number, click [OK], and the sampling group settings screen appears.



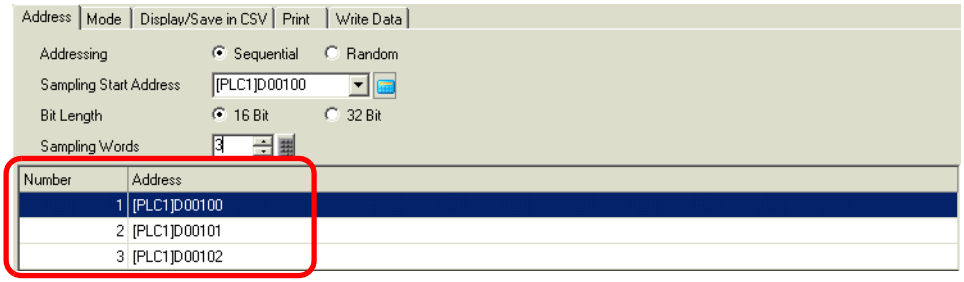
3 In [Sampling Start Address], set the start address (D100) for data you want to sample.

Click the icon to display an address input keypad.

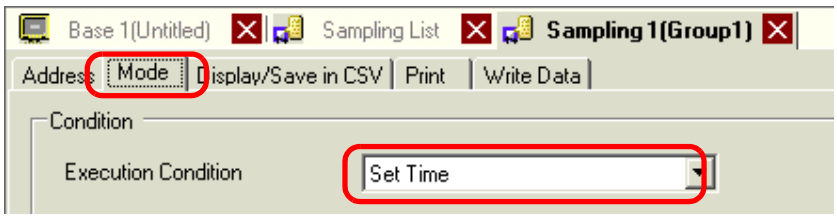
Enter "D" and "100".



4 Designate the bit length to store for sampled data, and in [Sampling Words], set the number of addresses (example, 3). The first three words are displayed, starting from the designated address.



5 On the [Mode] tab, for the [Execution Condition] select [Time Specification].

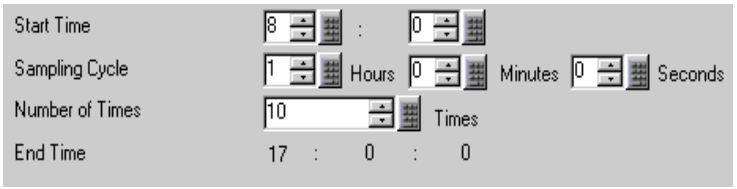


6 In [Sampling Permit Bit Address], set the Bit Address (For example, M100) to control the data sampling operation.

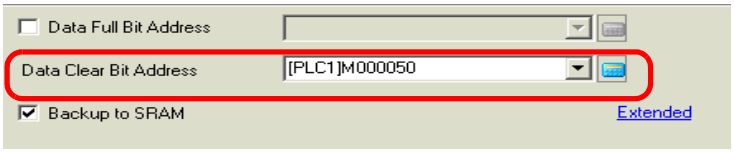
NOTE

- Please ensure that this bit is turned ON before the Start Time. Sampling will not begin if this bit is OFF at the Start Time. Time is monitored with the Clock Data in the GP.

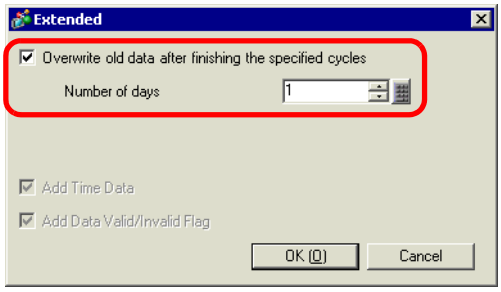
7 Designate the Start Time (8:00) for the data sampling, and set the cycle and Cycles (each hour for 10 cycles).



8 Set up the address (for example, M50) used to delete the sampling data. When this bit is turned ON, all data from sampling group 1 stored in the GP is deleted.



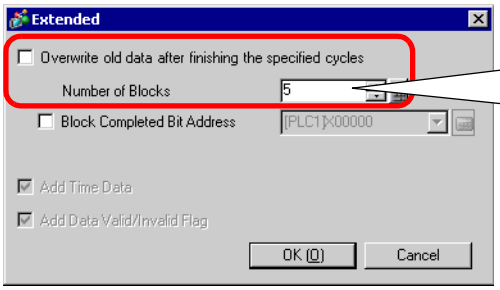
9 Click [Extended] and the following dialog box appears. As needed, set the number of days of sampling data that will be maintained in the GP.



For the picture to the left, one day data will be maintained in the GP.
On the following day at the Start Time (8:00), the previous day sampling data will be overwritten in order and new data stored.
If you clear the [Overwrite old data after finishing the specified cycles] check box, you can adjust the [Blocks] setting.

A "block" is the sampling data collected from the designated Cycles. When displaying or printing data, you can use block units.

(For example, Sample for five hours from Monday to Friday and display/print data every day.)



The sampled data for the designated Cycles is one block. Specify how many blocks.

For the picture to the left, five days sampling data will be maintained in the GP.
On the 6th day and later, sampling will not occur. To resume sampling, clear the sampling data stored in the GP.

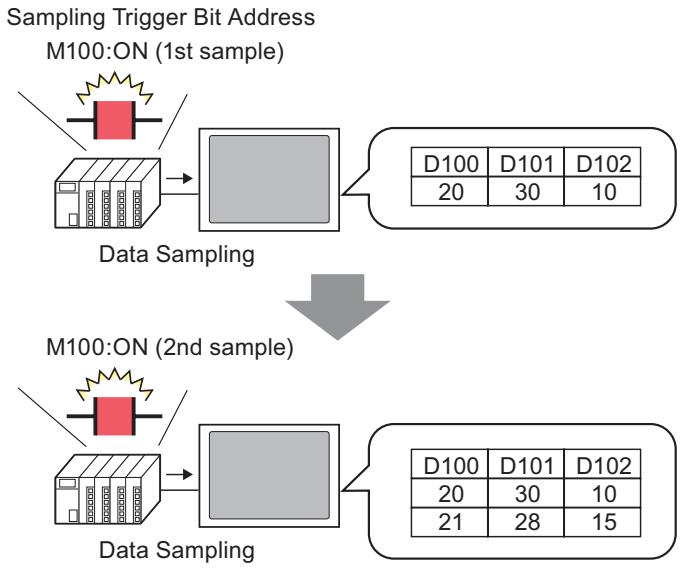
NOTE

- For information about the timing of the Sampling action, please refer to the following.
  ☞ "24.9.2 The Sampling Action ◆ Time Specification" (page 24-106)
- With [Backup to SRAM] unchecked, the sampling data stored in the GP will be erased when turning OFF or resetting the GP.

24.4 Sampling Data at Specific Periods

24.4.1 Introduction

Each time the designated bit address turns ON, the specified address value is read from the device/PLC and that data is saved in the GP.



Sample data from the designated Cycles, and set whether to overwrite the oldest data and store the new data the next time the designated bit turns ON, or to stop sampling.

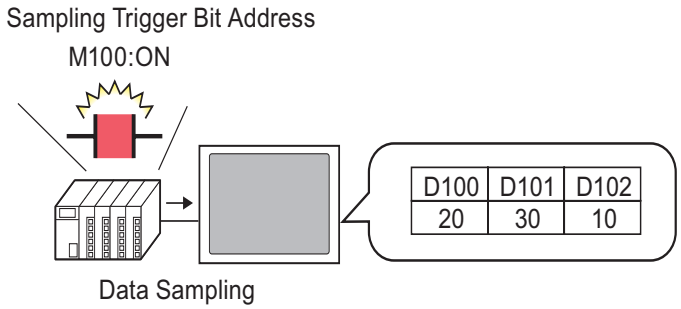
24.4.2 Setup Procedure

NOTE

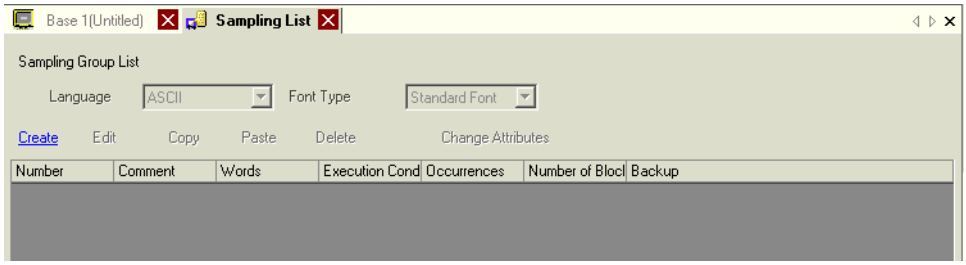
- Please refer to the settings guide for details.

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

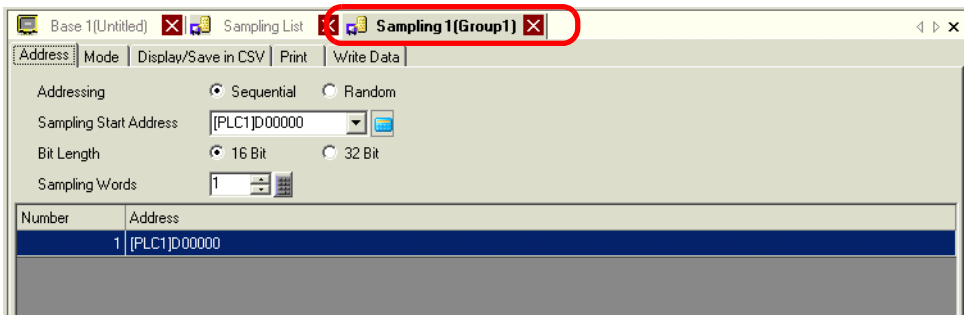
Configure settings to sample data from D100, D101, and D102 every time the bit (M100) turns ON.



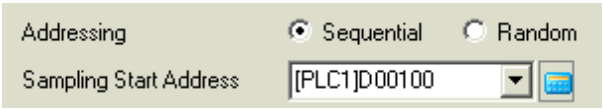
1 In the [Common Settings (R)] menu, select the [Sampling (D)] command or click , and the following screen appears.



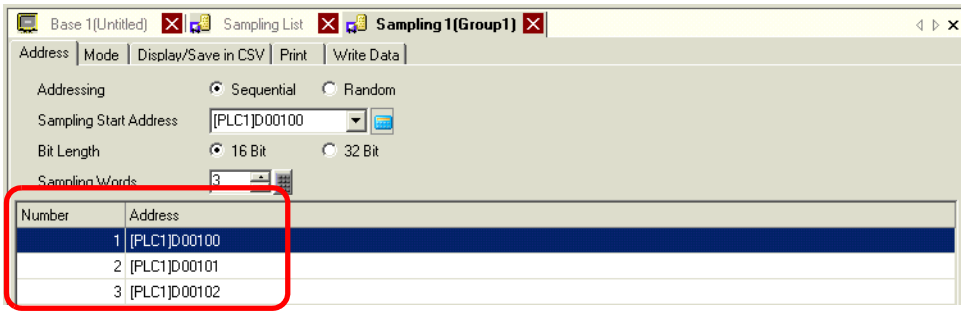
2 Click [Create] and the following dialog box appears. Set the sampling group number, click [OK], and the sampling settings screen appears.



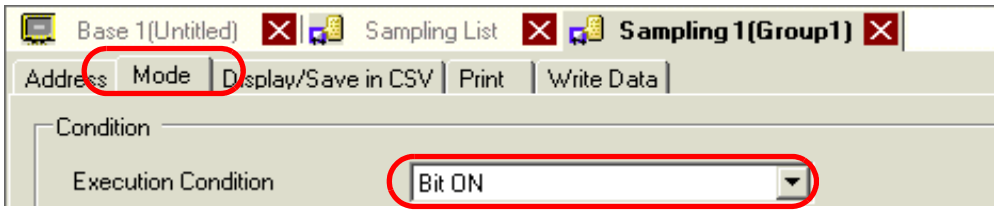
3 In [Sampling Start Address], set the start address (D100) for data you want to sample.



4 Designate the bit length to store for sampled data, and in [Sampling Words], set the number of addresses (example, 3). The first three words are displayed, starting from the designated address.



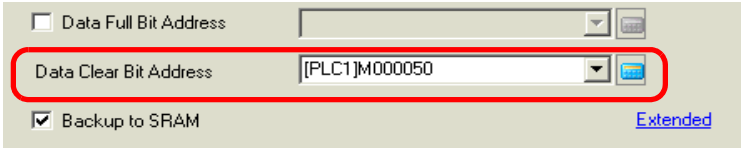
5 On the [Mode] tab, for the [Execution Condition] select [Bit ON].



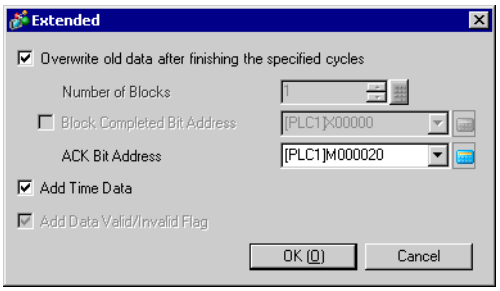
6 In [Sampling Triggered Bit Address], set the bit address (example, M100) to control the data sampling operation. Data sampling runs every time this bit turns ON.

7 Designate the number of times to sample the data (example, 4 times).

8 Set up the address (for example, M50) used to delete the sampling data. When this bit is turned ON, all data from sampling group 1 stored in the GP is deleted.



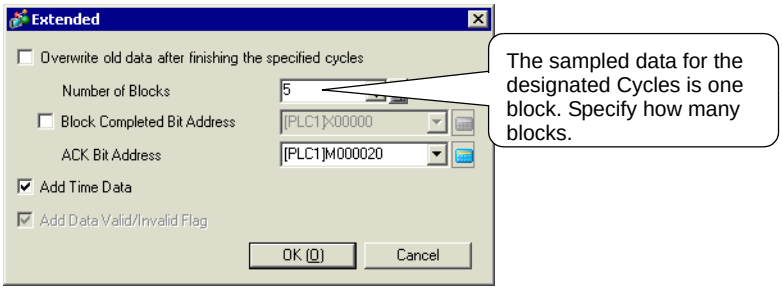
9 Click [Extended] and the following dialog box appears.
Designate the [ACK Bit Address] (example, M20) which will confirm when the data reading is finished. When the data reading is finished, this bit turns ON. Accept this Bit ON and turn OFF the [Sampling Triggered Bit Address] (M100).
(When M100 turns OFF, M20 turns OFF.)



In the picture to the left, when data for the designated number of times (example, 4) is stored to the GP and the trigger bit (M100) turns ON for the 5th time, data will be overwritten and stored starting from the 1st time's data.

If you do not want data to be overwritten, clear the [Overwrite old data after finishing the specified cycles] check box. When the designated bit turns ON for the 5th time, sampling will not occur.

A "block" is the sampling data collected from the designated Cycles. When displaying or printing data, you can use block units.
For example, Sampling for five hours from Monday to Friday and displaying/printing data everyday.



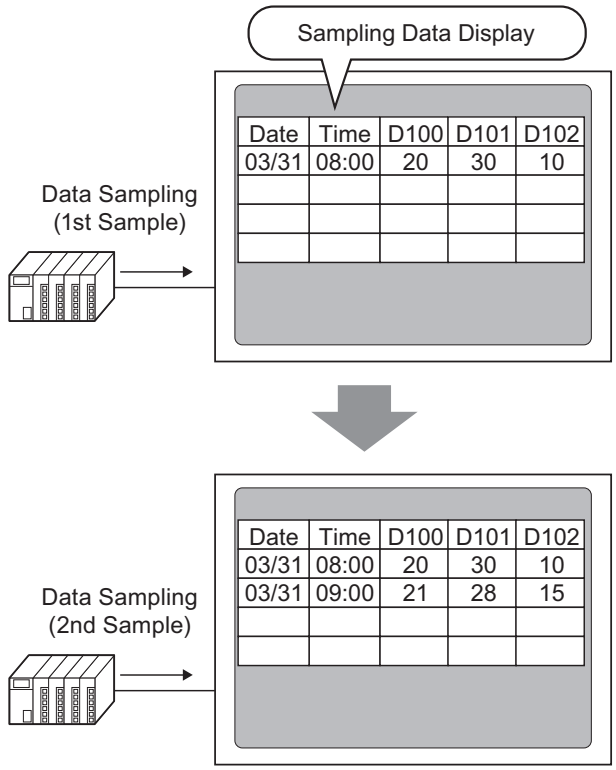
NOTE

- For information about the timing of the Sampling action, please refer to the following.
☞ "24.9.2 The Sampling Action ◆ Bit ON" (page 24-109)
- With [Backup to SRAM] unchecked, the sampling data stored in the GP will be erased when turning OFF or resetting the GP.

24.5 Displaying Sampled Data

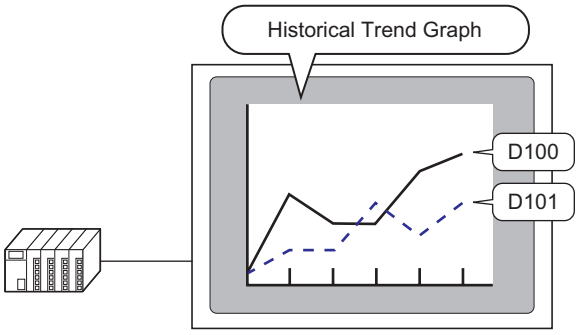
24.5.1 Introduction

Display data collected with the Sampling feature (Sampling Data) on the GP screen in table format.
Data is displayed on the screen every time sampling occurs. This feature is useful for checking changes in address values.



NOTE

- You can also edit sampling data on the screen by touching it.
- Sampled Data can also be displayed in a Line Chart.
  ☞ "17.4 Using Line Charts" (page 17-11)

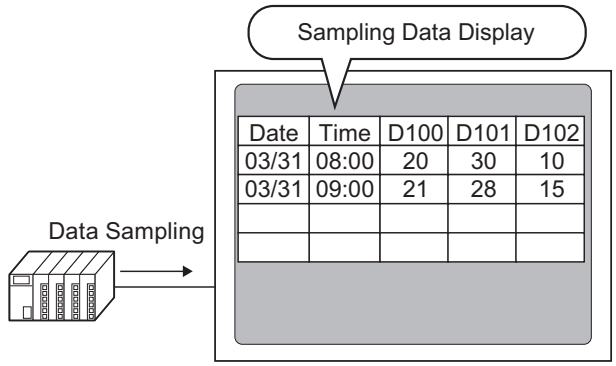


24.5.2 Setup Procedure

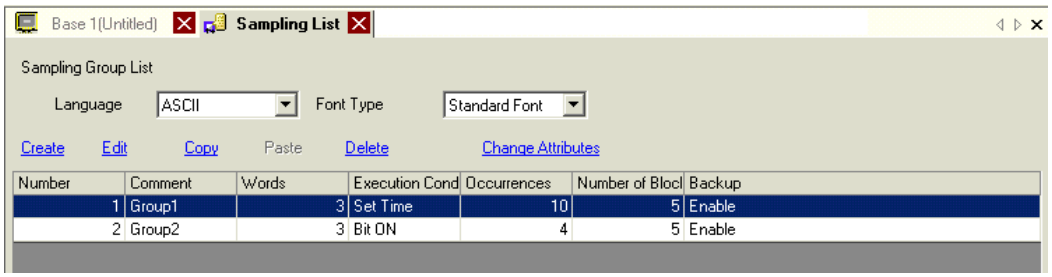
NOTE

- Please refer to the settings guide for details.
  ☞ "24.8.1 Common [Sampling] Settings Guide ■ Display/Save in CSV" (page 24-52)
  ☞ "24.8.2 Sampling Data Display Guide" (page 24-93)
- 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)

Configure settings to display Sampling Group "1" on the GP screen.

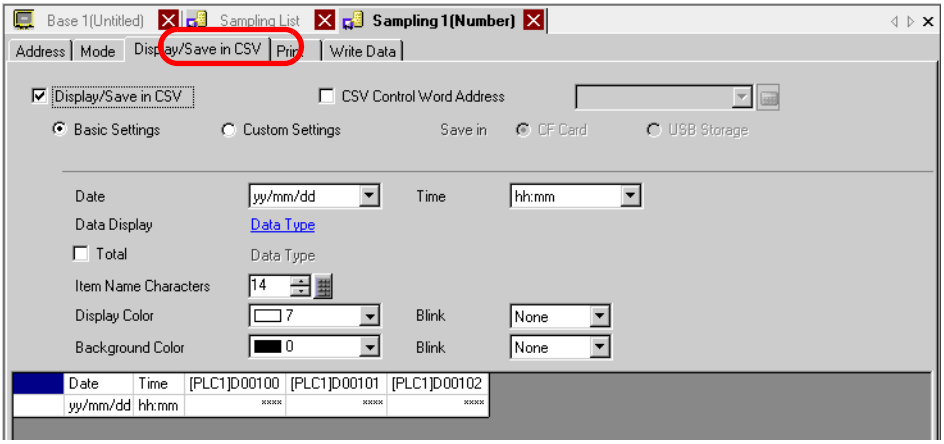


1 In the [Common Settings (R)] menu, select [Sampling (D)] or click , and a list of registered sampling groups appear. Double-click row 1 and the sampling group 1 setup screen appears.



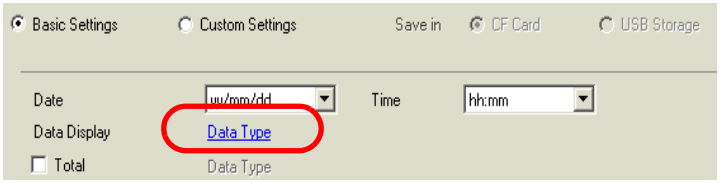
For information about Address/Action, see "24.3.2 Setup Procedure" (page 24-6) .

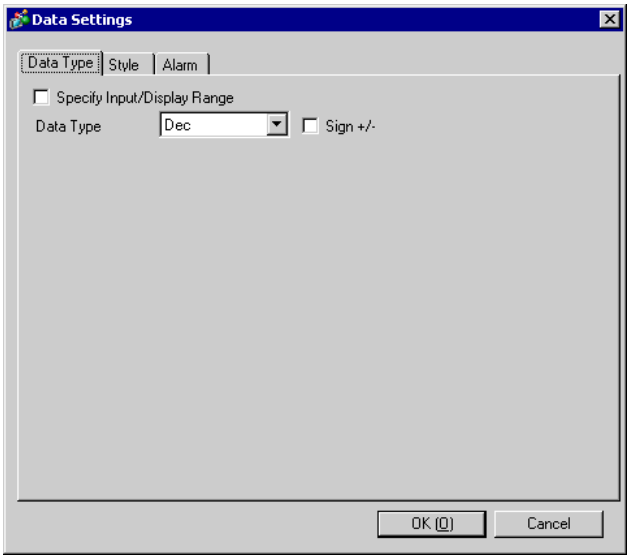
2 Open the [Display/Save in CSV] tab. Select the [Display/Save in CSV] check box.



3 Select the display format for the date and time.

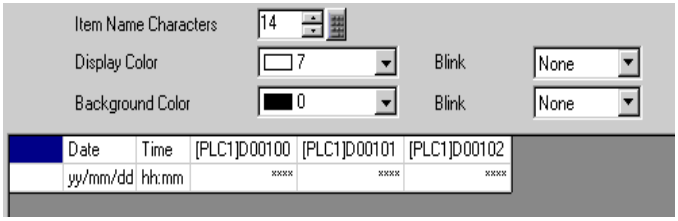
4 Click [Data Type Settings] to open the [Data Settings] dialog box. Set the data type, input range, number of display digits, and so on. The settings are applied to all the data columns.





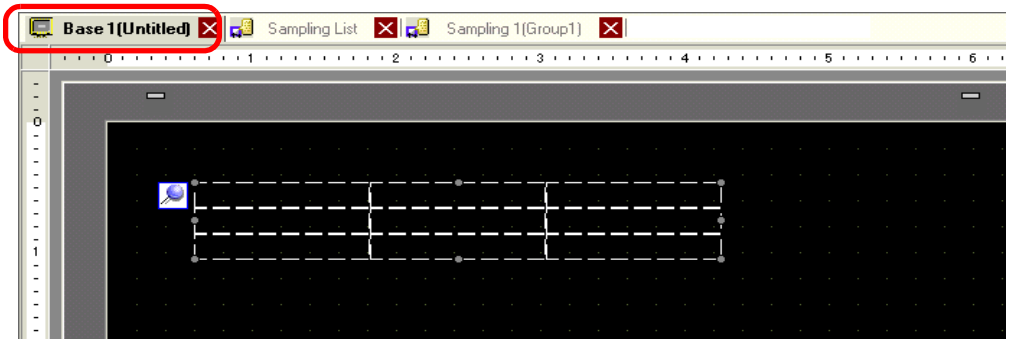
Click [OK] to close the dialog box.

5 Select a color and background color for the displayed text.

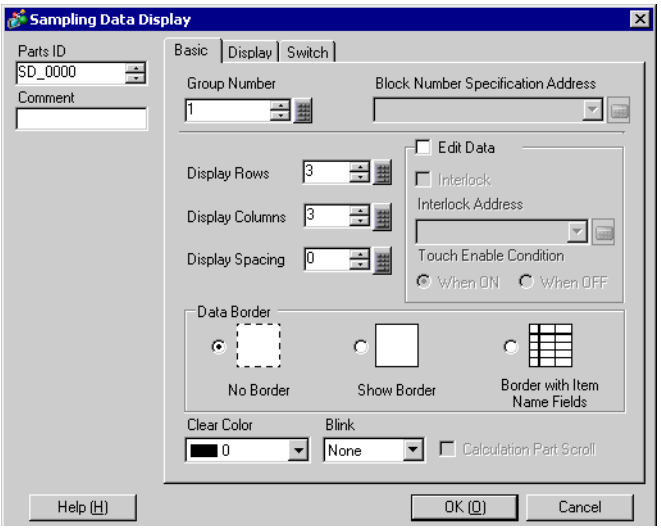


The display format settings are complete.

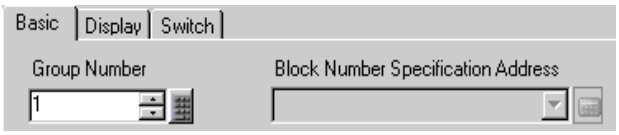
6 Open the editing screen, and on the [Parts (P)] menu select [Sampling Data Display (S)], or click , to place the Part on the screen.



7 Double-click the placed Sampling Data Display. The Settings dialog box appears.



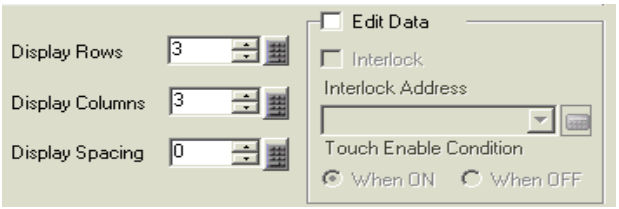
8 Define the sampling group you want to display on the screen. Set Sampling Group to "1".



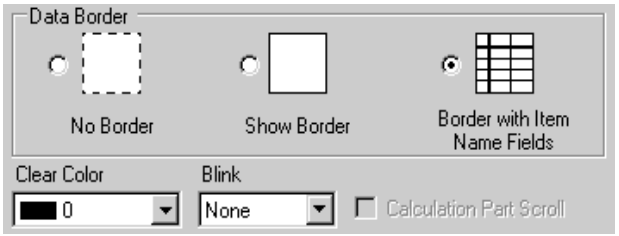
NOTE

- Use the [Block Number Specification Address] to display the sampling group when in the [Common Settings (R)] [Sampling] screen [Mode] tab [Extended] area, the [Overwrite old data after finishing the specified cycles] check box is cleared.

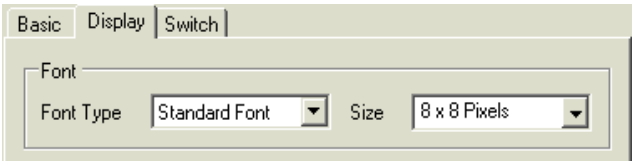
9 Set the [Display Lines] and [Display Columns].



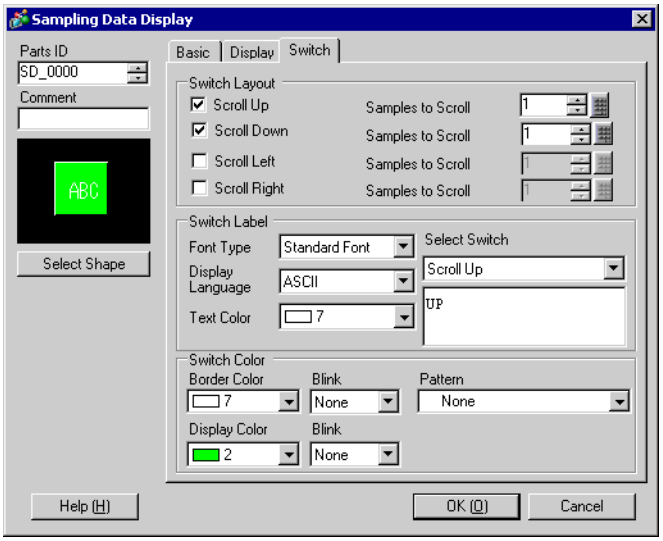
10 Select whether or not to show Ruled Line/Border and select the [Clear Color].



11 Select the [Display] tab, and set the font type and size.



12 Select the [Switch] tab, and select the necessary scroll switches.
With [Select Shape], select the switch shapes, set the label and text color as needed, and click [OK].



The Sampling Data Display is now set. You can move the switches independently to the desired location.

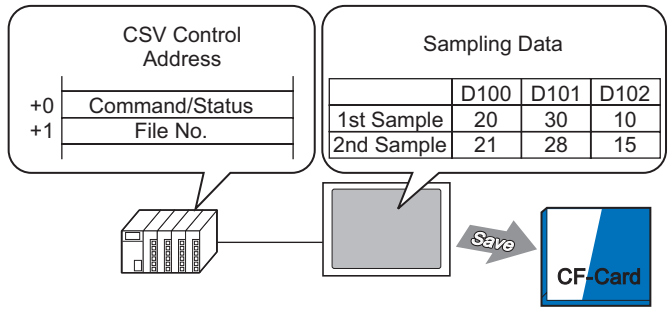
NOTE

- For the attached [Sampling Data Display] switches, you cannot set the shape or color independently. To set a different shape or color for each switch, use the Switch Lamp Part [Special Switch] - [Sampling Data Display Switch].

24.6 Saving Sampling Data to CF Card/USB storage

24.6.1 Introduction

The data (sampling data) sampled by sampling feature is saved in CSV format on a CF Card or USB storage device.
The sampling data (SA*****.csv) saved on a CF card/USB storage device can be analyzed using general spreadsheet software (such as Microsoft Excel) on a computer or used in databases.



Store the File in the designated Control Address + 1, write a command to the Control Address and...

Sampling data in the GP is written in CSV format to the CF Card.

NOTE

- Sampling data (SA*****.csv) in the CF Card can be displayed on the GP using a Special Data Display [File Manager] and Special Data Display [Show CSV].
  ☞ "25.6 Displaying/Editing CSV Data on the Screen" (page 25-30)
- If the CF-card does not have enough free space, you can move less important data from the CF Card to the USB Memory to secure enough memory.
  ☞ "A.5 Transferring Data Between a CF Card and a USB Memory Device" (page A-77)

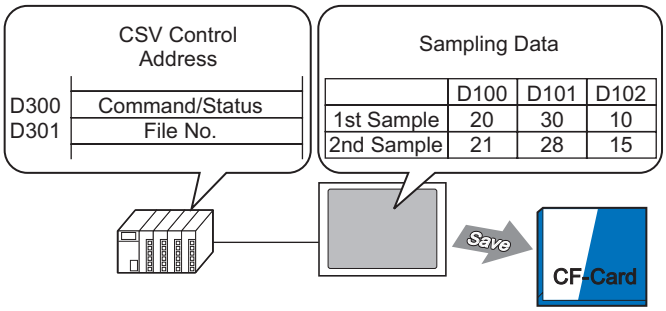
24.6.2 Setup Procedure

NOTE

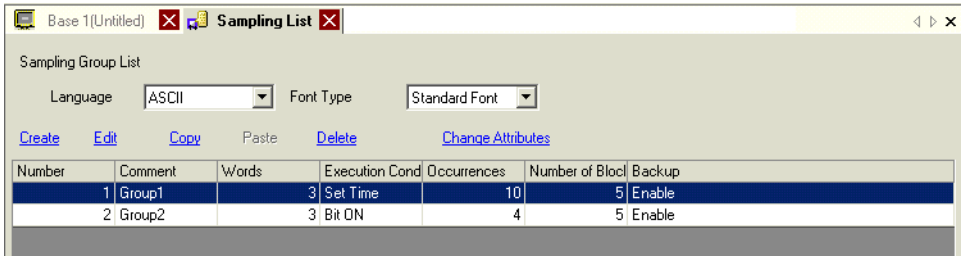
- Please refer to the settings guide for details.

☞ "24.8.1 Common [Sampling] Settings Guide ■ Display/Save in CSV" (page 24-52)

Configure settings to save data from Sampling Group "1" to the CF Card.

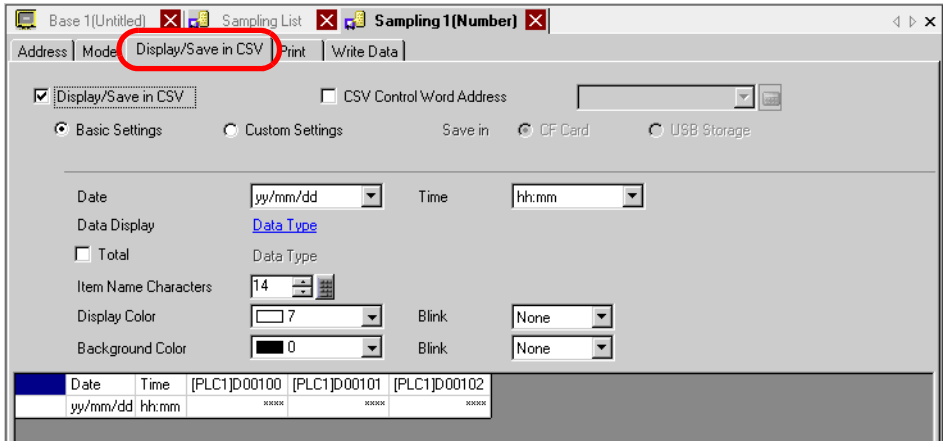


1 In the [Common Settings (R)] menu, select [Sampling (D)] or click , and a list of registered sampling groups appear. Double-click row 1 and the sampling group 1 setup screen appears.



For information about Address/Action, please refer to "24.3.2 Setup Procedure" (page 24-6) .

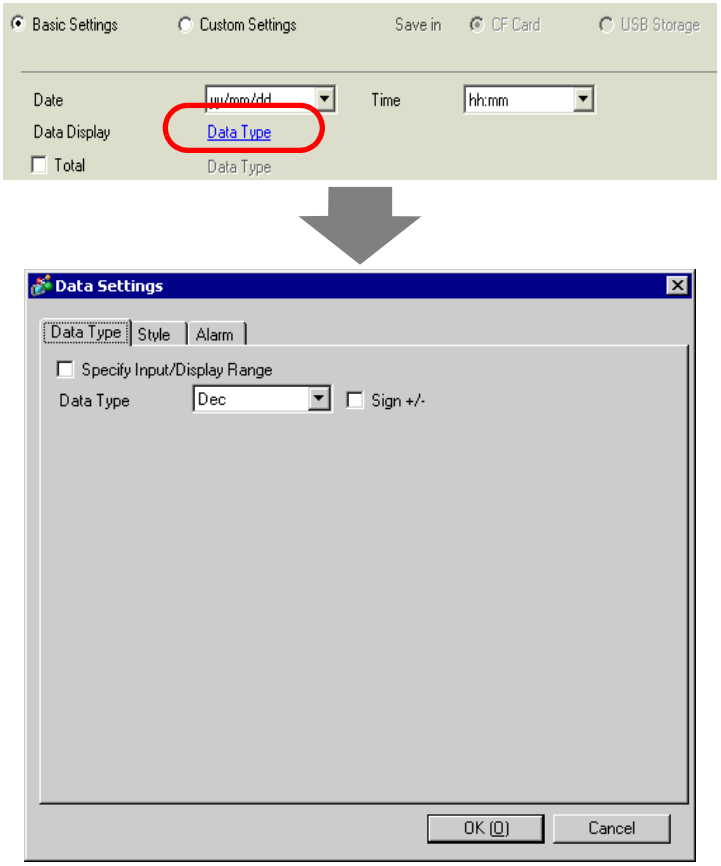
2 Open the [Display/Save in CSV] tab. Select the [Display/Save in CSV] check box.



3 Select the [CSV Save Control Word Address] check box and click [Save in]-[CF Card] to set the word address (for example: D300) to control the save operation.

Two consecutive words from the specified address are used.

4 Click [Data Type] to open the [Data Settings] dialog box. Set the data type and number of display digits as needed. The settings are applied to all the data columns.



Click [OK] to close the dialog box.

5 Set the [Item Name Characters].

The CSV format is now complete.

NOTE

- Regardless of the [Date] and [Time] display settings, the CSV file will be outputted with the [yy:mm:dd] and [hh:mm:ss] format ([hh:mm:ss.ms] when the sampling cycle unit is [ms]).
- Regardless of whether a [Total] row is designated or not, calculation data will not be exported with the CSV file.

24.6.3 CF Card/USB Storage Save Operation

There are two save operations for CF Cards/USB storage devices.

- Normal Save
  When the command is written to the [CSV Control Word Address], data stored in the GP is output as a CSV file.
  ☞ " ◆ Process for Normal Save" (page 24-25)
- Automatic Save
  When the defined number of samples are stored in the GP and the sampling cycle is complete, data stored in the GP is output as a CSV file. This option is available when in the [Mode] tab, [Extended] dialog box, you select the [Overwrite old data after finishing the specified cycles] check box.
  ☞ " ◆ Process for Auto Save" (page 24-25)

■ CSV Control Word Address

This address controls the writing of data to a CF Card/USB storage device. It writes a command to the address after designating a file number.

CSV Control Word Address	Command/Status
+1	File No.

- Command/Status
  Write the command with the specified file number to write the data to a CF Card/USB storage device. The processing results (status) are reflected in the address.

Mode	Word Data	Description
Command	0001h	Normal Save
	0020h	Start Auto Save (Only when data is stored by overwriting old data[*1])
	0021h	End Auto Save (Only when data is stored by overwriting old data[*1])
Status	0000h	Completed Successfully
	0100h	Write Error
	0200h	The CF Card is not inserted / CF Card hatch is open (access switch is OFF) / USB storage device is not inserted
	0300h	No data to be loaded (when no data is specified)
	0400h	File Error
	2000h	The GP is in the normal Auto Save mode. While the [CSV Save Control Address] is this value, the Auto Save action continues. When the value changes, the auto-save mode finishes.

*1 For information about data storage methods, see "24.9.2 The Sampling Action ■ Data Storage Methods" (page 24-112) .

NOTE

- When you change the value of status "2000h" or change the file number in the process, the auto save is exited and the data up to then is written to the CF Card/USB storage device. The written value (command) is not processed.

- File
  Designates the portion ***** the file name "SA*****.csv" when save to CF Card/USB storage. The value can be from 0 to 65,535. Set the file number before writing the command.
  The CSV File is saved to the folder created in the CF Card/USB storage device automatically. The folder is created with a fixed folder name for each sampling group.

Data to be saved	Folder	File Name
Sampling Group 1's data	\SAMP01	SA*****.CSV
* * *	* * *	
Sampling Group 64's data	\SAMP64	SA*****.CSV

◆ Process for Normal Save

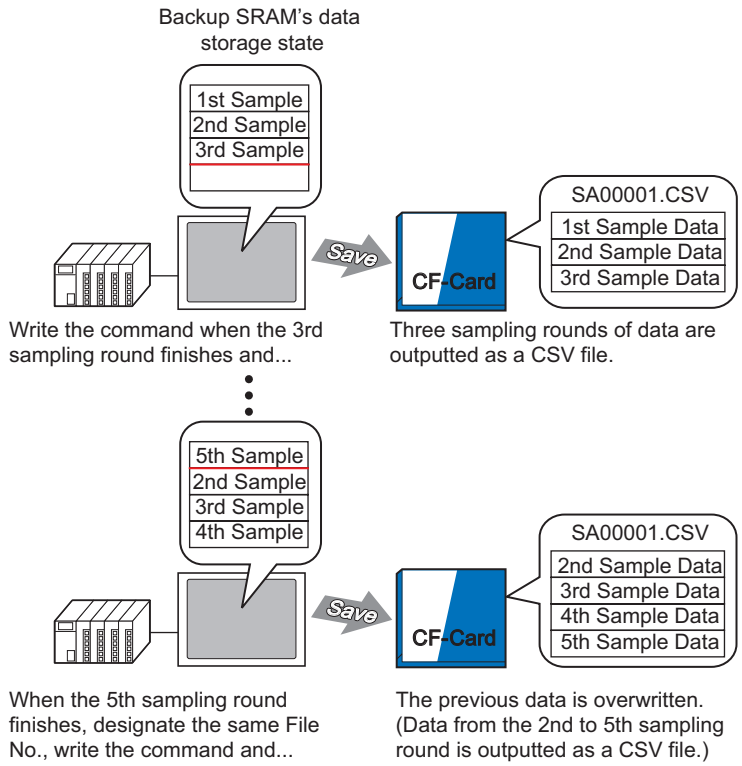
Save data from Sampling Group1 as file name "SA00001.csv" in the CF Card.

D300	Command/Status	←Store command "0001h"
D301	File No.	←Store "1"

1 In D301, store the File 1.
2 Write the command "0001h" to D300. The CSV output begins.
3 When the data is successfully saved to the CF Card, the status value "0000h" is written from the GP to D300.
"SA00001.csv" is created in the CF Card's "SAMP01" folder.

File Save Image

For example, [Overwrite old data after finishing the specified cycles] is selected, Sampling Cycles = 4



◆ Process for Auto Save

Save data from Sampling Group 1 as file name "SA00000.csv" in the CF Card.

D300	Command/Status	← Store command “0020h”
D301	File No.	← Store “0”

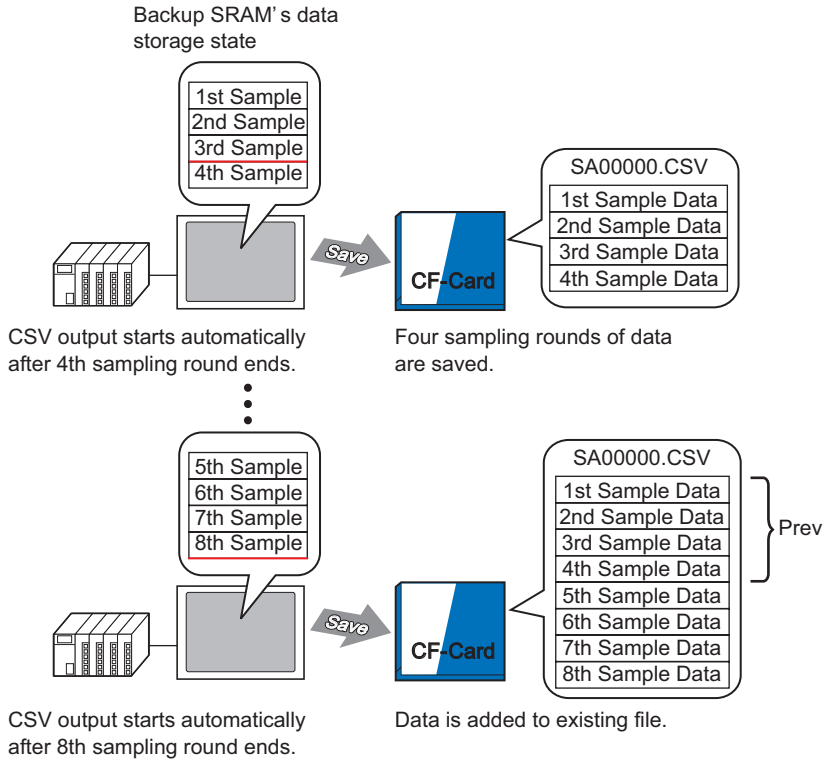
1 In D301, store the File 0.
2 Write the command "0020h" to D300. If the GP enters the auto-save mode normally, the status "2000h" will be written from the GP to D300.
3 When data is sampled for the designated Cycles, the CSV data is exported to the CF Card. "SA00000.csv" is created in the CF Card's "SAMP01" folder.

4 When data is sampled for the designated Cycles again, that period's CSV data is exported and added to the existing "SA00000.csv" file in the "SAMP01" folder. While D300 is "2000h" the auto save mode will continue.

5 Write the command "0021h" to D300, and the auto save mode ends. When the GP ends auto save mode, 0000h is written to D300.

File Save Image

For example, Sampling Cycles = 4



When auto save mode ends, even if there are contents still on the way to the GP (when the current sampling cycle has not completed), sampling data from up to that point will be written to the CF Card.

Also, when starting or resuming auto save (a Start Auto Save command is written), sampling data in the GP is written to the CF Card from the start data (the oldest data), regardless of the previous data save status.

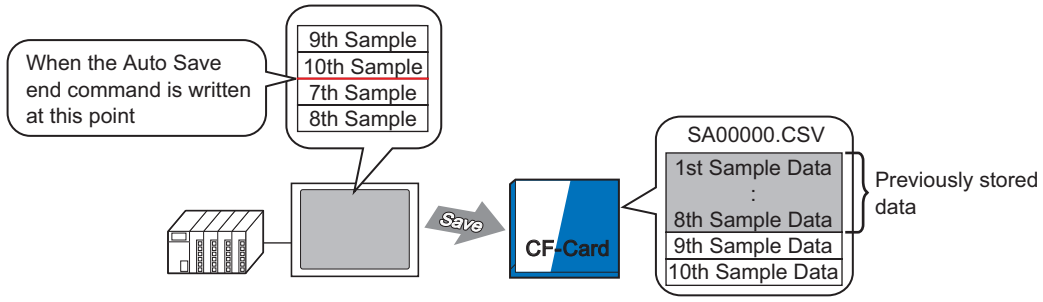
NOTE

- When resuming auto save while contents are on the way to the GP, that cycle will finish sampling before the data is collected and written to the CF Card. After the Auto Save start command is written, overwritten data is not saved until it is written to the CF Card.

Auto Save Exiting and Resuming - File Save Image

For example, Sampling Cycles = 4

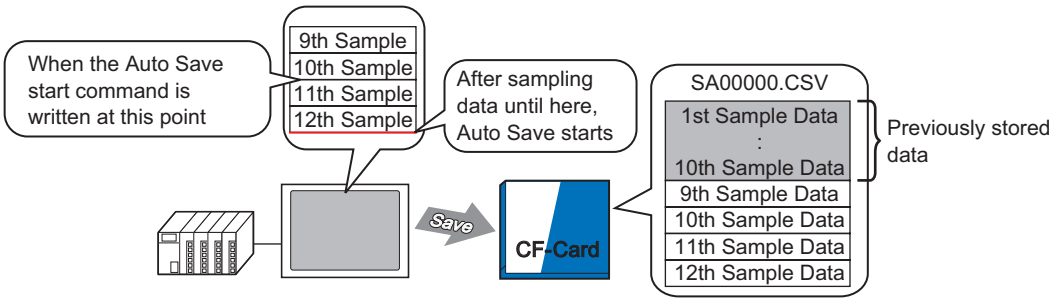
Auto Save Exit



Write the Auto Save end command after the 10th sampling round and...

9th and 10th sample data is added to the previous data.

Auto Save Resume



If you write the Auto Save start command during a sample cycle, system waits for that cycle to finish, then saves to the CF-card.

All data stored at this point (9th to 12th Sample) is added to previous data

■ CSV File Displayed in Excel

The following example will introduce the contents of a sampling data file (*.csv) saved to the CF Card and opened in Excel.

NOTE

- If the CSV file size is too large, Excel or other software may not be able to open it.
- Sampling data (*.csv) is outputted partly in a fixed format, regardless of the settings on the [Display/Save in CSV] tab. For more details, please refer to the following.

☞ "24.9.4 About Save in CF Card/USB Storage" (page 24-121)

◆ Automatic Save

(For example, Cycles is 4 and data sampled for 2 cycles.)
CSV file

```
" Date", " Time", " D00100", " D00200"," D00300"," D00301"
"05/03/31", "09:00:00", "3228", "30.3", "25.3", "6.1"
"05/03/31", "12:00:00", "3236", "26.4", "26.4", "6.4"   1st Cycle's Data
"05/03/31", "15:00:00", "3244", "28.6", "27.6", "6.2"
"05/03/31", "18:00:00", "3202", "30.7", "28.7", "6.5"
"05/04/01", "09:00:00", "3210", "26.9", "29.9", "6.3"
"05/04/01", "12:00:00", "3219", "29.2", "24.0", "6.0"   2nd Cycle Data
"05/04/01", "15:00:00", "3227", "31.1", "25.1", "6.3"
"05/04/01", "18:00:00", "3235", "27.3", "26.3", "6.1"
```

When opened in Excel:

Date	Time	D00100	D00200	D00300	D00301
2005/3/31	9:00:00	3228	30.3	25.3	6.1
2005/3/31	12:00:00	3236	26.4	26.4	6.4
2005/3/31	15:00:00	3244	28.6	27.6	6.2
2005/3/31	18:00:00	3202	30.7	28.7	6.5
2005/4/1	9:00:00	3210	26.9	29.9	6.3
2005/4/1	12:00:00	3219	29.2	24	6
2005/4/1	15:00:00	3227	31.1	25.1	6.3
2005/4/1	18:00:00	3235	27.3	26.3	6.1

◆ Normal Save

Normal Save occurs when the [Overwrite old data after finishing the specified cycles] check box is cleared in the [Mode] tab's Extended area.

CSV file

```
"","  Date","  Time","  D00001", "  D00002","  D00003","  D00004"
" Group1","05/03/31","09:00:00","123.4","123","12.345","1234"
" Group2","05/03/31","12:00:00","***.*","****","**.***","*****"
" Group3","05/03/31","15:00:00","234.5","234","23.456","2345"
" Group4","05/03/31","18:00:00","-123.4","-123","-12.345","-1234"
"","","","","","","","",""
" Group1","05/04/01","09:00:00","345.6","345","3.456","3456"
•••
```

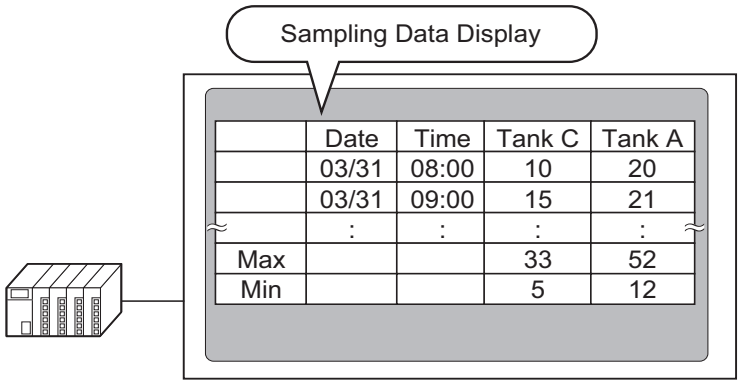
When opened in Excel:

	Date	Time	D00001	D00002	D00003	D00004
No.1	2005/3/31	9:00:00	123.4	123	12.345	1234
No.2	2005/3/31	12:00:00	***.*	***	**.***	****
No.3	2005/3/31	15:00:00	234.5	234	23.456	2345
No.4	2005/3/31	18:00:00	-123.4	-123	-12.345	-1234
No.1	2005/4/1	9:00:00	345.6	345	3.456	3456

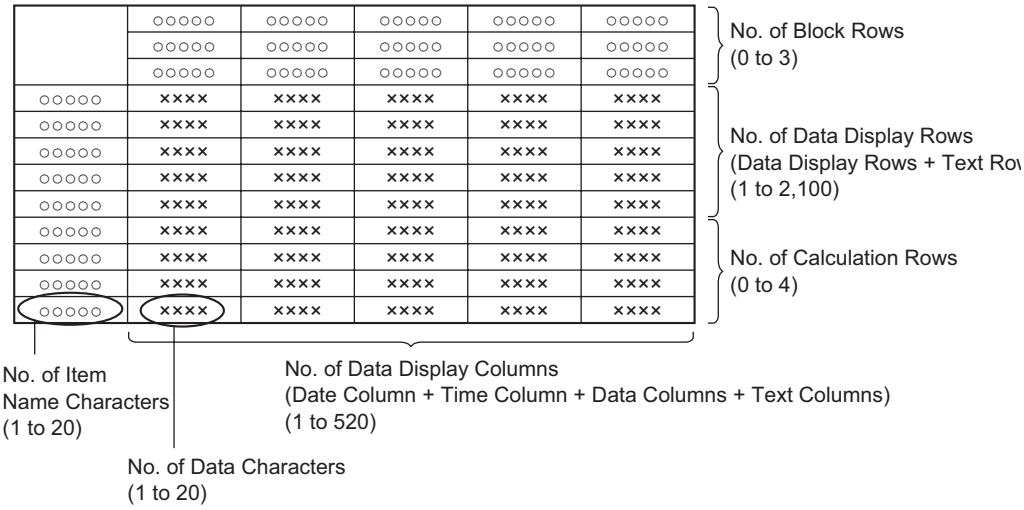
24.7 Display/Save Sampled Data in CSV with a Custom Format

24.7.1 Introduction

You can use a customized format when displaying/saving in CSV.
You can set a customized format: sort data columns, set multiple calculation rows (Total, Average, Maximum, Minimum), input desired information.



Sampling Data Display Format



NOTE

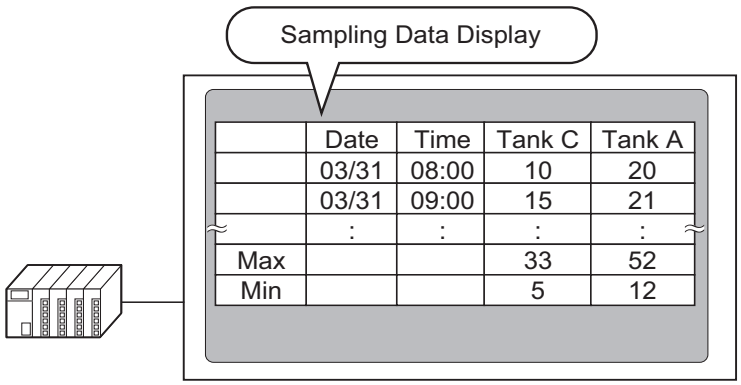
- Text for the Item Name Rows and Item Name Columns can be set in the same manner as the Text Rows/Text Columns. Text can only be entered in the language set in the [Sampling List] [Language].
- The maximum number of columns is 521 and the maximum number of rows is 2107.

24.7.2 Setup Procedure

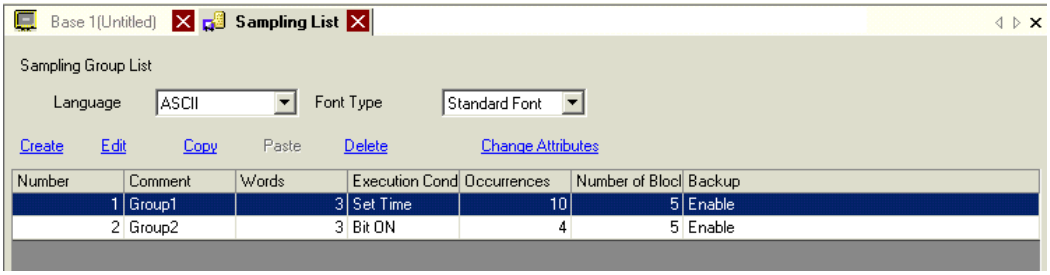
NOTE

- Please refer to the settings guide for details.
  ☞ "24.8.1 Common [Sampling] Settings Guide ■ Display/Save in CSV (Custom Settings)" (page 24-62)
  ☞ "24.8.2 Sampling Data Display Guide" (page 24-93)
- 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)

Configure settings so that the display format for Sampling Group 1 is as follows.

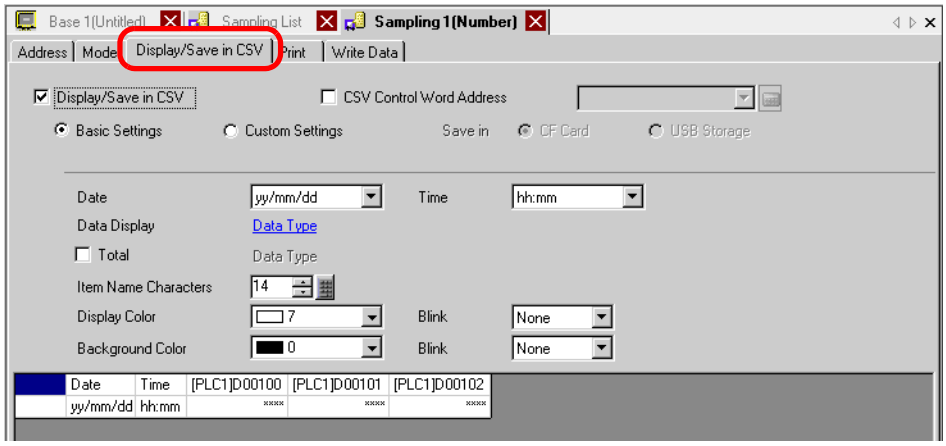


1 In the [Common Settings (R)] menu, select [Sampling (D)] or click , and a list of registered sampling groups appear. Double-click row 1 and the sampling group 1 setup screen appears.



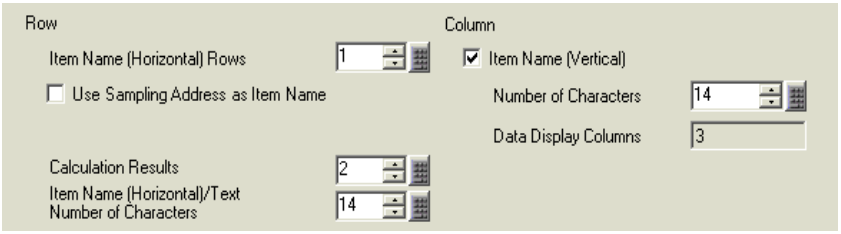
For information about Address/Action, please refer to "24.3.2 Setup Procedure" (page 24-6)

2 Open the [Display/Save in CSV] tab.



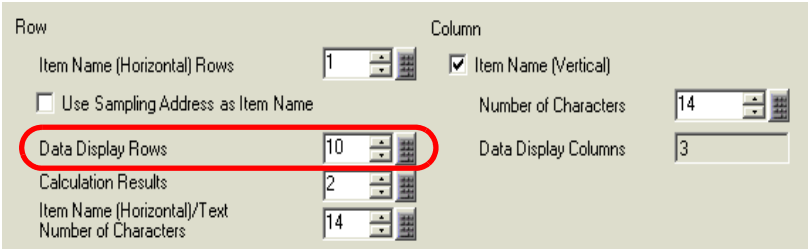
3 Select the [Display/Save in CSV] check box, and select [Custom Settings].

4 Set [Item Name (Horizontal) Rows] to 1, and [Calculated Result Display Rows] to 2.

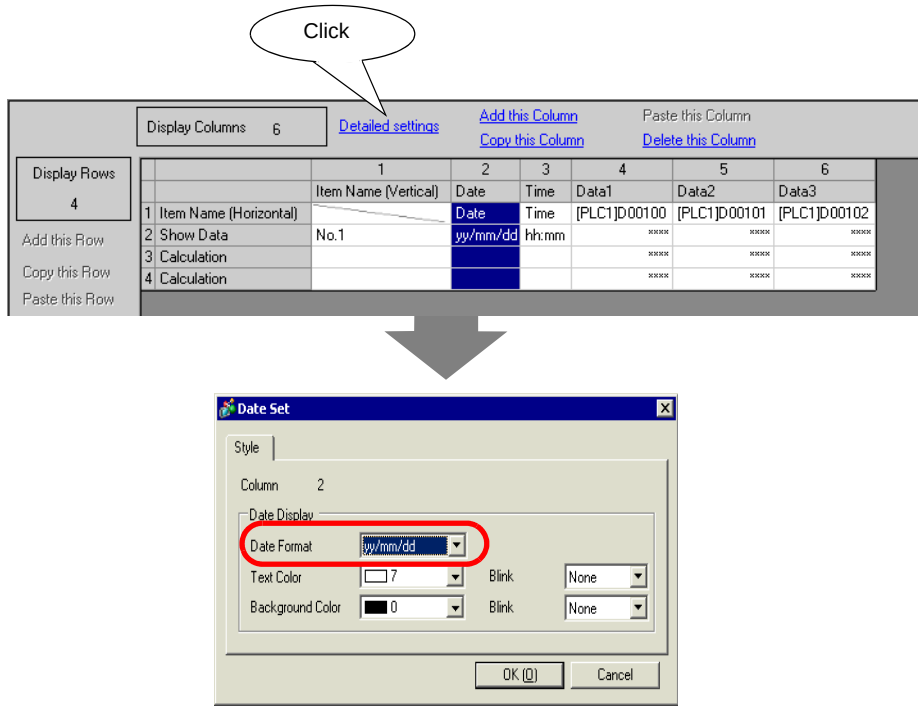


IMPORTANT

- When the [Overwrite old data after finishing the specified cycles] check box is cleared, set the [Number of Data Display Rows]. Set the number of display rows according to the number of occurrence.



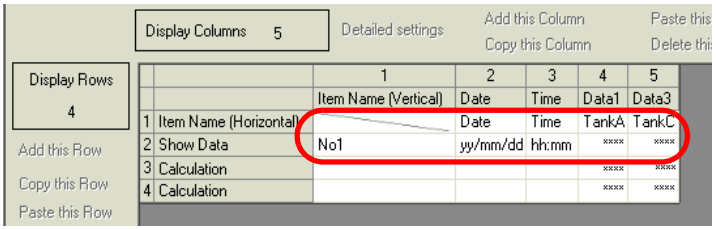
5 Select the Date column in the Preview area and click [Detail Settings]. The [Date Settings] dialog box appears. Change the date form to [mm/dd].



Click [OK] and the dialog box closes.

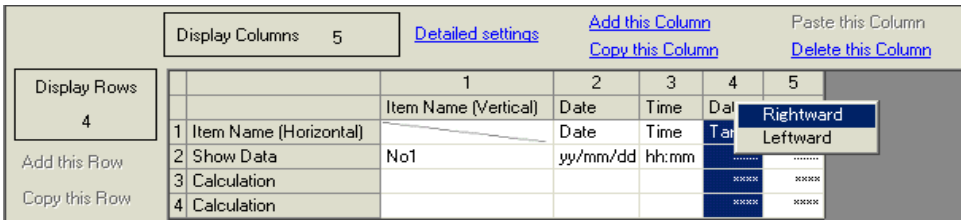
6 Delete the address D101 data column from the display format. Select the fifth column (Data 2) and click [Delete this Column].

7 Double-click each Item Name (Horizontal) cell and input the Item Name.

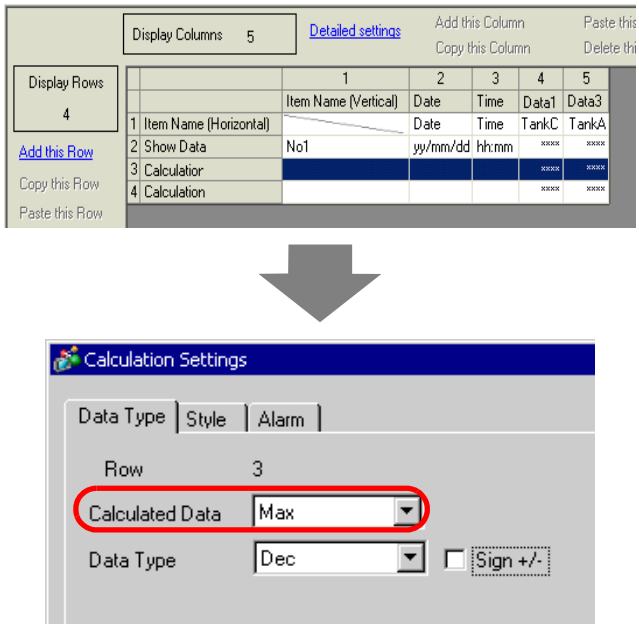


You can input text in the language defined in the Sampling List [Language].

8 Move the column. Right-click the fourth column (Data 1) in the selected state and select [Rightward].



9 Select the third row and click [Detail Settings]. The [Calculation Settings] dialog box appears. Change the [Calculated Data] to [Max].



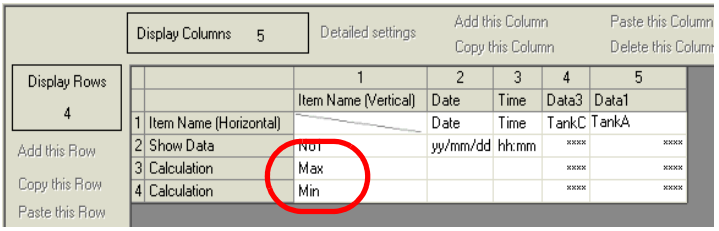
As needed, set the calculation row [Data Type], [Total Display Digits] and click [OK].

NOTE

- If you select a data column's calculation cell and click [Detail Settings], you can set [Data Type], [Total Display Digits] independently.

10 Select the calculation data in the fourth row and set [Min] in the same way.

11 Double-click the calculation cells in the Item Name (Vertical) column and input the Item Name for each row.



The customized Display/Save in CSV format is now set.

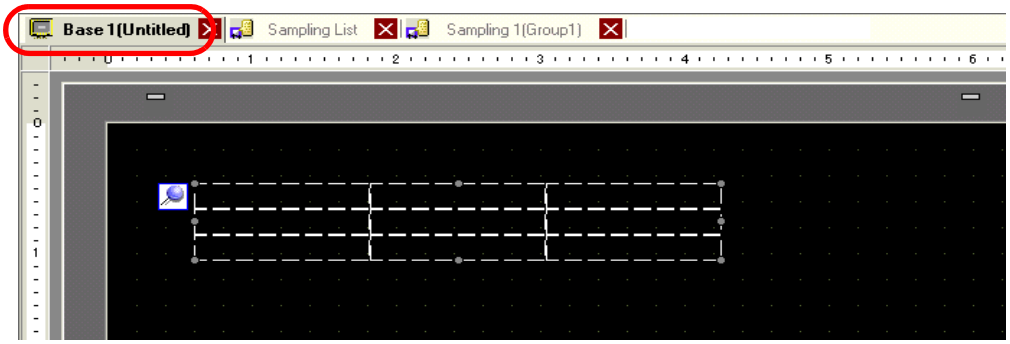
NOTE

- The format of CSV files saved in a CF Card differs slightly from the state displayed on the setting screen. For more details, please refer to the following.

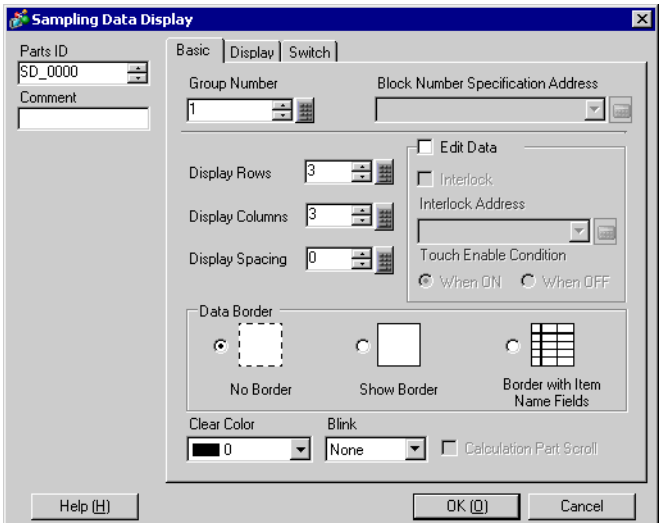
  ☞ "24.9.4 About Save in CF Card/USB Storage ◆ Excel Display Example for Basic Settings" (page 24-123)

- You can save sampling data to a CF card and USB storage device.

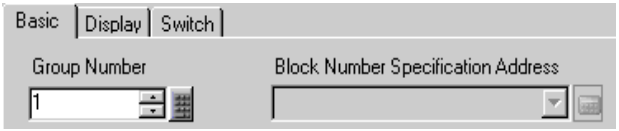
12 Open the editing screen, and on the [Parts (P)] menu select [Sampling Data Display (S)], or click , to place the Part on the screen.



13 Double-click the placed Sampling Data Display. The settings dialog box appears.



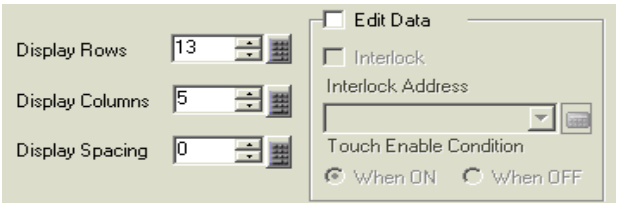
14 Define the sampling group you want to display on the screen. Set Sampling Group to "1".



NOTE

- To display the sampling group, use the [Block Number Specification Address] to define which block to display. This field is enabled if, in the [Common Settings (R)] [Sampling] screen [Mode] tab [Extended] area, the [Overwrite old data after finishing the specified cycles] check box is cleared.

15 Set the [Display Lines] and [Display Columns].



16 Select whether or not to show Ruled Line/Border and select the [Clear Color].

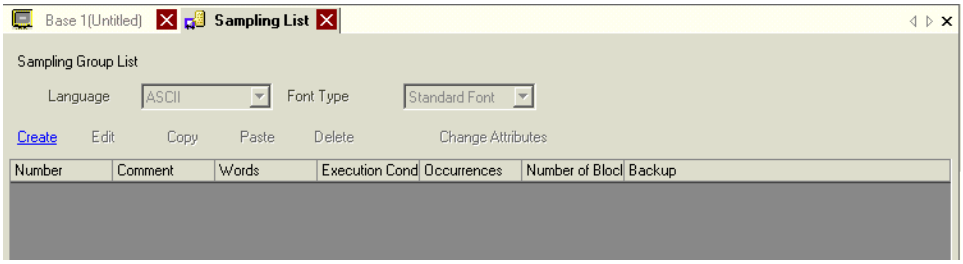
17 As needed, set the font size and scroll switch layout on the [Display] and [Switch] tabs and click [OK].

24.8 Settings Guide

24.8.1 Common [Sampling] Settings Guide

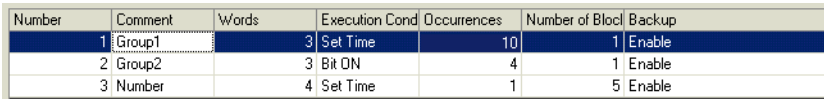
■ Sampling List

This screen is used to register new Sampling Groups. All registered Sampling Group settings are displayed in a list.



Setting	Description
Language	To display, save to a CF Card/USB storage device (CSV Save), or print, select the language from [Japanese], [ASCII]], [Chinese (Simplified)], [Chinese (Traditional)], [Korean], [Cyrillic] or [Thai]. All registered sampling groups follow this setting.
Font Type	Select the font type, [Standard Font] or [Stroke Font], for saving to a CF Card/USB storage device (CSV Save) or printing. • Standard Font This is a Bitmap font. Choose the character height and width magnification ratio. When you magnify/shrink characters, the outline may become rough or the letter may appear squished. • Stroke Font This is an outline font where the ratio of the characters' height/width is fixed. The letters will have a smooth outline even if you magnify/shrink them, however, this font has a large size so it may load slowly in the GP.
Create	Create a new Sampling Group. The following dialog box appears. Set the [Group] from 1 to 64 and input a [Comment] of up to 30 single-byte characters. Click [OK] and the Sampling Group settings screen will appear.
Edit	Displays the setting screen of the Sampling Group selected in [Sampling Group List].
Copy	Copy the Sampling Group selected in [Sampling Group List].
Paste	Add the copied Sampling Group into the list. This group will be allotted the smallest unused Group Number.

Continued

Setting	Description
Delete	Delete the Sampling Group selected in [Sampling Group List]. You can drag the mouse to select multiple sequential groups to delete.
Change Attribute	Change the number and comment for the group selected in [Sampling Group List].
Sampling Group List	The registered Sampling Group settings are displayed in a list. Select and double-click a row and the Sampling Group setting screen appears.  • Group Displays the Sampling Group • Comment Displays the Sampling Group comment. Comments can be edited and can be up to 30 single-byte characters. • Words Displays the [Sampling Words] (number of data sampled at one time) set on the [Address] tab. • Execution Condition Displays the [Execution Condition] set on the [Mode] tab. • Occurrences Displays the cycles when data sampling will occur, as set on the [Mode] tab. • Blocks Displays the [Number of Blocks] set in the [Mode] tab [Extended] dialog. If the [Overwrite old data after finishing the specified cycles] check box is selected, 1 will be displayed. However, if [Time Specification] is selected in Action, the [Number of Days] set in [Extended] is displayed. • Backup Displays whether or not [Backup to SRAM] is checked on the [Mode] tab.

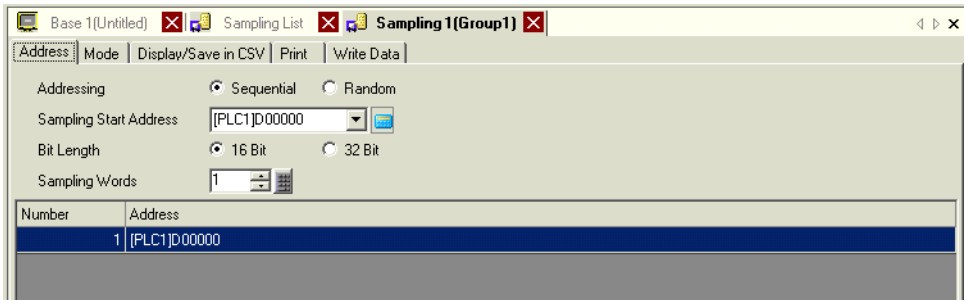
■ Address

Set the address to sample the data. Select the addressing method as [Sequential] or [Random].

NOTE

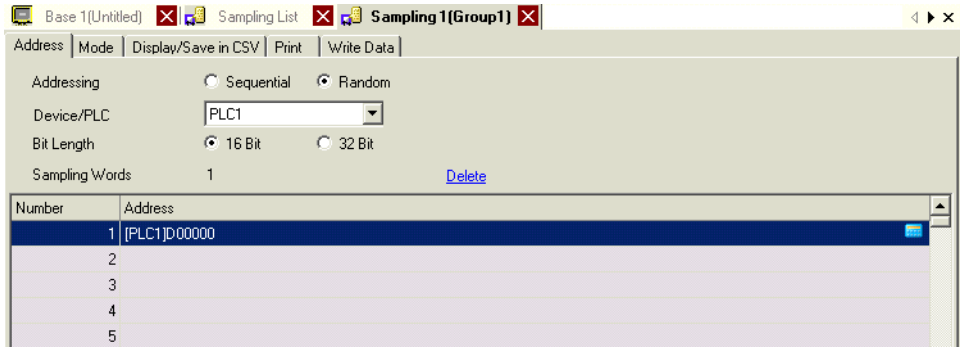
- When you change between [Random] → [Sequential], all address fields and the [Display/Save in CSV] and [Print] settings are initialized.
- If [Random] is selected, communication with the device may take longer than when [Sequential] is selected.

◆ Sequential



Setting	Description
Addressing	Select the designation method for the addresses. • Sequential Set the sequential addresses starting from the designated [Sampling Start Address]. • Random Set up to 512 addresses independently.
Sampling Start Address	Designate the top address to sample data.
Bit Length	Choose which bit length the designated address data will be stored as, from either [16 Bit] or [32 Bit]. NOTE • If you change this setting, contents on the [Display/Save in CSV] tab and [Print] will be reset. • If the defined [Sampling Words] is above 256 16 Bit addresses, all addresses above 256 will be deleted when you change the [Bit Length] from [16 Bit] → [32 Bit].
Sampling Words	Set the number of data items (number of addresses) to sample. Each [Bit Length] has a different size range. 16 Bit: 1 to 512 32 Bit: 1 to 256
Address List	The number of addresses in [Sampling Words] are displayed in a list, starting from the designated [Sampling Start Address].

◆ Random



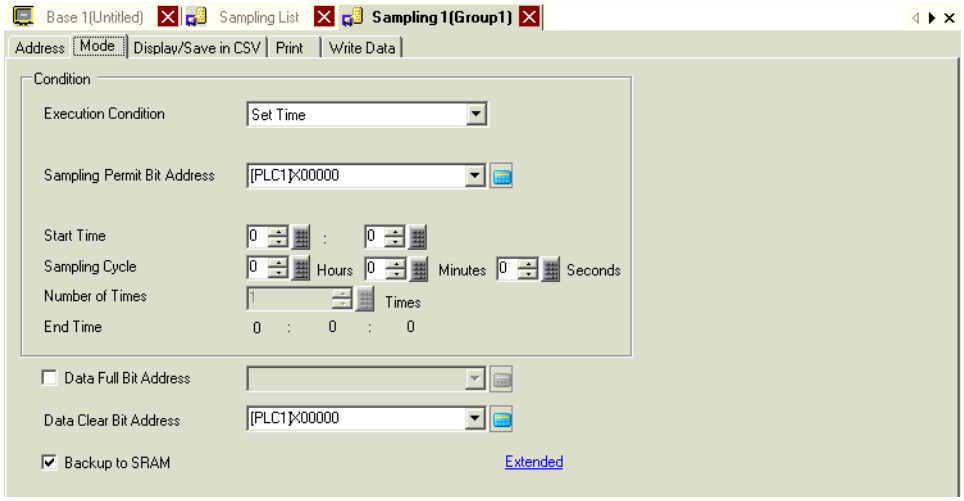
Setting	Description
Device/PLC	Designate the device/PLC where data will be sampled.
Bit Length	Choose which bit length the designated address data will be stored as, from either [16 Bit] or [32 Bit]. **NOTE** • If you change this setting, contents on the [Display/Save in CSV] tab and [Print] will be reset. • If the defined [Sampling Words] is above 256 16 Bit addresses, all addresses above 256 will be deleted when you change the [Bit Length] from [16 Bit] → [32 Bit].
Sampling Words	The set number of address will be displayed in [Address List].
Address List	The number of addresses in [Sampling Words] are displayed in a list, starting from the designated [Sampling Start Address]. 16 Bit: 1 to 512 rows 32 Bit: 1 to 256 rows
Delete	Delete the address selected in [Address List].

■ Action

Configure the timing and Occurrences settings for data sampling. You can select the Sampling action's execution condition from [Time Specification], [Constant Cycle], [Constant Cycle when Bit is ON], [Bit ON], or [Bit Change].

◆ Time Specification

Sample data at constant cycles starting from the designated time.



Setting	Description
Execution Condition	Select the sampling action's execution condition. Select [Time Specification].
Sampling Permit Bit Address	Select the address which will control whether or not sampling will execute. When this address is ON, sampling will begin at the designated [Start Time], and after that, read in data at each cycle of the set [Sampling Cycle]. When this address is OFF, sampling will not occur even when the [Start Time] is reached.
Start Time	Designate the sampling action's start time. Set the time from 0 to 23 (hour), and 0 to 59 (minute).
Sampling Cycle	Set the period that sampling will occur in 15-second increments from 0 sec. to 23 hours, 59 minutes, 45 sec.
Number of Times	Select the number of times sampling will occur. If in the [Extended] area the [Overwrite old data after finishing the specified cycles] check box is selected, this can be from 1 to 65,535 times. If the check box is cleared, the range is from 1 to 2,048 times. IMPORTANT • The settings range will be limited to ensure that the period from [Start Time] to [End Time] is within 24 hours. As well, the number of sampling groups and number of addresses (number of words) in the whole system will also be limited.
End Time	Set the [Start Time], [Sampling Cycle], [Number of Times], and the sampling end time will be displayed.

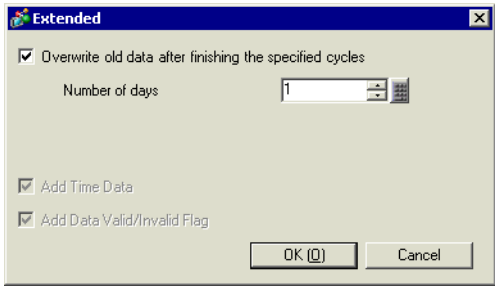
Continued

Setting	Description
Data Full Bit Address	After all the sampling is completed (after the designated [Number of Times] * [Blocks], or [Number of Times] * [Number of Days]) this bit address will turn ON to confirm that the operation is finished. To confirm, set this address. In the Extended area, when the [Overwrite old data after finishing the specified cycles] check box is selected, this bit tells when a data sampling cycle has been done. The sampling action will continue running even when this bit is ON. If not designated, the sampling action will end when this bit turns ON. Please turn ON the [Data Clear Bit Address] to resume. **NOTE** • This address will not be turned OFF automatically. If the [Overwrite old data after finishing the specified cycles] check box is selected, please ensure that the bit is turned OFF in order to confirm the next sampling cycle.
Data Clear Bit Address	Designate the bit address to control the clearing of the sampling data. When this address turns ON, all the Sampling Group data stored in the GP will be erased. After clearing the data, this bit will turn OFF.
Backup to SRAM	Select whether or not to save the sampling data to the backup SRAM. If the sampling data is not saved, the data will be deleted when the power to the GP unit is turned off or reset. ☞ "24.9.1 Summary ■ Backup SRAM" (page 24-100)

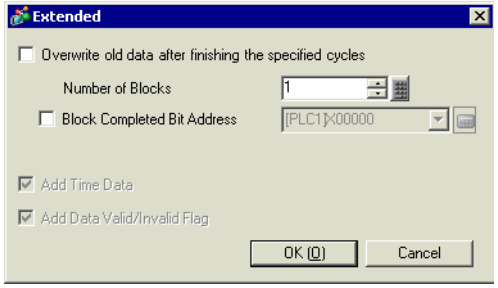
Extended

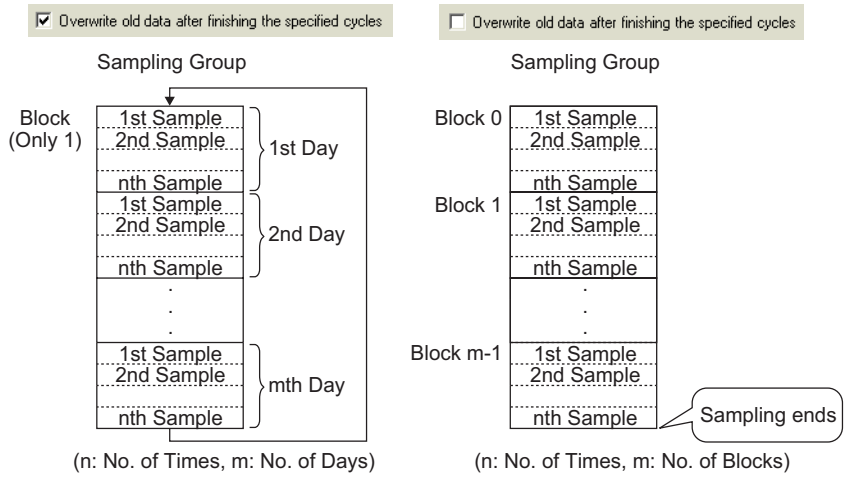
Click [Extended] and the following dialog box will open. The contents is different depending on whether the [Overwrite old data after finishing the specified cycles] check box is selected or cleared.

When [Overwrite old data after finishing the specified cycles] is selected



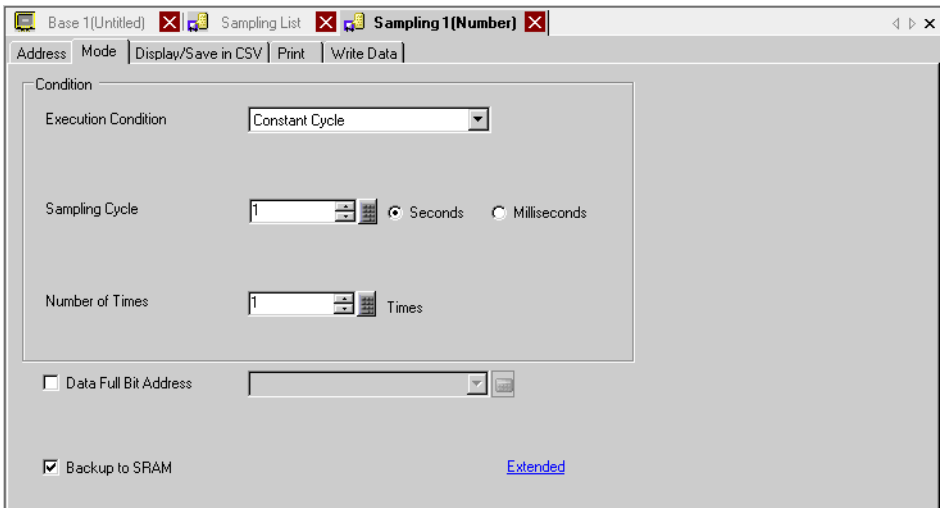
When [Overwrite old data after finishing the specified cycles] is cleared



Setting	Description
Overwrite old data after finishing the specified cycles	Select whether or not the data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times. If this is set, even when all the data sampling has completed ([Number of Times] x [Number of Days]), sampling will continue and data, starting with old data, will be overwritten. If this is not set, previous data will not be overwritten. The new rounds of data will be stored as separate blocks. After all data has been stored ([Number of Times] x [Blocks]), sampling will not occur until all stored data has been deleted. 
Number of Days	Designate how much sampling data should be maintained inside backup SRAM (or DRAM). Data from the designated number of days is stored, and then overwritten in order, starting with data on the first day. The value can be from 1 to 2048. The setting range is limited to ensure that the amount of [Number of Times] x [Number of Days] is 65535 or less.
Blocks	The complete set of data collected in the designated number of times is called a [block]. Designate the number of blocks to set inside one Sampling Group. The value can be from 1 to 2048. The setting range will automatically be limited to ensure that the amount of [Number of Times] x [Blocks] is 65535 or less.
Block Full Bit Address	After the sampling for one block of data (the designated number of times) is completed, this bit address will turn ON to confirm that the operation is finished. To confirm, set this address. This tells that one block's sampling has completed. The sampling action will still continue for the designated [Blocks]. **NOTE** • This address will not be turned OFF automatically. In order to verify the completion of the next block, please ensure that this bit is returned to OFF.
Add Time Data	The sample time will be stored along with the sampled data. This setting is fixed.
Add Data Valid/ Invalid Flag	Stores an observation flag along with the data which monitors if the data has been saved properly. This setting is fixed.

◆ Constant Cycle

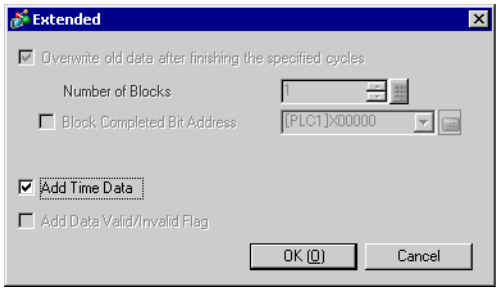
Sample data at constant cycles starting from when the GP is turned ON.



Setting	Description
Execution Condition	Select the sampling action's execution condition. Select [Constant Cycle].
Sampling Cycle	Select either seconds (s) or milliseconds (ms) as the unit for the sampling cycle. The value can be from 1 to 65,535 for seconds, or from 100 to 900 for milliseconds. **NOTE** • The first sampling is started in seconds timing even when milliseconds are selected.
Number of Times	Select the number of times sampling will occur. The value can be from 1 to 65,535. IMPORTANT • The setting range is limited by the number of sampling groups and addresses (words) registered in the entire system.
Data Full Bit Address	After the designated number of data samples are completed, this address will be used to confirm that the operation is finished. Select whether or not to verify this bit address. This bit tells when a data sampling cycle is complete. The sampling operation will continue running even when this bit is ON. **NOTE** • This address will not be turned OFF automatically. In order to verify the next sampling cycle, please ensure that this bit is returned to the OFF state.
Backup to SRAM	Select whether or not to save the sampling data to the backup SRAM. If the sampling data is not saved, the data will be deleted when the power to the GP unit is turned off or reset. ☞ "24.9.1 Summary ■ Backup SRAM" (page 24-100)

Extended

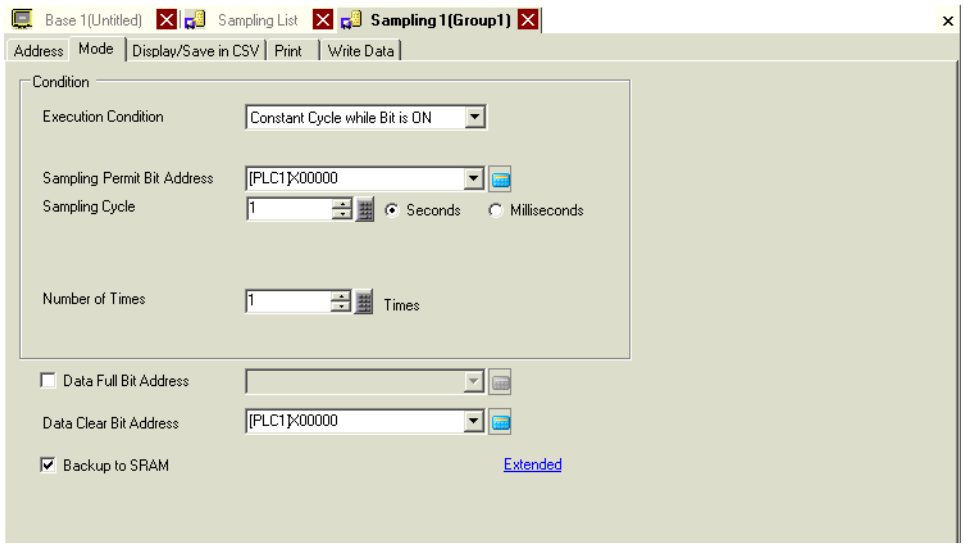
Click [Extended] and the following dialog box appears.



Setting	Description
Overwrite old data after finishing the specified cycles	Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times. This setting is fixed.
Add Time Data	Select whether or not to store the sample time along with the sampled data. If this is not designated, when displaying/saving in CSV or printing, the date/time columns will be blank.

◆ Constant Cycle when Bit is ON

Sample data at constant cycles starting from when the GP is turned ON, but only when the designated bit is ON.



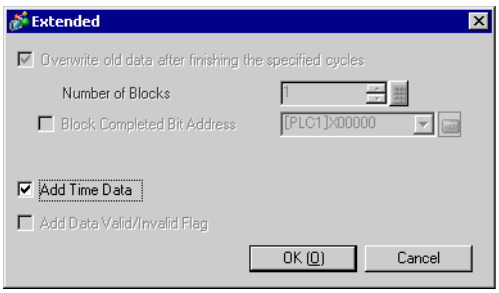
Setting	Description
Execution Condition	Select the sampling action's execution condition. Select [Constant Cycle when Bit is ON].
Sampling Permit Bit Address	Select the address which will control whether or not sampling will execute. While this address is ON, data will be read each cycle.

Continued

Setting	Description
Sampling Cycle	Select either seconds (s) or milliseconds (ms) as the unit for the sampling cycle. The value can be from 1 to 65,535 for seconds, or from 100 to 900 for milliseconds. NOTE • The first sampling is started in seconds timing even when milliseconds are selected.
Number of Times	Select the number of times sampling will occur. The value can be from 1 to 65,535. IMPORTANT • The setting range is limited by the number of sampling groups and addresses (words) registered in the entire system.
Data Full Bit Address	After the designated number of data samples are completed, this address will be used to confirm that the operation is finished. Select whether or not to verify this bit address. This bit tells when a data sampling cycle is complete. The sampling operation will continue running even when this bit is ON. NOTE • This address will not be turned OFF automatically. In order to verify the next sampling cycle, please ensure that this bit is returned to the OFF state.
Data Clear Bit Address	Designate the bit address to control the clearing of the sampling data. When this address turns ON, all the Sampling Group data stored in the GP will be erased. After clearing the data, this bit will turn OFF.
Backup to SRAM	Select whether or not to save the sampling data to the backup SRAM. If the sampling data is not saved, the data will be deleted when the power to the GP unit is turned off or reset. ☞ "24.9.1 Summary ■ Backup SRAM" (page 24-100)

Extended

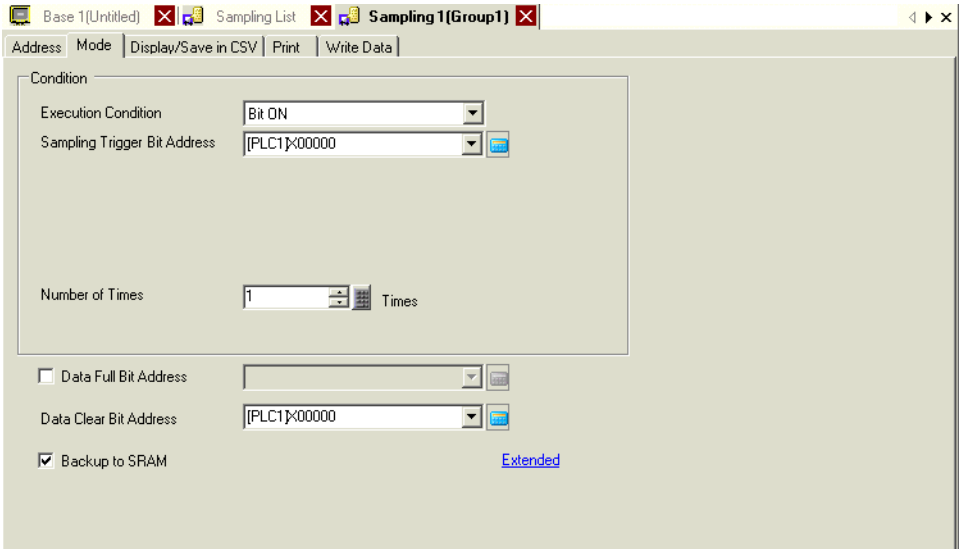
Click [Extended] and the following dialog box appears.



Setting	Description
Overwrite old data after finishing the specified cycles	Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times. This setting is fixed.
Add Time Data	Select whether or not to store the sample time along with the sampled data. If this is not designated, when displaying/saving in CSV or printing, the date/time columns will be blank.

◆ Bit ON

Data is collected every time the designated bit turns ON.



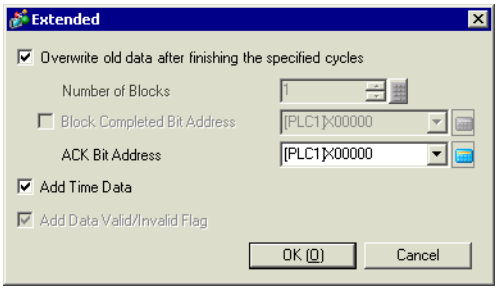
Setting	Description
Execution Condition	Select the sampling action's execution condition. Select [Bit ON].
Sampling Triggered Bit Address	Select the address which will control the sampling's timing. The sampling will execute every time this address turns ON.
Number of Times	Select the number of times sampling will occur. If in the [Extended] area the [Overwrite old data after finishing the specified cycles] check box is selected, this can be from 1 to 65,535 times. If it is not set, the range is from 1 to 2,048 times. IMPORTANT • The setting range is limited by the number of sampling groups and addresses (words) registered in the entire system.
Data Full Bit Address	After all the sampling is completed (the set [Number of Times] * [Blocks]) this address will be used to confirm that the operation is finished. Select whether or not to verify this bit address. In the Extended area, when the [Overwrite old data after finishing the specified cycles] check box is selected, this bit tells when a data sampling cycle has been done. The sampling operation will continue running even when this bit is ON. If not designated, the sampling action will end when this bit turns ON. Please turn ON the [Data Clear Bit Address] to resume. NOTE • This address will not be turned OFF automatically. If [Overwrite old data after finishing the specified cycles] is set, please ensure that the bit is turned OFF in order to confirm the next sampling cycle.

Continued

Setting	Description
Data Clear Bit Address	Designate the bit address to control the clearing of the sampling data. When this address turns ON, all the Sampling Group data stored in the GP will be erased. After clearing the data, this bit will turn OFF.
Backup to SRAM	Select whether or not to save the sampling data to the backup SRAM. If the sampling data is not saved, the data will be deleted when the power to the GP unit is turned off or reset. ☞ "24.9.1 Summary ■ Backup SRAM" (page 24-100)

Extended

Click [Extended] and the following dialog box appears.



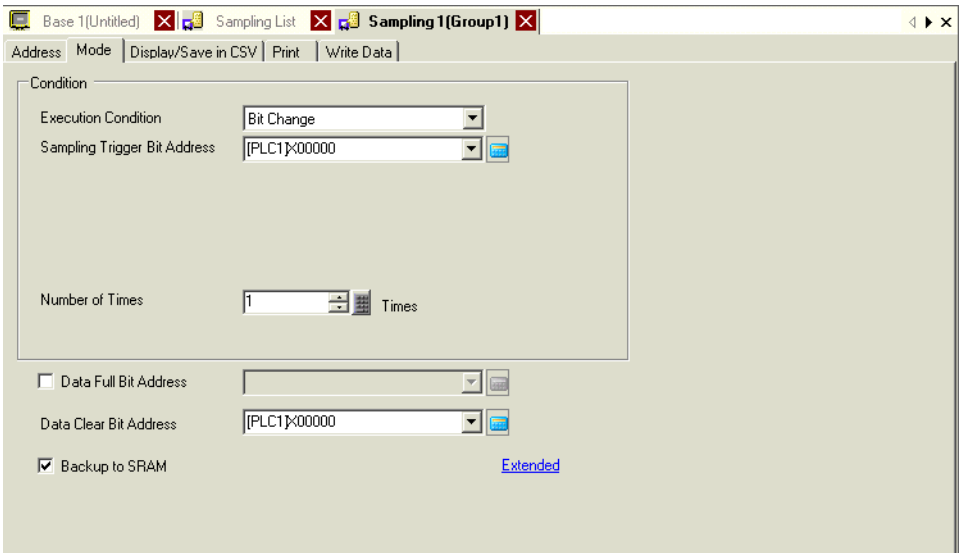
Setting	Description
Overwrite old data after finishing the specified cycles	Select whether or not the data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times. When this is selected, sampling will continue even after the number of times has completed. Old data will not remain. If this is not set, previous data will not be overwritten. The new rounds of data will be stored as separate blocks. After data from ([Number of Times] x [Blocks]) has been stored, sampling will not occur until all stored data has been deleted.
Blocks	All the data collected in the sampled in the designated number of times is called a [block]. Designate the number of blocks to set inside one sampling group, only if [Overwrite old data after finishing the specified cycles] is not set. The value can be from 1 to 2,048. The settings range is limited to ensure that the amount of [Number of Times] x [Blocks] is less than 65,535.
Block Full Bit Address	After the sampling for one block of data (the designated number of times) is completed, this bit address will turn ON to confirm that the operation is finished. To confirm, set this address. This tells that one block's sampling has completed. The sampling action will still continue for the designated [Blocks]. **NOTE** • This address will not be turned OFF automatically. In order to verify the completion of the next block, please ensure that this bit is returned to OFF.

Continued

Setting	Description
ACK Bit Address	Select the address which will confirm when the data reading is finished. When the data reading is finished, the GP will turn this bit ON. When this address receives a [Bit ON] state, please turn OFF the device/PLC [Sampling Triggered Bit Address]. When the [Sampling Triggered Bit Address] turns OFF, this bit will turn OFF.
Add Time Data	Select whether or not to store the time when the data read finished, along with the sampled data. If this is not designated, when displaying/saving in CSV or printing, the date/time columns will be blank.
Add Data Valid/Invalid Flag	Stores an observation flag along with the data which monitors if the data has been saved properly. This setting is fixed.

◆ Bit Change

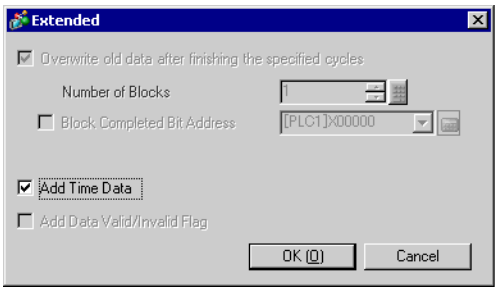
Sample data every time the designated bit changes state (ON/OFF).



Setting	Description
Execution Condition	Select the sampling action execution condition. Select [Bit Change].
Sampling Triggered Bit Address	Select the address which will control the sampling's timing. The sampling will execute every time this address changes (ON/OFF).
Number of Times	Select the number of times sampling will occur. The value can be from 1 to 65,535. IMPORTANT • The setting range is limited by the number of sampling groups and addresses (words) registered in the entire system.
Data Full Bit Address	After the designated number of data samples are completed, this address will be used to confirm that the operation is finished. Select whether or not to verify this bit address. This bit tells when a data sampling cycle is complete. The sampling operation will continue running even when this bit is ON. NOTE • This address will not be turned OFF automatically. In order to verify the next sampling cycle, please ensure that this bit is returned to the OFF state.
Data Clear Bit Address	Designate the bit address to control the clearing of the sampling data. When this address turns ON, all the Sampling Group data stored in the GP will be erased. After clearing the data, this bit will turn OFF.
Backup to SRAM	Select whether or not to save the sampling data to the backup SRAM. If the sampling data is not saved, the data will be deleted when the power to the GP unit is turned off or reset. ☞ “24.9.1 Summary ■ Backup SRAM” (page 24-100)

Extended

Click [Extended] and the following dialog box will open.

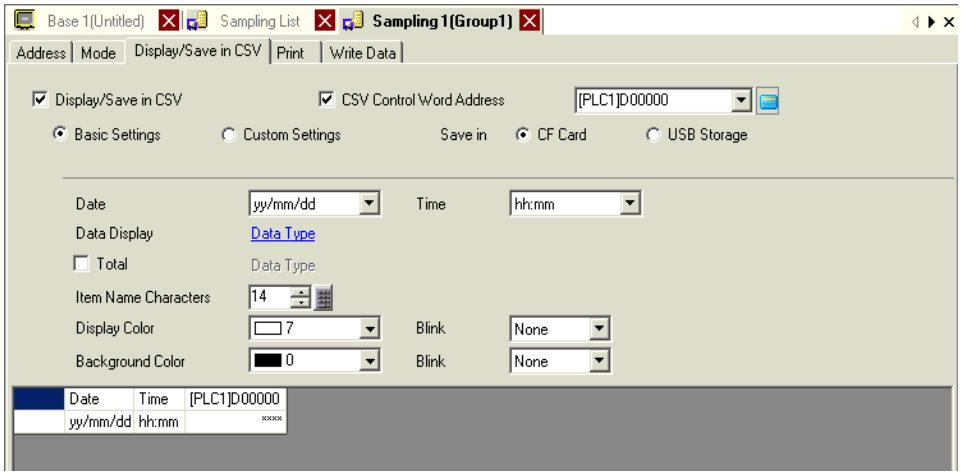


Setting	Description
Overwrite old data after finishing the specified cycles	Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times. This setting is fixed.
Add Time Data	Select whether or not to store the sample time along with the sampled data. If this is not designated, when displaying/saving in CSV or printing, the date/time columns will be blank.

■ Display/Save in CSV

Set the format in which to display the sampling data on the GP screen and to save on the CF Card/USB storage device as a CSV file. Settings will differ between the [Basic Settings] or [Custom] format settings mode.

The following is a guide for [Basic]. For [Custom Settings], see “ ■ Display/Save in CSV (Custom Settings)” (page 24-62) .

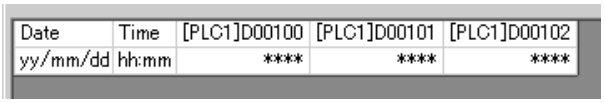
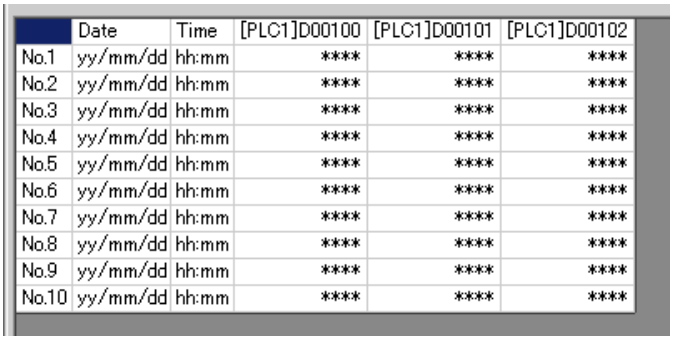


Setting	Description
Display/Save in CSV	Specifies whether to display the sampling data on the GP screen or to save to the CF Card/USB storage device. When you display using the Sampling Data Display, or save the data to the CF Card/USB storage device, you must check and set the format.
CSV Control Word Address	Specifies whether to save as a CSV file. When you save, set the control address to write the data to a CF Card/USB storage device. Two sequential word addresses are used as the area to write the command and its result (status), and File (the *****portion in "SA*****.csv".) The File can be from 0 to 65535. Control Word Address: Command/Status +1: File No.
Save in	Select the save destination for the sampling data. • CF Card Write data to a CF card. • USB storage Write data to a USB storage device. ☞ “24.6.3 CF Card/USB Storage Save Operation ■ CSV Control Word Address” (page 24-23)
Basic Settings/ Custom Settings	Select the format setting mode. • Basic Settings Use a preset format to easily configure settings. • Custom Settings Set a customized format.

Continued

Setting	Description
Date	Select the date format as: [yy/mm/dd], [mm/dd/yy], [dd/mm/yy], or [mm/dd]. "yy" displays the last two digits of the year, and "mm" and "dd" use two digits to display the month and date. **NOTE** • No matter which display format you select, it is output in CSV format as [yy/mm/dd] when you save to a CF Card/USB storage device.
Time	Select the time format as: [hh:mm], [hh:mm:ss], or [hh:mm:ss.ms]. "hh", "mm", and "ss" use two digits to display the hours, minutes, and seconds. "ms" uses three digits to display the milliseconds. **NOTE** • No matter which display format you select, it is output in CSV format as [hh:mm:ss] (If the sampling cycle unit is set [milliseconds], output is [hh:mm:ss.000].) type when you save to CF Card/USB storage.
Data Display	Click [Data Type Settings] to open the [Data Settings] dialog box. The data type, input range, number of display digits can now be set. ☞ " ◆ [Data Settings] Dialog Box" (page 24-55)
Total	Select whether or not the totals row will be displayed. Values calculated from the data of the designated Number of Times stored in the GP are displayed. Click on [Data Type Settings] and open the [Calculation Settings] dialog box. The data type and style for the totals rows can now be set. ☞ " ◆ [Calculation Settings] Dialog Box" (page 24-60) **NOTE** • Regardless of whether a totals row is designated or not, calculation data will not be exported with the CSV file.
Item Name Characters	Set the number of item name characters from 1 to 20 (single-byte). **NOTE** • You cannot set a value that is less than the Date Column/Time Column display format or the data column's display format
Text Color	Select a color for the text and values to be displayed.
Background Color	Select a background color for the text.
Blink	Select whether or not the Part will blink, and the 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 Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

Continued

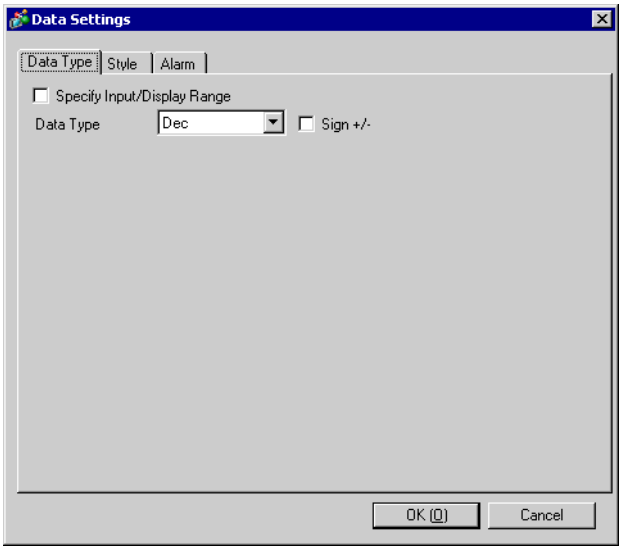
Setting	Description
Preview area	Displays the set contents with the selected format. If [Overwrite old data after finishing the specified cycles] is selected on the [Mode] tab's Extended settings, only one data row will display. If the [Overwrite old data after finishing the specified cycles] check box is cleared, the data rows equal the designated [Number of Times]. When [Overwrite old data after finishing the specified cycles] check box is selected  When [Overwrite old data after finishing the specified cycles] check box is cleared 

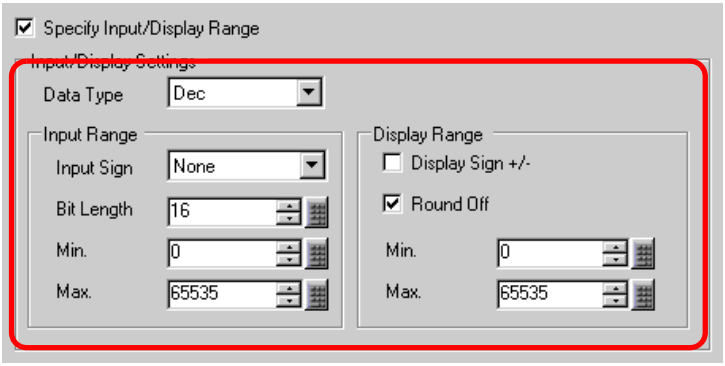
Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
yy/mm/dd	hh:mm	****	****	****

	Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
No.1	yy/mm/dd	hh:mm	****	****	****
No.2	yy/mm/dd	hh:mm	****	****	****
No.3	yy/mm/dd	hh:mm	****	****	****
No.4	yy/mm/dd	hh:mm	****	****	****
No.5	yy/mm/dd	hh:mm	****	****	****
No.6	yy/mm/dd	hh:mm	****	****	****
No.7	yy/mm/dd	hh:mm	****	****	****
No.8	yy/mm/dd	hh:mm	****	****	****
No.9	yy/mm/dd	hh:mm	****	****	****
No.10	yy/mm/dd	hh:mm	****	****	****

◆ [Data Settings] Dialog Box

[Data Type] Tab

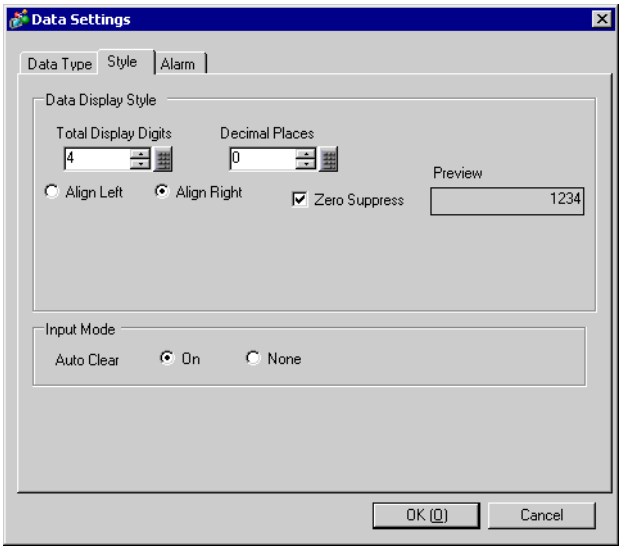


Setting	Description
Specify Input/ Display Range	Designate whether or not an input range and display range of the sampling data will be set. If designated, the following setting items will appear. 
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

Continued

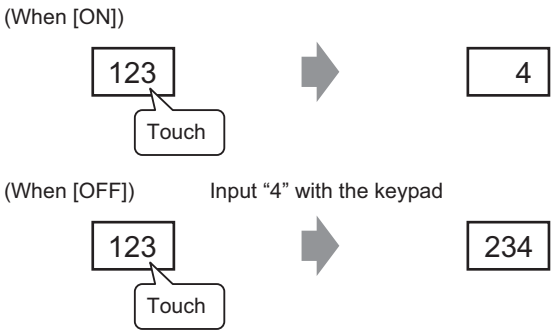
<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td rowspan="3">Input Range</td><td>Input Sign</td><td>If [Specify Input/Display Range] is designated and [Data Type] is [Dec], select whether or not to handle negative numbers.
• None
Only positive numeric data.
• 2's Complement
Negative numbers are handled with 2's complement.
• MSB Sign
Negative numbers are handled with MSB sign (highest bit).</td></tr>
<tr><td>Bit Length</td><td>If [Specify Input/Display Range] is designated and [Data Length] is [16 Bit] on the [Address] tab, set the bit length for one word from 1 to 16.</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>If [Specify Input/Display Range] is designated, set the data input range. Each [Data Type] and [Input Sign] has a different size range.
<table>
<tr><th>Bit Length</th><th>Data Type</th><th>Input Sign</th><th>Input Range</th></tr>
<tr><td rowspan="5">16 Bit</td><td rowspan="3">Dec</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32768 to 32767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 9999</td></tr>
<tr><td rowspan="6">32 bit</td><td rowspan="3">Dec</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>Hex</td><td>-</td><td>0 to FFFFFFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 99999999</td></tr>
<tr><td>Float</td><td>-</td><td>– $9.9e^{16}$ to $9.9e^{16}$</td></tr>
</table></td></tr>
<tr><td rowspan="3">Display Range</td><td>Display Sign +/–</td><td>If [Specify Input/Display Range] is designated and [Data Type] is [Dec], select whether or not to attach a sign to display data.</td></tr>
<tr><td>Round Off</td><td>Designate whether or not to round off fractions when converting input values to the display range. Fractions will be discarded if rounding off is not selected.</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>If you select [Specify an Input/Display Range], select the Min/Max for the display range. The settings range is different, depending on the [Data Type] and whether [Display Sign +/–] is set.
<table>
<tr><th>Bit Length</th><th>Data Type</th><th>Display Sign +/–</th><th>Display Range</th></tr>
<tr><td rowspan="4">16 Bit</td><td rowspan="2">Dec</td><td>Checked</td><td>–32768 to 32767</td></tr>
<tr><td>Unchecked</td><td>0 to 65535</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 9999</td></tr>
<tr><td rowspan="6">32 bit</td><td rowspan="2">Dec</td><td>Checked</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>Unchecked</td><td>0 to 4294967295</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFFFFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 99999999</td></tr>
<tr><td>Float</td><td>Checked (Fixed)</td><td>– $9.9e^{16}$ to $9.9e^{16}$</td></tr>
</table></td></tr>
</table>

[Style] Tab

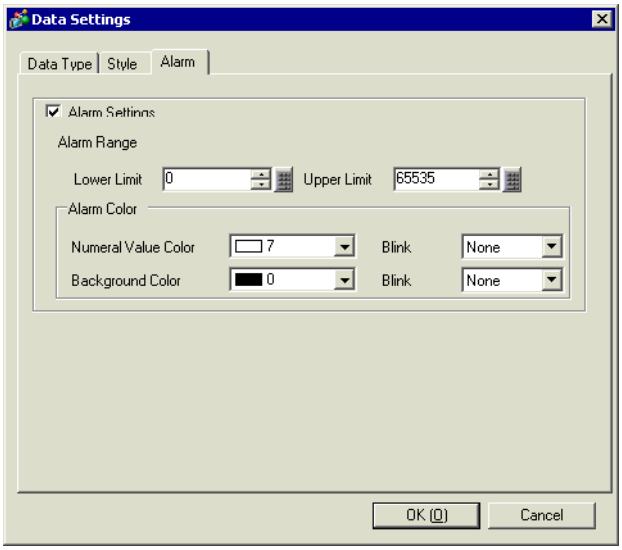


Setting	Description
Total Display Digits	Select the number of display digits for the data from 1 to 17. This can be designated to within the number of characters set in [Item Name Characters]. The numbers displayed after the decimal point are also included in the number of digits. (For example, Total Display Digits is "5", and the Decimal Places is "2") 123.45
Decimal Places	Set the number of display digits after the decimal point, from: 0 to [Total Display Digits]–1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4) Zero Suppress 25 — Leading zeroes are not displayed Zero Suppress 0025 — Zeroes are added to correspond to the length of
Preview	Preview the selected style.

Continued

Setting	Description
Auto Clear	Select whether or not to clear previously inputted values when correcting data on the screen. If [ON] is set, previous values are deleted when a value is inputted, and only the new value is displayed. If [OFF] is set, previous data remains, and the new value is added to the end. (For example, Number of Display Digit = 3) 

[Alarm] Tab



Setting	Description
Alarm	Designate whether or not to display an alarm (change the data color when the value goes outside of the alarm range).
Upper Limit/ Lower Limit	If [Specify Input/Display Range] is not designated on the [Data Type] tab, select the alarm range upper and lower limit value. Set values within the ranges of the following table.

Bit Length	Data Type	Sign +/-	Display Range
16 Bit	Dec	Checked	–32768 to 32767
		Unchecked	0 to 65535
	Hex	-	0 to FFFF(h)
	BCD	-	0 to 9999
32 bit	Dec	Checked	–2147483648 to 2147483647
		Unchecked	0 to 4294967295
	Hex	-	0 to FFFFFFFF(h)
	BCD	-	0 to 99999999
	Float	Checked (Fixed)	$-9.9e^{16}$ to $9.9e^{16}$

If [Specify Input/Display Range] is designated, Min. Value/Max. Value for the [Display Range] is displayed.

Numeral Value Color	Select the numeric value color for when the Alarm is displayed.
Background Color	Select the background color for when the Alarm is displayed.
Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the Alarm's [Numeral Value Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

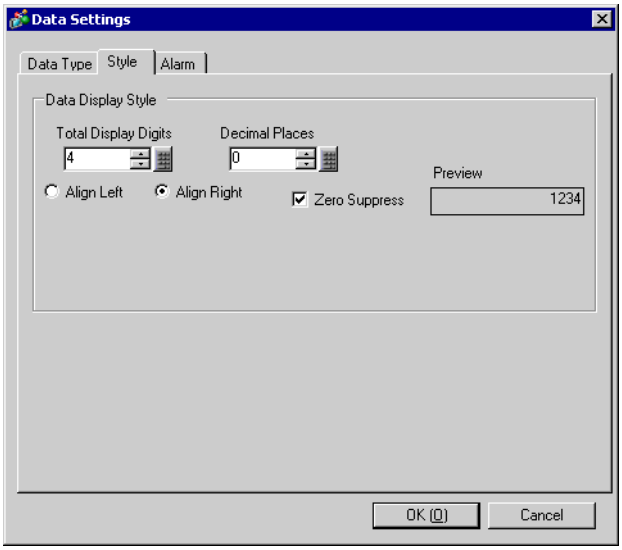
◆ [Calculation Settings] Dialog Box

[Data Type] Tab

The [Total] row data type conforms to the data type set in the [Data Type Settings] dialog box.

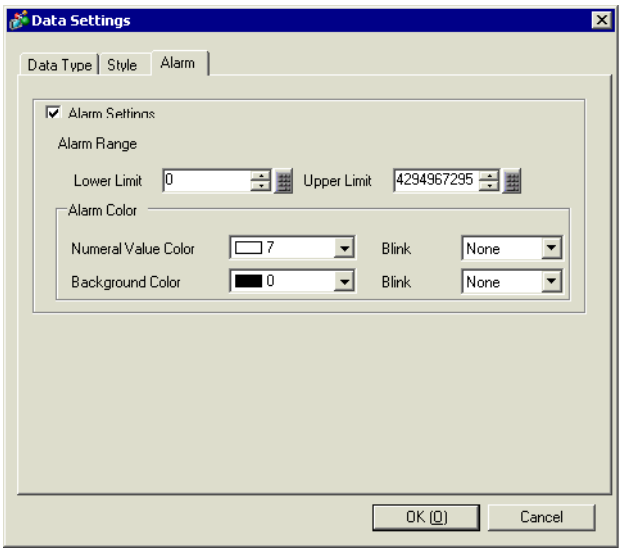
(There is no item to set on this tab.)

[Style] Tab



Setting	Description
Total Display Digits	Select the number of display digits for the calculation data from 1 to 17. This can be designated to within the number of characters set in [Item Name Characters]. The numbers displayed after the decimal point are also included in the number of digits. (For example, Total Display Digits is "5", and the Decimal Places is "2") 123.45
Decimal Places	Set the number of display digits after the decimal point for the calculation data, from 0 to [Total Display Digits]–1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the calculation data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4) Zero Suppress 25 — Leading zeroes are not displayed Zero Suppress 0025 — Zeroes are added to correspond to the length of
Preview	Preview the selected style.

[Alarm] Tab

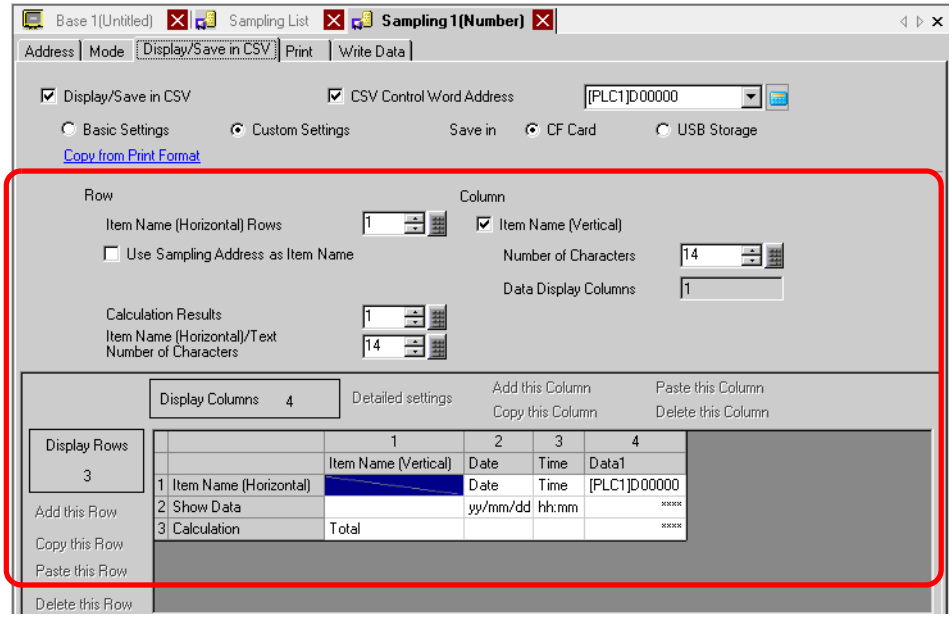


Setting	Description
Alarm	Designate whether or not the use alarm display (change the calculation data color when the value goes outside of the alarm range).
Upper Limit/ Lower Limit	Select the alarm range upper and lower limit value.

Data Type	Sign +/-	Display Range
Dec	Checked	–2147483648 to 2147483647
	Unchecked	0 to 4294967295
Hex	-	0 to FFFFFFFF(h)
BCD	-	0 to 99999999
Float	Checked (Fixed)	$-9.9e^{16}$ to $9.9e^{16}$

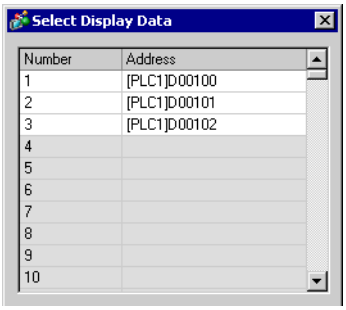
Numeral Value Color	Select the numeric value color for when the Alarm is displayed.
Background Color	Select the background color for when the Alarm is displayed.
Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the Alarm's [Numeral Value Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

■ Display/Save in CSV (Custom Settings)

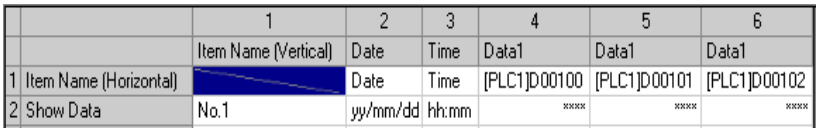
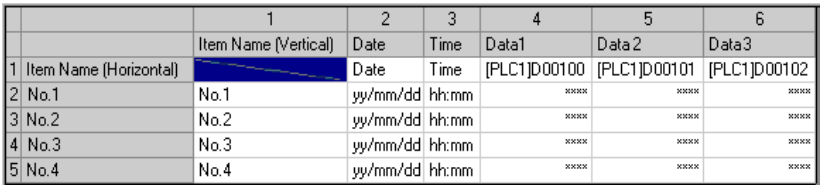


Setting		Description
Copy From Print Format		When the print format is set on the [Print] tab, copy the settings from the [Print] tab. Use this feature when you want to display/save in CSV using the print format. The border row and border column are not copied.
Row	Item Name (Horizontal) Rows	The number of item name rows can be from 0 to 3. "Date" and "Time" will be displayed in the first row of the Date and Time columns.
	Use Sampling Address as Item Name	If the [Item Name (Horizontal) Rows] is not "0", select whether or not to display the sampling address as the data column item name. If selected, cells that have an address displayed in the Preview area cannot be edited.
	Number of Data Display Rows	If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, set the number of data rows from 1 to the [Number of Times] set on the [Mode] tab. IMPORTANT • Adjust the number of data display rows to the [Number of Times].
	Calculated Result Display Rows	The number of calculation rows can be from 0 to 4. In the Calculation rows, values calculated (Total, Average, Max, Min) from data from the designated [Number of Times] can be displayed. NOTE • The calculation line is not output when it is saved to CF Card/USB storage (CSV Output).
	Item Name (Horizontal)/Text Characters	Set the number of display characters for the item names (horizontal) and text rows from 1 to 20 single-byte characters. When you double-click an item name row/text row cell in the Preview area, you can input text that is within the number of characters set here.

Continued

Setting		Description
Column Settings	Item Name (Vertical) Characters	Designate whether or not to display the item name column. If designated, set the number of item name column's characters from 1 to 20 single-byte characters. When you double-click an item name column cell in the Preview area, you can input text that is within the number of characters set here.
	Data Display Columns	Displays the number of data columns.
Detail Settings		Select and click the column, calculation row, or heading row in the Preview area, and a dialog box to configure detail settings appears. ☞ "◆ Detail Settings - [Date Settings] Dialog Box" (page 24-65) ☞ "◆ Detail Settings - [Time Settings] Dialog Box" (page 24-66) ☞ "◆ Detail Settings - [Data Settings] Dialog Box" (page 24-67) ☞ "◆ Detail Settings - [Text Settings] Dialog Box" (page 24-70) ☞ "◆ Detail Settings - [Calculation Settings] Dialog Box" (page 24-71) ☞ "◆ Detail Settings - [Item Name (Horizontal) Settings] Dialog Box" (page 24-73)
Add this Column		Insert a column in front of the column selected in the Preview area. Choose from a [Date], [Time], [Data], or [Text] column. You can directly input the desired text in the [Text] column. When inserting a [Data] column, the [Select Display Data] dialog box appears and you can select a data column (address) you want to add.  To add multiple addresses, drag the mouse to select consecutive columns. If you click columns to add while pressing the [Ctrl] key, you can select separate addresses. **NOTE** • The [Text] line is not output when saved to CF Card/USB storage (CSV Output). Also, when [Date] line and [Time] line are multiple set, each line is output to a fixed position.
Copy this Column		Copy the column selected in the Preview area.
Paste this Column		Insert the copied column in front of the column selected in the Preview area.
Delete this Column		Delete the column selected in the Preview area.
Add this Row		Insert a [Text] row in front of the row selected in the Preview area. You can directly input the desired text in the [Text] row. **NOTE** • The [Text] line is not output when saved to CF Card/USB storage (CSV Output). • When multiple calculation rows are set, you cannot input a Text row between two calculation rows.

Continued

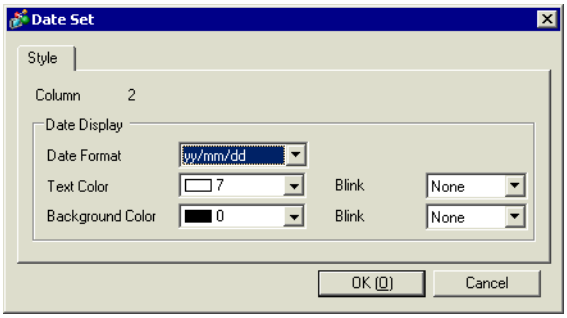
Setting	Description
Copy this Row	Copy the Text row selected in the Preview area.
Paste this Row	Insert the copied Text row in front of the row selected in the Preview area.
Delete this Row	Delete the [Text] row selected in the Preview area.
Preview area	Displays the set contents with the selected format. If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, only one data row will display. If the [Overwrite old data after finishing the specified cycles] check box is cleared, the data rows equal the designated [Number of Times]. When [Overwrite old data after finishing the specified cycles] check box is selected  When [Overwrite old data after finishing the specified cycles] check box is cleared 

		1	2	3	4	5	6
		Item Name (Vertical)	Date	Time	Data1	Data1	Data1
1	Item Name (Horizontal)		Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
2	Show Data	No.1	yy/mm/dd	hh:mm	****	****	****

		1	2	3	4	5	6
		Item Name (Vertical)	Date	Time	Data1	Data 2	Data3
1	Item Name (Horizontal)		Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
2	No.1	No.1	yy/mm/dd	hh:mm	****	****	****
3	No.2	No.2	yy/mm/dd	hh:mm	****	****	****
4	No.3	No.3	yy/mm/dd	hh:mm	****	****	****
5	No.4	No.4	yy/mm/dd	hh:mm	****	****	****

◆ Detail Settings - [Date Settings] Dialog Box

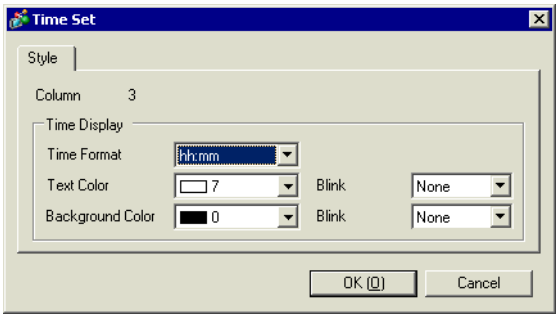
Select a Date column in the Preview area, click [Detail Settings], and the following dialog box will be displayed.



Setting	Description
Column	Displays the selected column's number.
Date Form	Select the date format as: [yy/mm/dd], [mm/dd/yy], [dd/mm/yy], or [mm/dd]. "yy" displays the last two digits of the year, and "mm" and "dd" use two digits to display the month and date. **NOTE** • No matter which display format you select, it is output in CSV format as [yy/mm/dd] type when you save to CF Card/USB storage (CSV Save).
Text Color	Select the text's color.
Background Color	Set the background color for the text.
Blink	Select whether or not the Part will blink, and the 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 Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

◆ Detail Settings - [Time Settings] Dialog Box

Select a Time column in the Preview area and click [Detail Settings]. The following dialog box appears.

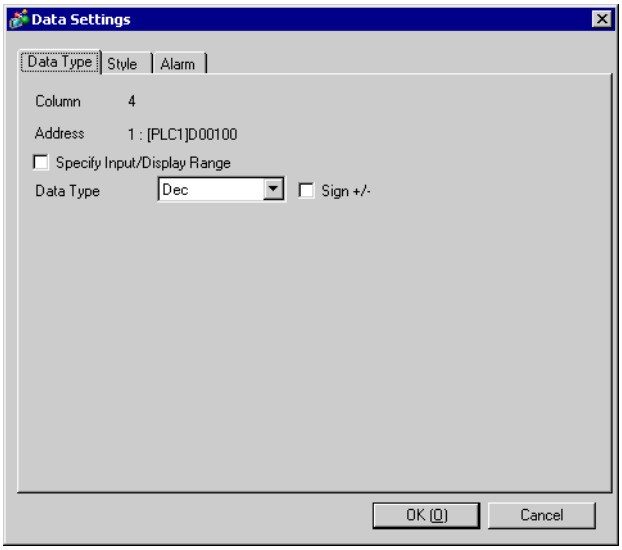


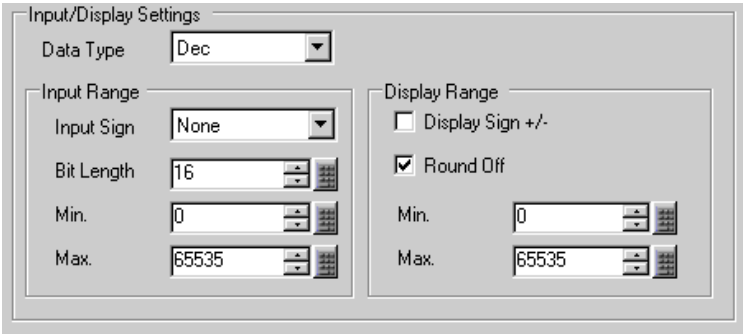
Setting	Description
Column	Displays the selected column's number.
Time Format	Select the time format as: [hh:mm], [hh:mm:ss], or [hh:mm:ss.ms]. "hh", "mm", and "ss" use two digits to display the hours, minutes, and seconds. "ms" uses three digits to display the milliseconds. **NOTE** • No matter which display format you select, it is output in CSV format as [hh:mm:ss] (If the sampling cycle unit is set [milliseconds], output is [hh:mm:ss.000].) type when you save to CF Card /USB storage.
Text Color	Select the text's color.
Background Color	Set the background color for the text.
Blink	Select whether or not the Part will blink, and the 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 Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

◆ Detail Settings - [Data Settings] Dialog Box

Select a Data column in the Preview area and click [Detail Settings]. The following dialog box appears.

[Data Type] Tab

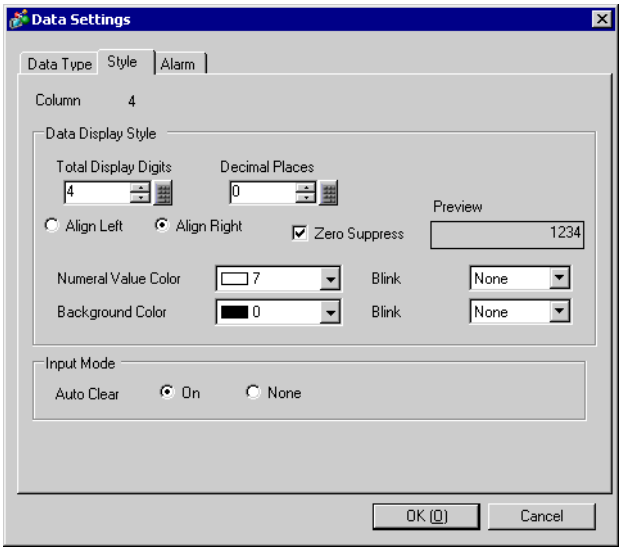


Setting	Description
Column	Displays the selected column's number.
Address	Displays the selected column address.
Specify Input/ Display Range	Designate whether or not an input range and display range will be set. If designated, the following setting items appears.  **NOTE** • Each setting for the input range/display range is the same as [Basic] mode, [Data Type Settings], in the displayed [Data Settings] dialog box. ☞ " ◆ [Data Settings] Dialog Box" (page 24-77)

Continued

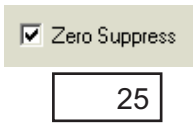
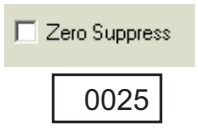
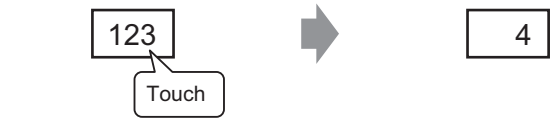
Setting	Description
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

[Style] Tab



Setting	Description
Total Display Digits	Select the number of display digits for the data from 1 to 17. This can be designated to within the number of characters set in [Item Name (Vertical) Characters]. The numbers displayed after the decimal point are also included in the number of digits. Example) When the Total Display Digits is 5, and the Decimal Places is 2. 123.45
Decimal Places	Set the number of display digits after the decimal point, from: 0 to [Total Display Digits]−1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the data display position.

Continued

Setting	Description
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4)  Leading zeroes are not displayed  Zeroes are added to correspond to the length of
Preview	Preview the selected style.
Numeral Value Color	Set the numeric value color.
Background Color	Select a background color for the numeric values.
Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the [Numeral Value Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Auto Clear	Select whether or not to clear previously inputted values when correcting data on the screen. If [ON] is set, previous values are deleted when a value is inputted, and only the new value is displayed. If [OFF] is set, previous data remains, and the new value is added to the end. (For example, Number of Display Digit = 3) (When [ON])  (When [OFF]) Input "4" with the keypad

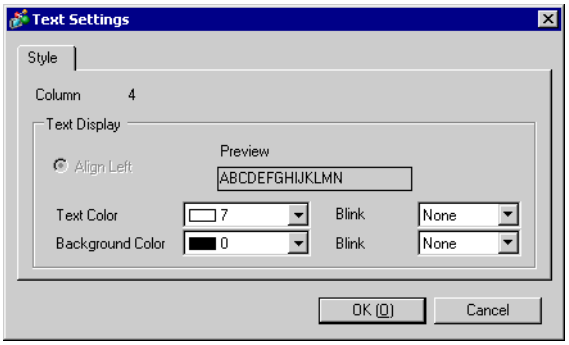
[Alarm] Tab

This is the same as the [Alarm] tab in the [Data Settings] dialog box, displayed by clicking [Data Type Settings] in [Basic] mode.

☞ " ◆ [Data Settings] Dialog Box" (page 24-77)

◆ Detail Settings - [Text Settings] Dialog Box

Select a Text column in the Preview area, click [Detail Settings], and the following dialog box will be displayed.

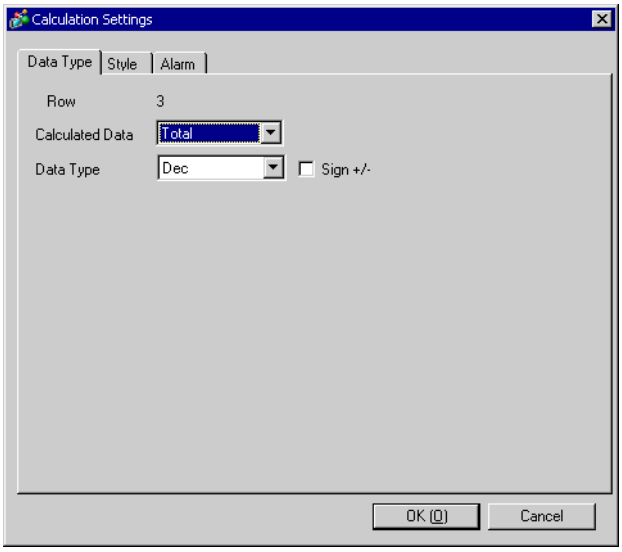


Setting	Description
Column	Displays the selected text column number.
Align Left	Displays that text is fixed as Align Left.
Preview	Previews the selected text style.
Text Color	Select the text's color.
Background Color	Set the background color for the text.
Blink	Select whether or not the Part will blink, and the 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 Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

◆ Detail Settings - [Calculation Settings] Dialog Box

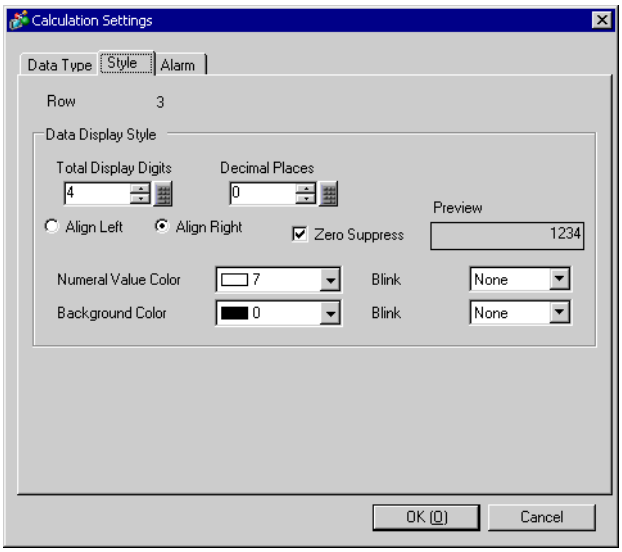
Select a Calculation cell in a Calculation row or Data row in the Preview area and click [Detail Settings]. The following dialog box appears.

[Data Type] Tab



Setting	Description
Row Number/ Column	Displays the selected Calculation row or Calculation cell row number/ column number.
Calculated Data	Choose the data calculation type from [Total], [Average], [Max], or [Min]. Values calculated from the data of the designated Number of Times stored in the GP are displayed.
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

[Style] Tab



Setting	Description
Total Display Digits	Select the number of display digits for the calculation data from 1 to 17. This can be designated to within the number of characters set in [Item Name (Horizontal)/Text Characters]. The numbers displayed after the decimal point are also included in the number of digits. (For example, Total Display Digits is "5", and the Decimal Places is "2") 123.45
Decimal Places	Set the number of display digits after the decimal point for the calculation data, from 0 to [Total Display Digits]–1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the calculation data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4) Zero Suppress 25 Leading zeroes are not displayed Zero Suppress 0025 Zeroes are added to correspond to the length of Display Digits
Preview	Preview the selected style.
Numeral Value Color	Set the calculation data color.
Background Color	Set the calculation data background color.

Continued

Setting	Description
Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the [Numeral Value Color] and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

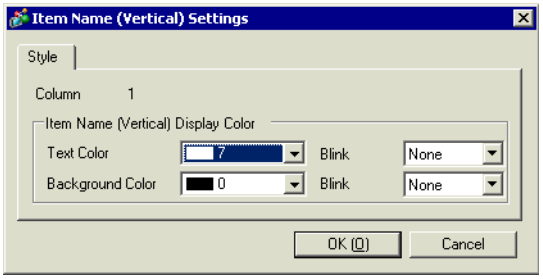
[Alarm] Tab

Same as the [Calculation Settings] dialog box which displays when you click [Total Type Settings] in the [Basic] mode.

☞ " ◆ [Calculation Settings] Dialog Box" (page 24-80)

◆ Detail Settings - [Item Name (Horizontal) Settings] Dialog Box

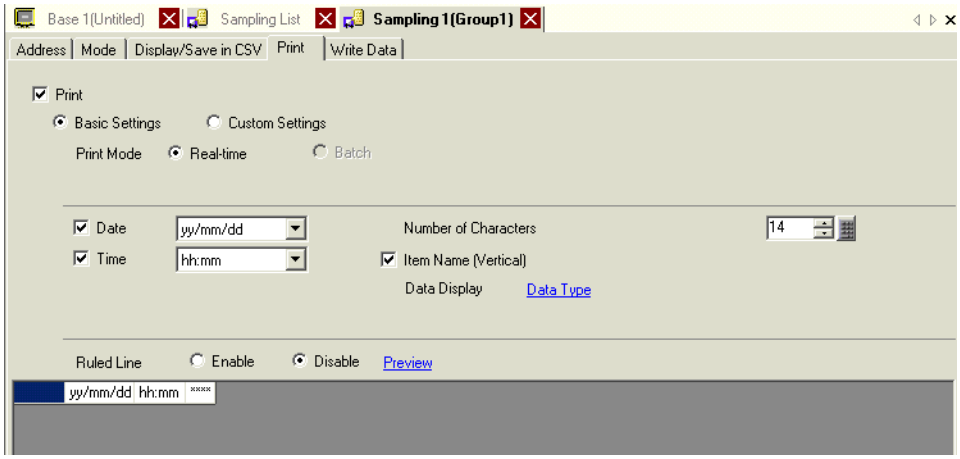
Select an Item Name row in the Preview area, click [Detail Settings], and the following dialog box will be displayed.

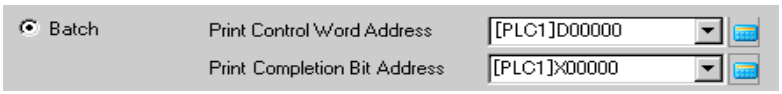


Setting	Description
Row Number	Displays the selected Item Name row number.
Text Color	Select the text's color.
Background Color	Set the background color for the text.
Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the [Display Color], and [Background Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

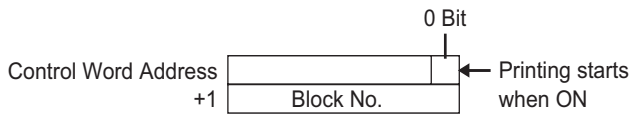
■ Print

Set the format for printing sampling data from a printer connected to the GP.
The following is a settings guide for [Basic]. For [Custom Settings], see “ ■ Print (Custom Settings)” (page 24-81) .

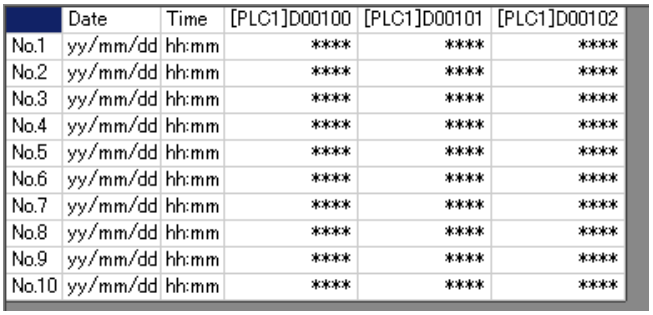


Setting	Description
Print	Select whether or not to print. When printing sampling data, ensure that this option is checked, and select the print format. ☞ “24.9.5 Printing” (page 24-124)
Basic Settings/ Custom Settings	Select the print format setting mode. • Basic Settings Use a preset format to easily configure settings. • Custom Settings Set a customized format.
Print Mode	Select the print timing. • Real-time Print Printing is performed every time sampling occurs. • Batch Data is printed in block units. This can only be set when in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared. Printing is started via the [Print Control Word Address]. 

Continued

Setting		Description
Print Mode	Print Control Word Address	When the [Print Mode] is set to [Batch], select an address to control the start of printing. When 0 bit in the designated address turns ON the printing starts. Two sequential Words are used to store the Word Address: the control Word and the block number. Select the block number and start the printing. 
	Print Completion Bit Address	When the [Print Mode] is set to [Batch], select an address to confirm the completion of the printing. Designates the Bit Address to be turned ON when data is printed out for each block. After confirming that this Bit Address is turned ON, perform the next printing.
Date		Defines whether or not to print the date, as: [yy/mm/dd], [mm/dd/yy], [dd/mm/yy], or [mm/dd]. "yy" prints the last two digits of the year, and "mm" and "dd" use two digits to print the month and date.
Time		Defines whether or not to print the time, as: [hh:mm], [hh:mm:ss], or [hh:mm:ss.ms]. "hh", "mm", and "ss" use two digits to print the hours, minutes, and seconds. "ms" uses three digits to print the milliseconds.
Number of Text Rows		If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, set the number of characters to display in a cell.
Item Name (Horizontal) Characters		If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, designate whether or not to print the Item Name row. If printing, the number of characters in the block name can be from 1 to 20 (single-byte). For the Date and Time columns, the item names will be printed as [Date] and [Time]. For a Data column, the address will be printed.
Item Name (Vertical) Characters		Select whether or not the Item Name column will be printed.
Data Display		Click [Data Type Settings] to open the [Data Settings] dialog box. The data type, input range, number of display digits can now be set. ☞ " ◆ [Data Settings] Dialog Box" (page 24-77)
Total		If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, designate whether or not to print the Total row. Click on [Data Type Settings] and open the [Calculation Settings] dialog box. The number of display digits for the Totals rows can now be set. ☞ " ◆ [Calculation Settings] Dialog Box" (page 24-80)
Ruled Line		Select whether or not the ruled line will be printed.
Preview		Opens a preview screen to confirm the print image.

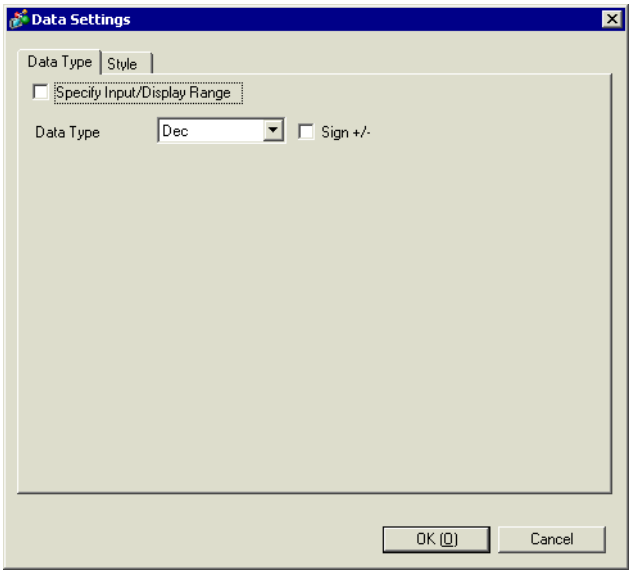
Continued

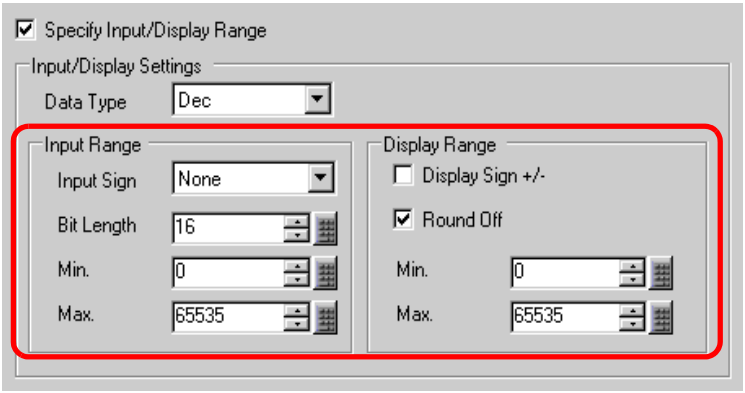
Setting	Description
Preview area	Displays the set contents with the selected print format. If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, only one data row will be displayed. If it is not designated, the data rows will equal the designated [Number of Times]. When [Overwrite old data after finishing the specified cycles] check box is selected When [Overwrite old data after finishing the specified cycles] check box is cleared 

	Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
No.1	yy/mm/dd	hh:mm	****	****	****
No.2	yy/mm/dd	hh:mm	****	****	****
No.3	yy/mm/dd	hh:mm	****	****	****
No.4	yy/mm/dd	hh:mm	****	****	****
No.5	yy/mm/dd	hh:mm	****	****	****
No.6	yy/mm/dd	hh:mm	****	****	****
No.7	yy/mm/dd	hh:mm	****	****	****
No.8	yy/mm/dd	hh:mm	****	****	****
No.9	yy/mm/dd	hh:mm	****	****	****
No.10	yy/mm/dd	hh:mm	****	****	****

◆ [Data Settings] Dialog Box

[Data Type] Tab

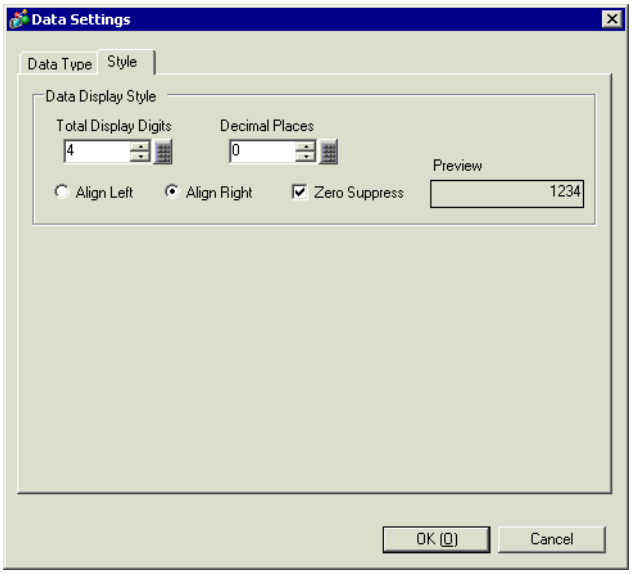


Setting	Description
Specify Input/ Display Range	Designate whether or not an input range and display range of the data will be set. If designated, the following setting items will appear. 
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

Continued

<table>
<tr><th colspan="2">Setting</th><th>Description</th></tr>
<tr><td rowspan="3">Input Range</td><td>Input Sign</td><td>If [Specify Input/Display Range] is designated and [Data Type] is [Dec], select whether or not to handle negative numbers.
• None
Only positive numeric data.
• 2's Complement
Negative numbers are handled with 2's complement.
• MSB Sign
Negative numbers are handled with MSB sign (highest bit).</td></tr>
<tr><td>Bit Length</td><td>If [Specify Input/Display Range] is designated and [Data Length] is [16 Bit] on the [Address] tab, set the bit length for one word from 1 to 16.</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>If [Specify Input/Display Range] is designated, set the data input range. Each [Data Type] and [Input Sign] has a different size range.
<table>
<tr><th>Bit Length</th><th>Data Type</th><th>Input Sign</th><th>Input Range</th></tr>
<tr><td rowspan="5">16 Bit</td><td rowspan="3">Dec</td><td>None</td><td>0 to 65535</td></tr>
<tr><td>2's Complement</td><td>–32768 to 32767</td></tr>
<tr><td>MSB Sign</td><td>–32767 to 32767</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 9999</td></tr>
<tr><td rowspan="4">32 bit</td><td rowspan="3">Dec</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>Hex</td><td>-</td><td>0 to FFFFFFFF(h)</td></tr>
</table>
If [Specify Input/Display Range] is designated, Min. Value/Max. Value for the [Display Range] is displayed.</td></tr>
<tr><td rowspan="3">Display Range</td><td>Display Sign +/–</td><td>If [Specify Input/Display Range] is designated and [Data Type] is [Dec], select whether or not to attach a sign to display data. This is fixed when the [Data Type] is [Float].</td></tr>
<tr><td>Round Off</td><td>Designate whether or not to round off fractions when converting input values to the display range. Fractions will be discarded if rounding off is not selected.</td></tr>
<tr><td>Min. Value/ Max. Value</td><td>If you select [Specify an Input/Display Range], select the Min/Max for the display range. The settings range is different, depending on the [Data Type] and whether [Display Sign +/–] is set.
<table>
<tr><th>Bit Length</th><th>Data Type</th><th>Display Sign +/–</th><th>Display Range</th></tr>
<tr><td rowspan="4">16 Bit</td><td rowspan="2">Dec</td><td>Checked</td><td>–32768 to 32767</td></tr>
<tr><td>Unchecked</td><td>0 to 65535</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 9999</td></tr>
<tr><td rowspan="4">32 bit</td><td rowspan="2">Dec</td><td>Checked</td><td>–2147483648 to 2147483647</td></tr>
<tr><td>Unchecked</td><td>0 to 4294967295</td></tr>
<tr><td>Hex</td><td>-</td><td>0 to FFFFFFFF(h)</td></tr>
<tr><td>BCD</td><td>-</td><td>0 to 99999999</td></tr>
</table></td></tr>
</table>

[Style] Tab



Setting	Description
Total Display Digits	Select the number of display digits for the data from 1 to 17. This can be designated to within the number of characters set in [Characters] or [Item Name (Horizontal) Characters]. The numbers displayed after the decimal point are also included in the number of digits. (For example, Total Display Digits is "5", and the Decimal Places is "2") 123.45
Decimal Places	Set the number of display digits after the decimal point, from: 0 to [Total Display Digits]−1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4) Zero Suppress 25 — Leading zeroes are not displayed Zero Suppress 0025 — Zeroes are added to correspond to the length of
Preview	Preview the selected style.

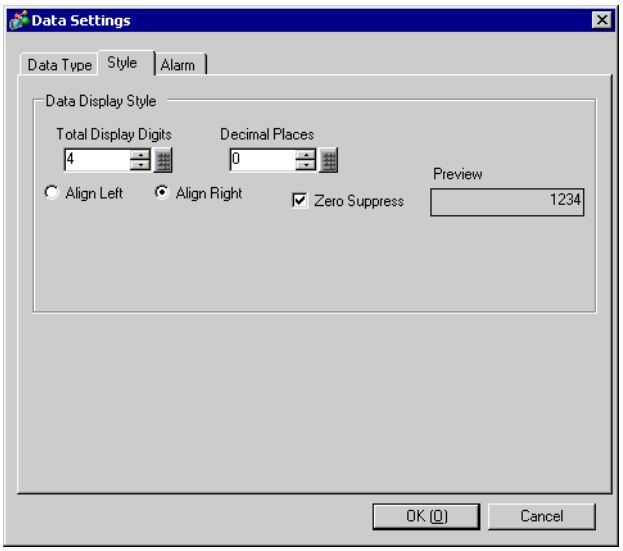
◆ [Calculation Settings] Dialog Box

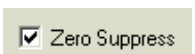
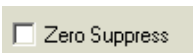
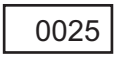
To display a Total row, click [Data Type Settings]. The [Calculation Settings] dialog box appears.

[Data Type] Tab

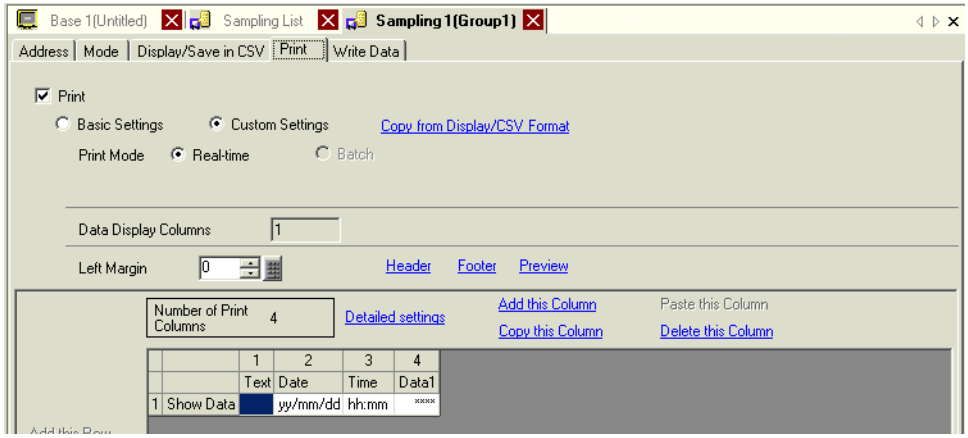
The [Total] row data type conforms to the settings in the [Data Settings] dialog box. (There is no item to set on this tab.)

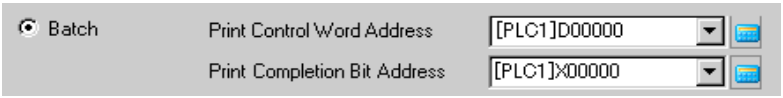
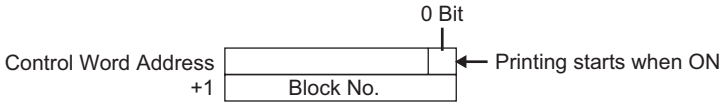
[Style] Tab



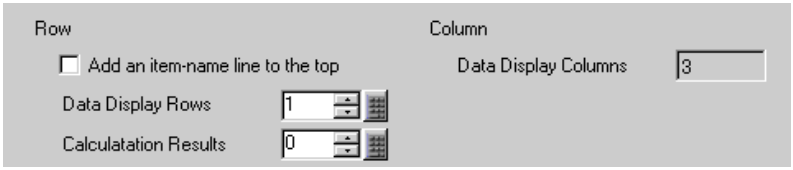
Setting	Description
Total Display Digits	Select the number of display digits for the calculation data from 1 to 17. This can be designated to within the number of characters set in [Item Name (Horizontal) Characters]. The numbers displayed after the decimal point are also included in the number of digits. Example) When the Total Display Digits is 5, and the Decimal Places is 2.
Decimal Places	Set the number of display digits after the decimal point for the calculation data, from 0 to [Total Display Digits]–1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the calculation data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4)  Leading zeroes are not displayed   Zeroes are added to correspond to the length of
Preview	Preview the selected style.

■ Print (Custom Settings)

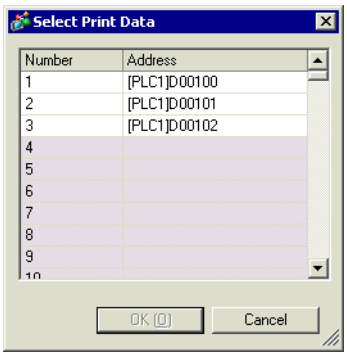


Setting	Description
Print Mode	Select the print timing. • Real-time Print Printing is performed every time sampling occurs. • Batch Data is printed in block units. This can only be set when in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared. Printing is started via the [Print Control Word Address]. 
Print Control Word Address	When the [Print Mode] is set to [Batch], select an address to control the printing. When 0 bit of the designated address turns ON the printing starts. Two sequential Words are used to store the Word Address: the control Word and the block number. Select the block number and start the printing. 
Print Completion Bit Address	When the [Print Mode] is set to [Batch], select an address to confirm the completion of the printing. Designates the Bit Address to be turned ON when data is printed out for each block. After confirming that this Bit Address is turned ON, perform the next printing.
Copy from Display/CSV Format	When the format is set on the [Display/Save in CSV] tab, copy the settings from the [Display/Save in CSV] tab. Use this feature when you want to print data using the Display/Save in CSV format. **NOTE** • The Display/Save in CSV format Item Name (Horizontal)/Block Name (Vertical) are handled as a Text row/Text column in the print settings.

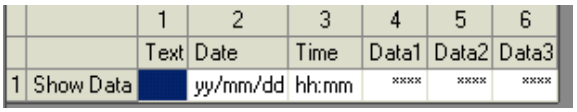
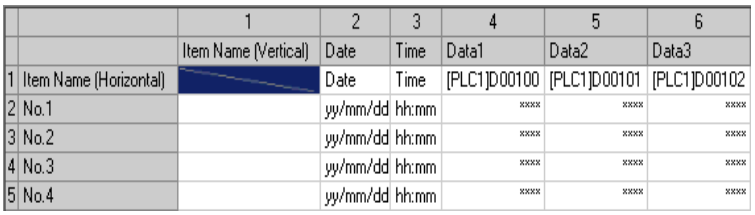
Continued

Setting	Description
Data Display Columns	Displays the number of data columns.
Row/Column	You can set the following items when in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared. 
Add an item-name line to the top	Designate whether or not to add text rows on top of the Data row. The sampling addresses are displayed in the editing area as the Data column item names. Cells that have an address displayed cannot be edited.
Number of Data Display Rows	Set the number of data rows to print from 1 to the [Number of Times] set on the [Mode] tab. IMPORTANT • Adjust the number of data display rows to the [Number of Times].
Calculated Result Display Rows	The number of calculation rows can be from 0 to 4. In the Calculation rows, values calculated (Total, Average, Max, Min) from data from the designated [Number of Times] can be displayed.
Data Display Columns	Displays the number of data columns.
Left Margin	The left margin when printing can be from 0 to 80 single-byte characters.
Detail Settings	Opens up a dialog box to configure detail settings for the column or Calculation row selected in the Preview area. ☞ " ◆ Detail Settings - [Date Settings] Dialog Box" (page 24-85) ☞ " ◆ Detail Settings - [Time Settings] Dialog Box" (page 24-85) ☞ " ◆ Detail Settings - [Data Settings] Dialog Box" (page 24-86) ☞ " ◆ Detail Settings - [Text Settings] Dialog Box" (page 24-88) ☞ " ◆ Detail Settings - [Calculation Settings] Dialog Box" (page 24-89)
Header/Footer	Opens the [Edit Header]/[Edit Footer] dialog box. Input text you wish to print as a header/footer. The number of characters that can be entered is 160 char./line x 40 lines. IMPORTANT • When [Overwrite old data when designated block count finishes] is set in the Action, printing will not be performed even if the Header/Footer is set. Only the Data rows will be printed.
Preview	Opens a preview screen to confirm the print image.

Continued

Setting	Description
Add this Column	Insert a column in front of the column selected in the Preview area. Choose from a [Date], [Time], [Data], [Text], or [Ruled Line] column. You can directly input the desired text in each cell of an inserted [Text] column. When adding a [Data] column, the [Select Print Data] dialog box opens and you can select a data column (address) you want to add.  To add multiple addresses, drag the mouse to select consecutive columns. If you click columns to add while pressing the [Ctrl] key, you can select separate addresses.
Copy this Column	Copy the column selected in the Preview area.
Paste this Column	Insert the copied column in front of the column selected in the Preview area.
Delete this Column	Delete the column selected in the Preview area.
Add this Row	Insert a [Text] or [Ruled Line] row in front of the row selected in the Preview area. You can directly input the desired text in each cell of an inserted [Text] row. **NOTE** • When multiple calculation rows are set, you cannot input a [Text] row between two calculation rows.
Copy this Row	Copy the [Text] or [Ruled Line] row selected in the Preview area.
Paste this Row	Insert the copied row in front of the row selected in the Preview area.
Delete this Row	Delete the [Text] or [Ruled Line] row selected in the Preview area.

Continued

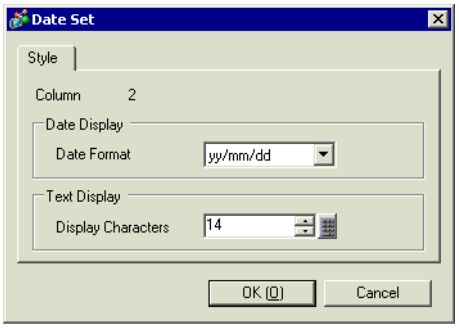
Setting	Description
Preview area	Displays the set contents with the selected format. If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, only one data row will display. If [Overwrite old data after finishing the specified cycles] is cleared, the data rows equal the designated [Number of Times]. When [Overwrite old data after finishing the specified cycles] check box is selected  When [Overwrite old data after finishing the specified cycles] check box is cleared 

		1	2	3	4	5	6
		Text	Date	Time	Data1	Data2	Data3
1	Show Data		yy/mm/dd	hh:mm	****	****	****

		1	2	3	4	5	6
		Item Name (Vertical)	Date	Time	Data1	Data2	Data3
1	Item Name (Horizontal)		Date	Time	[PLC1]D00100	[PLC1]D00101	[PLC1]D00102
2	No.1		yy/mm/dd	hh:mm	****	****	****
3	No.2		yy/mm/dd	hh:mm	****	****	****
4	No.3		yy/mm/dd	hh:mm	****	****	****
5	No.4		yy/mm/dd	hh:mm	****	****	****

◆ Detail Settings - [Date Settings] Dialog Box

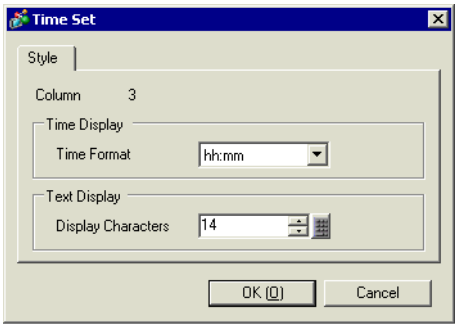
Select the Date column and click [Detail Settings]. The following dialog box appears.



Setting	Description
Column	Displays the selected column number.
Date Form	Select the date format as: [yy/mm/dd], [mm/dd/yy], [dd/mm/yy], or [mm/dd]. "yy" displays the last two digits of the year, and "mm" and "dd" use two digits to display the month and date.
Display Characters	Set the number of characters to be displayed in the Date column cells from 1 to 20 single-byte characters.

◆ Detail Settings - [Time Settings] Dialog Box

Select the Date column and click [Detail Settings]. The following dialog box appears.

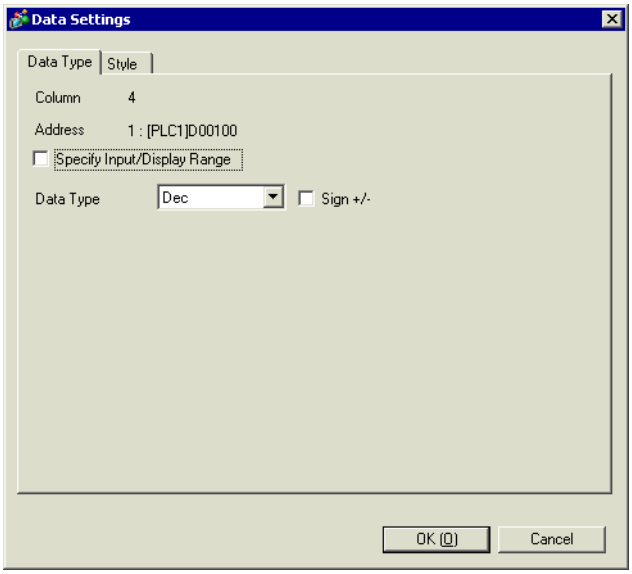


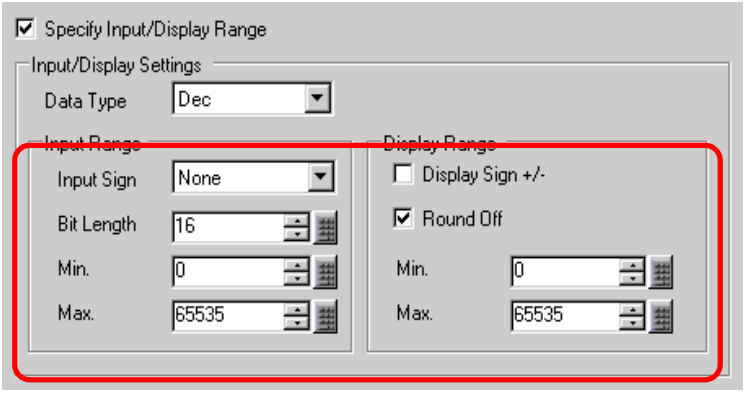
Setting	Description
Column	Displays the selected column number.
Time Format	Select the time format as: [hh:mm], [hh:mm:ss], or [hh:mm:ss.ms]. "hh", "mm", and "ss" use two digits to display the hours, minutes, and seconds. "ms" uses three digits to display the milliseconds.
Display Characters	Set the number of characters to be displayed in the Time column cells from 1 to 20 single-byte characters.

◆ Detail Settings - [Data Settings] Dialog Box

Select a Data column in the Preview area and click [Detail Settings]. The following dialog box appears.

[Data Type] Tab

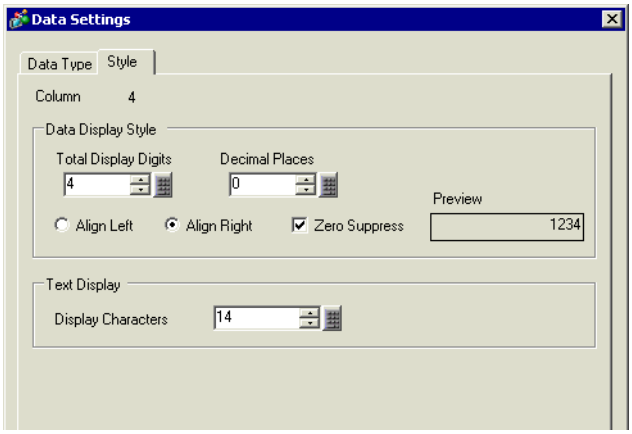


Setting	Description
Column	Displays the selected column's number.
Address	Displays the selected column address.
Specify Input/ Display Range	Designate whether or not an input range and display range will be set. If designated, the following setting items will appear.  **NOTE** • Each setting for the input range/display range is the same as [Basic] mode, [Data Type Settings], in the displayed [Data Settings] dialog box. ☞ " ◆ [Data Settings] Dialog Box" (page 24-77)

Continued

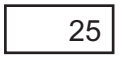
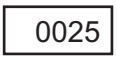
Setting	Description
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

[Style] Tab



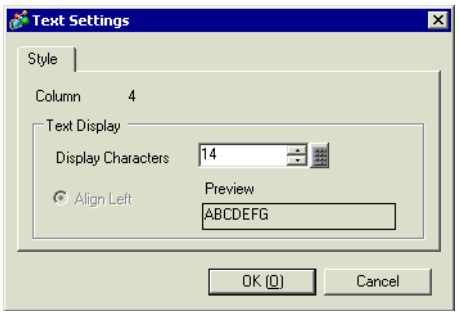
Setting	Description
Total Display Digits	Select the number of display digits for the data from 1 to 17. This can be designated to within the number of characters set in [Display Characters]. The numbers displayed after the decimal point are also included in the number of digits. (For example, Total Display Digits is "5", and the Decimal Places is "2") 123.45
Decimal Places	Set the number of display digits after the decimal point, from: 0 to [Total Display Digits]−1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the data display position.

Continued

Setting	Description
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4)  Leading zeroes are not displayed  Zeroes are added to correspond to the length of
Preview	Preview the selected style.
Display Characters	Set the number of characters to be displayed in the Data column cells from 1 to 20 single-byte characters.

◆ Detail Settings - [Text Settings] Dialog Box

If you add a [Text] column, select the column and click [Detail Settings]. The following dialog box appears.

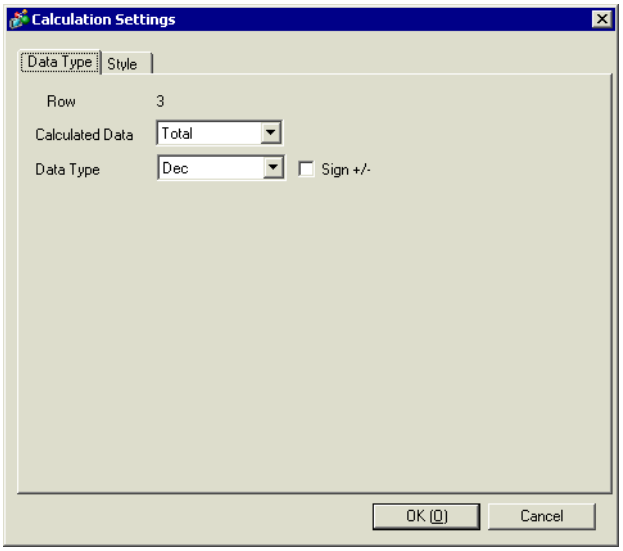


Setting	Description
Column	Displays the selected column number.
Display Characters	Set the number of characters to be displayed in the [Text] column cells from 1 to 20 single-byte characters.
Align Left	The display of the text is fixed as left-aligned.
Preview	Previews the selected text column style.

◆ Detail Settings - [Calculation Settings] Dialog Box

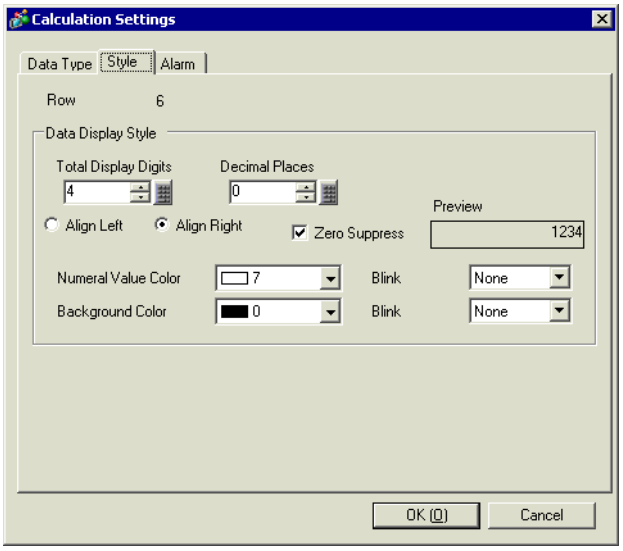
If the [Number of Calculation Display Rows] in [Block Print] is not Åg0Åh, select the Calculation row or Data column Calculation cell, and click [Detail Settings]. The following dialog box appears.

[Data Type] Tab



Setting	Description
Row Number	Displays the selected row number.
Calculated Data	Choose the data calculation type from [Total], [Average], [Max], or [Min].
Data Type	Choose the data type from [Dec], [BCD], [Hex], or [Float]. [Float] can only be selected when the set [Bit Length] is [32 Bit] on the [Address] tab. **NOTE** • When [BCD] is selected, sampling data containing the digits A-F (hexadecimal) other than BCD will be displayed/saved in CSV with "----" (Number of digits "-").
Sign +/-	Designate whether or not to attach a minus sign to data. This can only be set when the [Data Type] is [Dec]. **NOTE** • This is fixed when the [Data Type] is [Float].

[Style] Tab

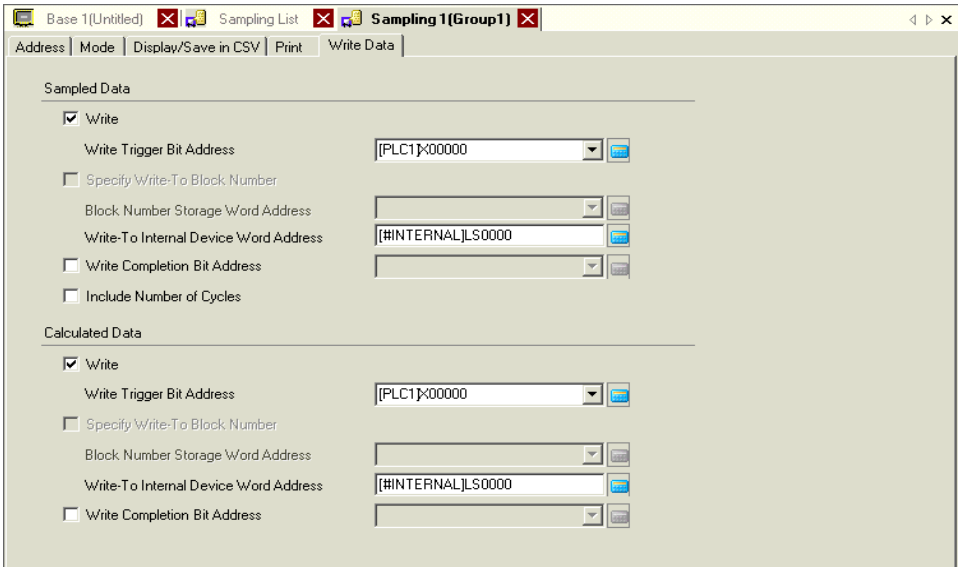


Setting	Description
Total Display Digits	Select the number of display digits for the calculation data from 1 to 17. This can be designated to within the number of characters set in the [Style Type] tab's [Display Characters]. The numbers displayed after the decimal point are also included in the number of digits. Example) When the Total Display Digits is 5, and the Decimal Places is 2. 123.45
Decimal Places	Set the number of display digits after the decimal point for the calculation data, from 0 to [Total Display Digits]–1. This cannot be set when the [Data Type] is [Hex].
Align Right/Align Left	Select the calculation data display position.
Zero Suppress	If this option is selected, leading zeros are not displayed. (For example, Number of Display Digits = 4) Zero Suppress 25 — Leading zeroes are not displayed Zero Suppress 0025 — Zeroes are added to correspond to the length of
Preview	Preview the selected style.

■ Write Data

Select the settings for writing sampling data to the GP internal device. For more information about this function, please refer to the following.

☞ "24.9.6 Writing to the Internal Device" (page 24-130)



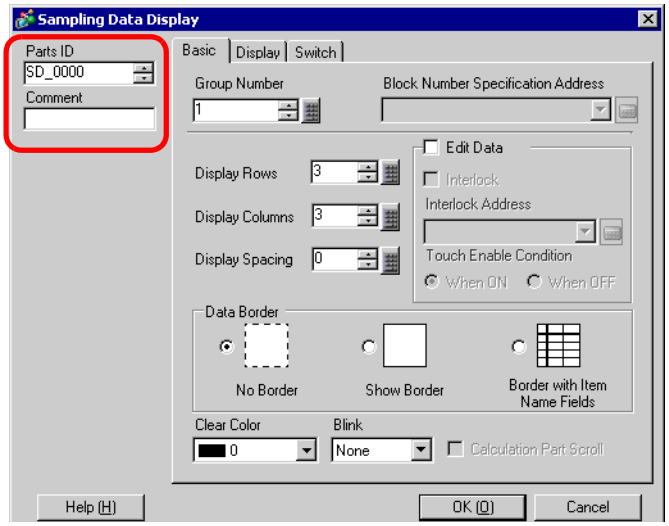
Setting		Description
Sampled Data	Write	Select whether or not to write the sampling data stored in backup SRAM (or DRAM) to the GP internal device.
	Write Triggered Bit Address	Define the address to control data writing to internal device addresses. When the bit address is turned ON, sampling data is output to the internal device.
	Specify Write-To Block Number	If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, designate whether or not to set the block number to write to the internal device.
	Block Number Storage Word Address	When [Specify Write-To Block Number] is designated, set a Word Address in order to store the block number. The data stored in this address block will be outputted to the internal device. If no block number is specified, data from Block Number "0" will be outputted.
	Save-In Internal Device Word Address	Select the internal device address where the data will be stored. The sampling data will be stored starting from this address. ☞ " ◆ The Structure of Sampled Data Stored in the Internal Device" (page 24-131)
	Write Completion Bit Address	Designate whether or not to confirm the completion of writing to the internal device. If you want to confirm it, set a bit address. When the data writing is finished, this bit will turn ON. **NOTE** • This bit will not be turned OFF automatically. After confirming that the writing was completed, please turn OFF this bit.

Continued

Setting		Description
Sampled Data	Include Number of Cycles	Designate whether or not to output the number of data sampled to the internal device along with the data.
Calculated Data	Write	Select whether or not to read total values for each data column, set on the [Display/Save in CSV] tab, to the internal device.
	Write Triggered Bit Address	Set the address to control the writing of calculation data to the internal device. When this bit address turns ON, the calculation values for each Data column set on the [Display/Save in CSV] tab are written to the internal device.
	Specify Write-To Block Number	If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, designate whether or not to set the block number to write to the internal device.
	Block Number Storage Word Address	When [Specify Write-To Block Number] is designated, set a word address in order to store the block number. The totals data stored in this address block will be outputted to the internal device. If no block number is specified, totals data from block number [0] will be outputted.
	Save-In Internal Device Word Address	Select the internal device address where the totals data will be stored. The calculation data will be stored starting from this address. ☞ " ◆ The Structure of Sampled Data Stored in the Internal Device" (page 24-131)
	Write Completion Bit Address	Designate whether or not to confirm the completion of calculation data writing to the internal device. If you want to confirm it, set a bit address. When the data write is finished, this bit will turn ON. **NOTE** • This bit will not be turned OFF automatically. After confirming that the writing was completed, please turn OFF this bit.

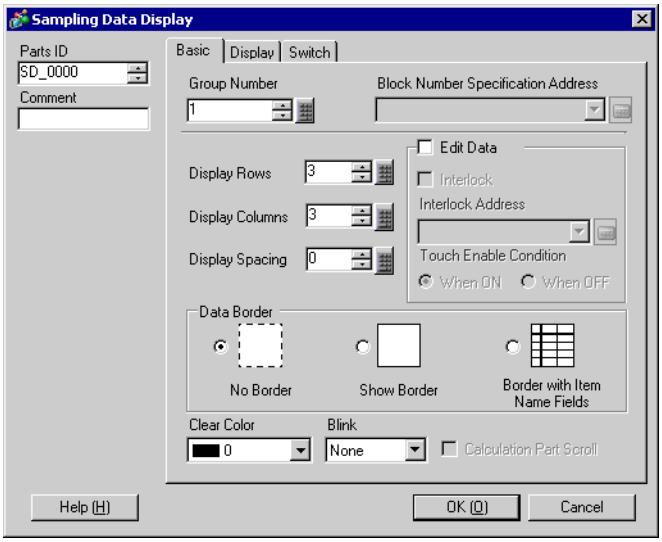
24.8.2 Sampling Data Display Guide

Displays the sampling group data with the display format set in the Common - [Sampling] on the GP screen. One data item can be placed per screen.



Setting	Description
Part ID	Placed parts are assigned an ID number. Sampling Data Display's ID: SD_**** (4 digits) The letter portion is fixed. The number portion can be modified from 0000 to 9999.
Comment	The comment for each Part can be up to 20 characters long.

■ Basic Settings

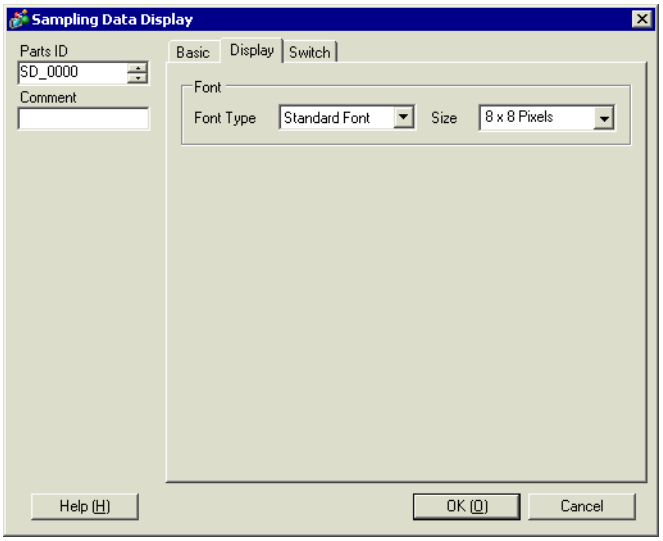


Setting	Description
Sampling Group	Set the sampling group number you want to display on the screen from among the sampling groups created in [Common] - [Sampling].
Block Specify Range Address	When the designated sampling group has multiple blocks, this address will designate which block's data will be displayed. You can change the displayed data by changing the block number stored here. **NOTE** • If a block number that does not exist is specified, data will not be displayed. • If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, this address is disabled.
Display Lines	Set the number of lines to be displayed on the screen from 1 to 50.
Display Columns	Set the number of columns to be displayed on the screen from 1 to 25.
Display Spacing	Select the spacing between rows and columns displayed on the screen from 0 to 10 dots. This can only be set when the [Data Border] is set to [No Border]. When drawing a ruled line freely, draw a line within the width of the spacing so that it may not overlap the cells.
Edit Data	Specify whether or not displayed data can be edited. If this is designated, touching a displayed Date/Time or numeric value cell on the screen will allow you to change the value. **NOTE** • If you change the block number while editing data or move a cell being edited off the screen with a scroll switch, the value will not be changed and data edit mode will be canceled.

Continued

Setting			Description
Edit Data	Interlock		When [Edit Data] is designated, select whether or not to use the Interlock feature (the feature to allow data editing only when a condition is satisfied).
		Interlock Address	If the Interlock feature is enabled, designate the address which will control whether touch is enabled or disabled. Only when this bit address is in the same state as the [Touch Enable Condition] can data be edited by touching it.
		Touch Enable Condition	When using the Interlock feature, choose the condition which will enable touch. • ON Touch is only enabled when the designated [Interlock Address] is ON. • OFF Touch is only enabled when the designated [Interlock Address] is OFF. **NOTE** • When touch is disabled while editing data on the screen, the Edit Data mode is canceled.
Data Border			Select the type of data border from [No Border], [Border], or [Border with Item Name Fields].
Clear Color			Select a color for the portion with no text displayed.
Blink			Select whether or not the [Clear Color] will blink, and the blink speed. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)
Calculation Part Scroll			Designate whether or not to scroll the calculation data portion together with the data portion. If this is not designated, the data calculation portion will be displayed on the screen. This cannot be set when [Overwrite old data when designated block count finishes] is set to the sampling data. The calculation data is not scrolled.

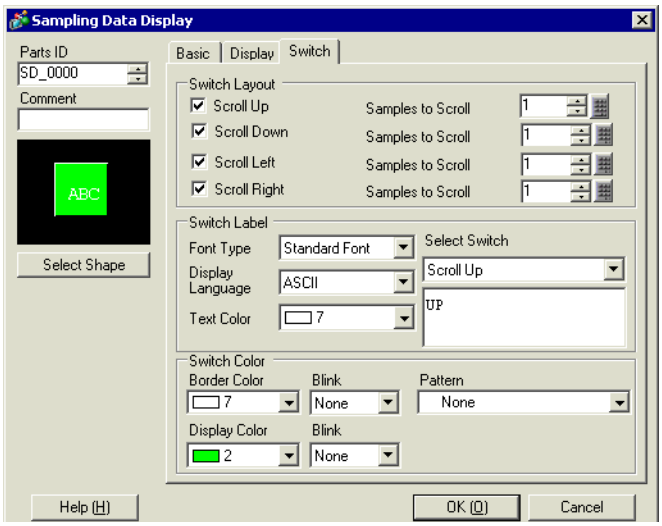
■ Display



Setting	Description
Font Type	Choose a font type for the characters and numeric values from [Standard Font] or [Stroke Font]. • Standard Font This is a Bitmap font. Choose the character height and width magnification ratio. When you magnify/shrink characters, the outline may become rough or the letter may appear squished. • Stroke Font This is an outline font where the ratio of the characters' height/width is fixed. The letters will have a smooth outline even if you magnify/shrink them, however, this font has a large size so it may load slowly in the GP.
Character Size	Select a font size for the characters and numeric values to be displayed. Standard Font: From [8x8] to [64x128], in increments of 8 dots. Fixed Size: select from [6x10], [8x13], or [13x23]. Stroke Font: 6 to 127 dots

■ Switch

Set the Switches to scroll the display of the Sampling Data Display.



Setting		Description
Part Shape		Displays the shape that you chose for the switch with [Select Shape].
Select Shape		Open the [Select Shape] dialog box to choose the switch shape.
Switch Layout	Scroll Up/ Scroll Down/ Scroll Left/ Scroll Right	Select whether or not to place switches to scroll the display data in each direction.
	Samples to Scroll	When selecting a switch to place, set how many rows or columns it will scroll when pressed.
Switch Label	Font Type	Choose the label font for the switches from [Standard Font] or [Stroke Font].
	Display Language	Select a language for the label on the switch from [Japanese], [ASCII], [Chinese (Traditional)], [Chinese (Simplified)], [Korean], [Cyrillic], or [Thai].
	Text Color	Select the font color that will be displayed on the switch labels.
	Select Switch	Select a switch whose label you will set from among the placed switches.
	Label	Enter the text that you want to display on the switch selected in [Select Switch].

Continued

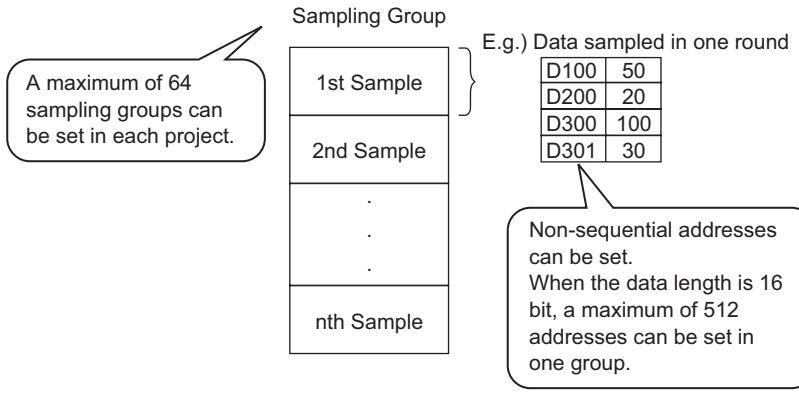
Setting		Description
Switch Color	Border Color	Select a color and border color for the Switch. **NOTE** • Some settings cannot be set depending on the part that you chose with [Select Shape].
	Display Color	
	Pattern	Select the switch pattern from 9 types.
	Pattern Color	Select the switch pattern color.
	Blink	Select whether or not the Part will blink, and the blink speed. You can choose different blink settings for the [Display Color], [Pattern Color], [Border Color], and [Text Color]. **NOTE** • There are cases where you can and cannot set Blink depending on the Main Unit and System Settings [Color]. ☞ "9.5.1 Setting Colors ■ List of Available Colors" (page 9-34)

24.9 Sampling Structure

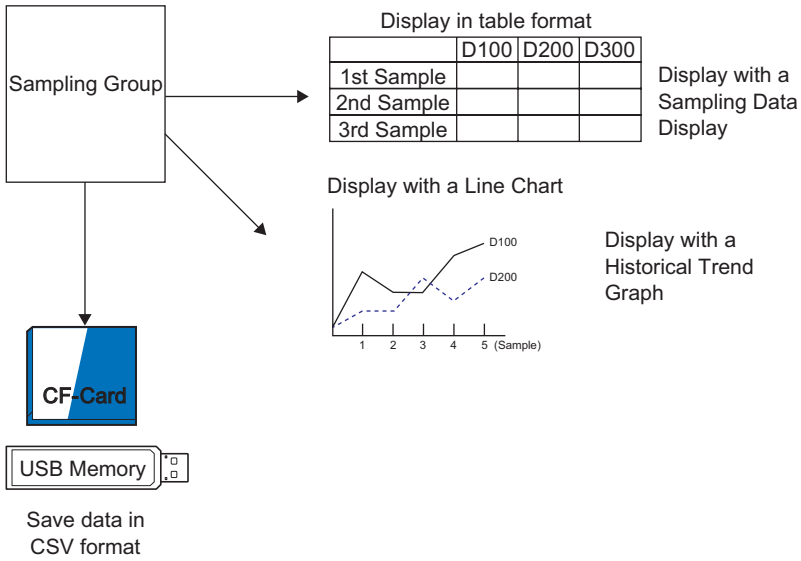
24.9.1 Summary

Select which address data and which timing will be used for sampling. The sampled data is handled as a group based on those settings (called a "Sampling Group").
A maximum of 64 sampling groups can be set in each project. The number of groups that can be set in a system depends on the Cycles and the Addresses.

When there is only one sampling group, the maximum number of data (number of addresses) that can be sampled at one time is 512 for 16 bit length, and 256 for 32 bit length.



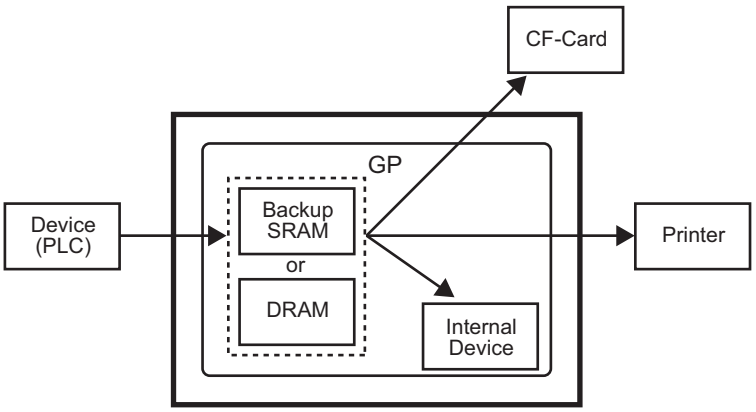
Sampled data is displayed by group unit on the GP screen, and saved to CF Card or USB storage.



NOTE

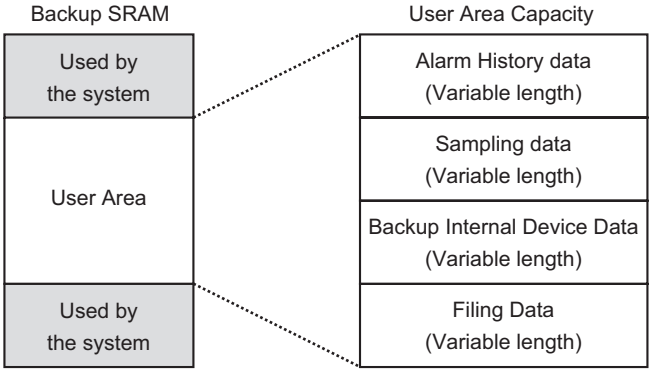
- Same structure as when you save to the USB storage device.

■ Data Sampling Flow



■ Backup SRAM

This memory will save data even when the GP unit is OFF.
The backup SRAM user area is used to back up Sampling data, Alarm History data, filing data, and the internal device User Area.
The capacity of backup SRAM that can be used by sampling data depends on the model of GP and how much capacity is being used by other data.



Backup SRAM has the following usage priorities:
(1) Alarm History data
(2) Sampling data
(3) Internal device backup
(4) Filing data

NOTE

- The priority order within the Sampling feature goes in order of the smallest Sampling Group

IMPORTANT

- Sampling data stored in backup SRAM is erased when:
  - •Screen transfer occurs
  - •Memory is reset (Offline)
  - •Backup SRAM is initialized (Offline)
  - •The designated [Data Clear Bit Address] turns ON

◆ DRAM

This memory is used for temporary storage and all data stored here will be erased when the GP is turned OFF or reset.
When the [Mode] tab's [Backup to SRAM] check box is cleared, sampling data will be stored in this DRAM.

IMPORTANT

- Sampling data stored in DRAM is erased when:
  - •GP is turned OFF
  - •GP is reset
  - •Screen transfer occurs
  - •The designated [Data Clear Bit Address] turns ON

◆ Usage Capacity of Sampled Data

Sampling data backup SRAM (or DRAM) usage capacity differs depending on the Number of Sampling Groups, Data Length, Number of Data (Addresses) and the contents of the action settings.
Without the sampling settings, the usage capacity is 0 bytes.

Calculation

- Usage capacity per group (in bytes)

  20 + Blocks x Cycles*2 x [(Number of Data + 31)/32 x 4*3 + 2*5 x **Number of Data***1 + 12 *4]

  *1When the Number of Data is an odd number, this value becomes [Data Items] (the portion in bold)+1.
  *2When in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, this value becomes [Cycles] + 1.
  *3When [Add Data Valid/Invalid Flag] is selected in the action settings, this portion size (the underlined portion) is added.
  *4When [Add Time Data] is designated in the action settings, 12 bytes will be added to each sample as time data.
  *5When the data length is 16 bits equals 2 bytes; when the data length is 32 bits equals 4 bytes.

- Usage capacity for whole system (in bytes)

  (4 + 4 x Number of Groups) + each Sampling Group's total usage capacity

Calculation Example

Setting	Description
Number of Groups	1
Data Type	16 Bit
Blocks	1
Cycles	100
Number of Data (Addresses)	7

Example 1)[Overwrite old data after finishing the specified cycles] is cleared, [Add Time Data] is cleared, [Add Data Valid/Invalid Flag] is selected

[Calculation] (4 + 4 x Number of Groups) + [20 + Blocks x Cycles x {(Number of Data + 31)/32 x 4 + 2 x (Number of Data + 1)}

[Calculation Result] (4 + 4 x 1) + [20 + 1 x 100 x {(7 + 31)/32 x 4 + 2 x (7 + 1)}]
= 2103 bytes (Around 2.1 KB)

Example 2)[Overwrite old data after finishing the specified cycles] is selected, [Add Time Data] is selected, [Add Data Valid/Invalid Flag] is selected

[Calculation] (4 + 4 x Number of Groups) + [20 + Blocks x (Cycles + 1) x {(Number of Data + 31)/32 x 4 + 2 x (Number of Data + 1) + 12}

[Calculation Result](4 + 4 x 1) + [20 + 1 x (100 + 1) x {(7 + 31)/32 x 4 + 2 x (7 + 1) + 12}]
= 3335 bytes (Around 3.3 KB)

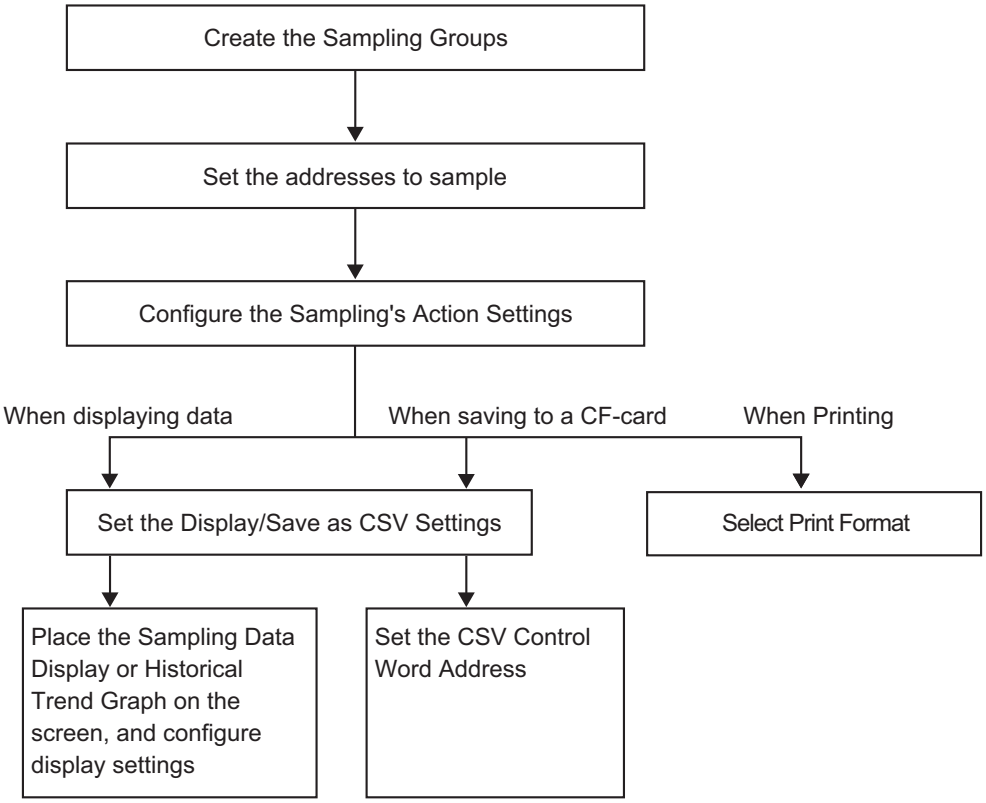
Indication of the number of sampling data you can save

Set the following high limit as an indication of the occurrences of sampling (or Occurrences x Number of Blocks) for whole system when the sampling data number at one time (Address) is one.

(The following is an indication of the number of sampling data you can save when you use the model that has backup SRAM capacity is 320 KB. The indication is calculated from SRAM capacity, the sampling data occurrences that you can set actually up to 65535 times.)

Condition	Sampled Data storage area		
	Backup SRAM	DRAM	Combining Backup SRAM and DRAM
Only Sampled Data	for 81,332	for 81,912	for 163,244
Sampled Data + Time Data	for 20,332	for 20,476	for 40,808
Sampled Data + Data Valid/Invalid Flag	for 40,664	for 40,954	for 81,618
Sampled Data + Time Data + Data Valid/ Invalid Flag	for 16,264	for 16,380	for 32,644

■ Sampling Flow



24.9.2 The Sampling Action

■ Data Sampling Timing

There are two methods of sampling, by time period or bit state.
The following shows the execution conditions for the Sampling, and the characteristic of each action.

Timing	Sampling Execution Condition	Attribute
Time Period	Time Specification Sampling begins at the designated time and continues for the designated period.	• You can set the start time. • Sampling cycles are set in 15 second increments. • After sampling data for the designated Cycles, you can select whether to overwrite data starting with the oldest data, or whether not to overwrite and store in a separate block*2.
	Constant Cycle*1 Sample data at constant cycles starting from when the GP is turned ON.	• You can set the sampling cycle 100 ms (millisecond) or 1 s (second) units. • Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times.
	Constant Cycle when Bit is ON *1 Sample data at constant cycles starting from when the GP is turned ON, but only when the designated bit is ON.	• You can set the sampling cycle 100 ms (millisecond) or 1 s (second) units. • While the designated bit is OFF, data will not be sampled even when a cycle starts. • Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times.
Bit	Bit ON Data is collected every time the designated bit turns ON.	• After sampling data for the designated Cycles, you can select whether to overwrite data starting with the oldest data, or whether not to overwrite and store in a separate block*2.
	Bit Change *1 Data is collected every time the designated bit changes state (ON/OFF).	• Data will be overwritten and stored, starting with the oldest data, after data has been sampled the designated number of times.

*1 [Constant Cycle], [Constant Cycle when Bit is ON], and [Bit Change], all the set address data is read) at the time the execution condition becomes satisfied, and stored in backup SRAM (or DRAM).

*2 All sampling data collected in the designated Cycles is called a "block".

" ■ Data Storage Methods" (page 24-112)

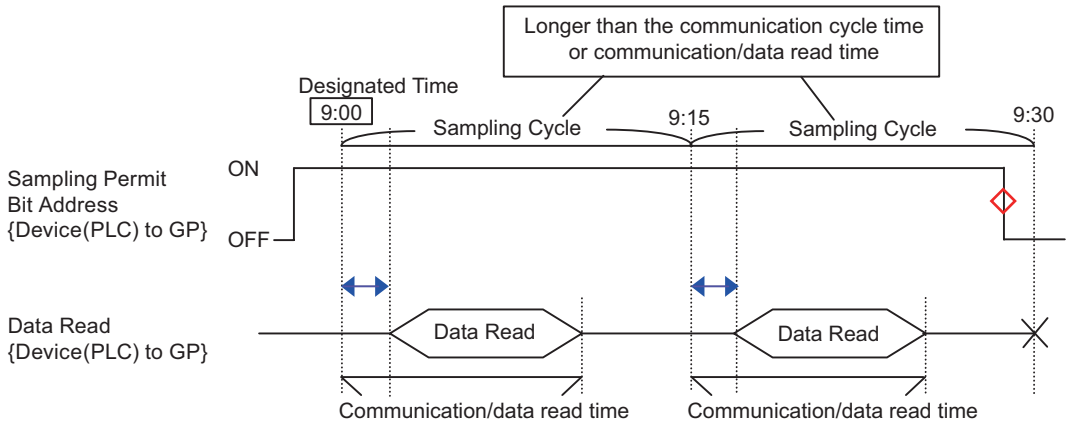
NOTE

- After the GP is powered ON and the internal programs are prepared, one second maximum of delay time may occur before the sampling starts.
- When using [Constant Cycle], [Constant Cycle while Bit is ON], or [Bit Change], after powering up these sampling groups read in data for all the defined addresses before starting sampling operations.
- For [Constant Cycle], [Constant Cycle when Bit is ON], and [Bit Change], because all the set address data is being read, the communication may put a burden on the system if the number of addresses to sample is large.
- The data's display state when a communication error occurs during sampling depends on the execution condition.

☞ "24.9.3 About Sampling Data Display ■ What Happens When Data Cannot be Sampled?" (page 24-120)

◆ Time Specification

When a device/PLC [Sampling Permit Bit Address] is ON and the designated [Start Time] begins, the data from the designated addresses is read. After that, the data is read occurs at the designated cycle.
The sampling cycle time monitor is operated by the GP's internal clock.

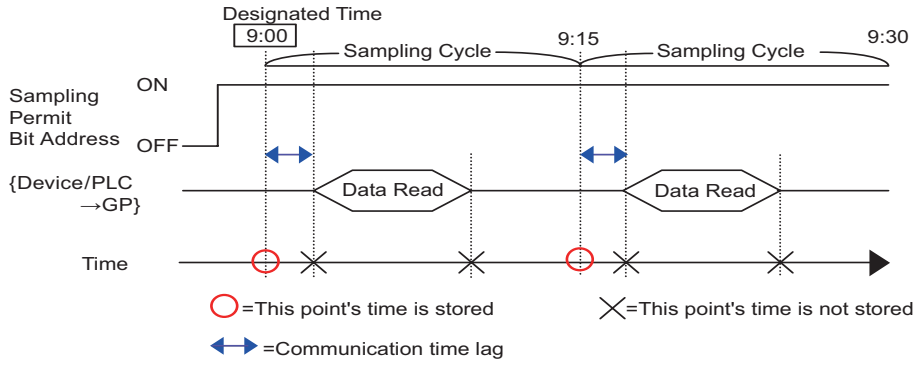


=Communication time lag

=Return the bit to the OFF state when action finishes (e.g. "Stop action after 9:15 sampling").

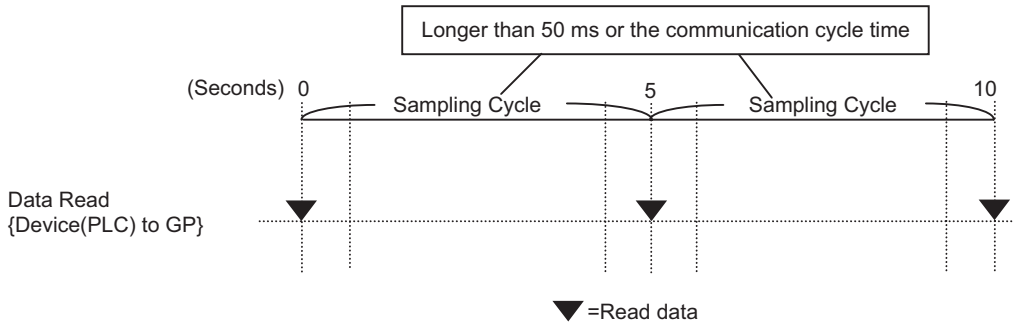
NOTE

- The above image shows the timing of the GP reading data from the designated address. The displayed time intervals are not accurate.
- Please set the [Sampling Cycle] to either the communication cycle time or the time taken to read the communication data, whichever is longer. Communication cycle time is stored in the GP internal device Special Relay Area LS2037.
- Sampled data will also have the sample time added to it. The start time of the data read at the designated [Start Time] and each [Sampling Cycle] will become the "time data".



◆ Constant Cycle

Read data at the designated fixed cycle starting from when the GP unit is turned ON. The sampling cycle's time monitor is operated by the GP's internal clock.

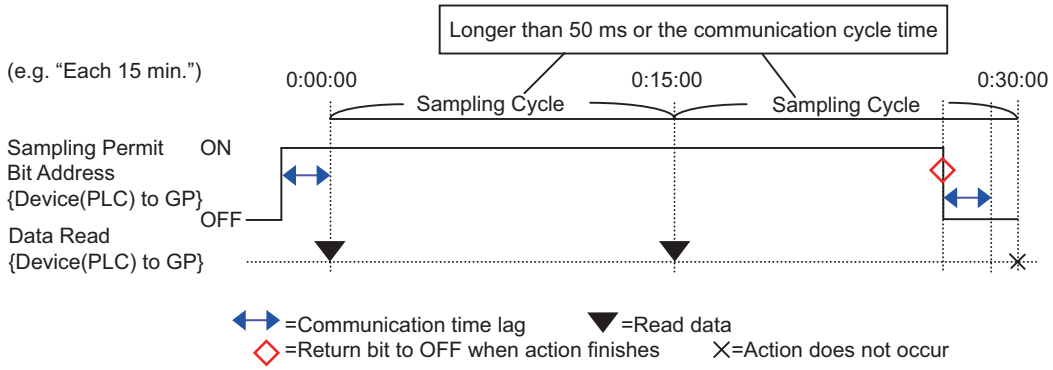


NOTE

- The above figure illustrates the timing of how specified address data is read by the GP. The diagram does not indicate the actual speed.
- When using the Direct Access method to communicate with the device/PLC, set the [Sampling Cycle] to the communication cycle time or 50 ms, whichever is longer. For the Memory Link method, set the [Sampling Cycle] to 50 ms or more. Communication cycle time is stored in the GP internal device's (Special Relay Area) LS2037.

◆ Constant Cycle when Bit is ON

When the device/PLC [Sampling Triggered Bit Address] is ON, data is read at the designated fixed cycle. The sampling cycle's time monitor is operated by the GP's internal clock.



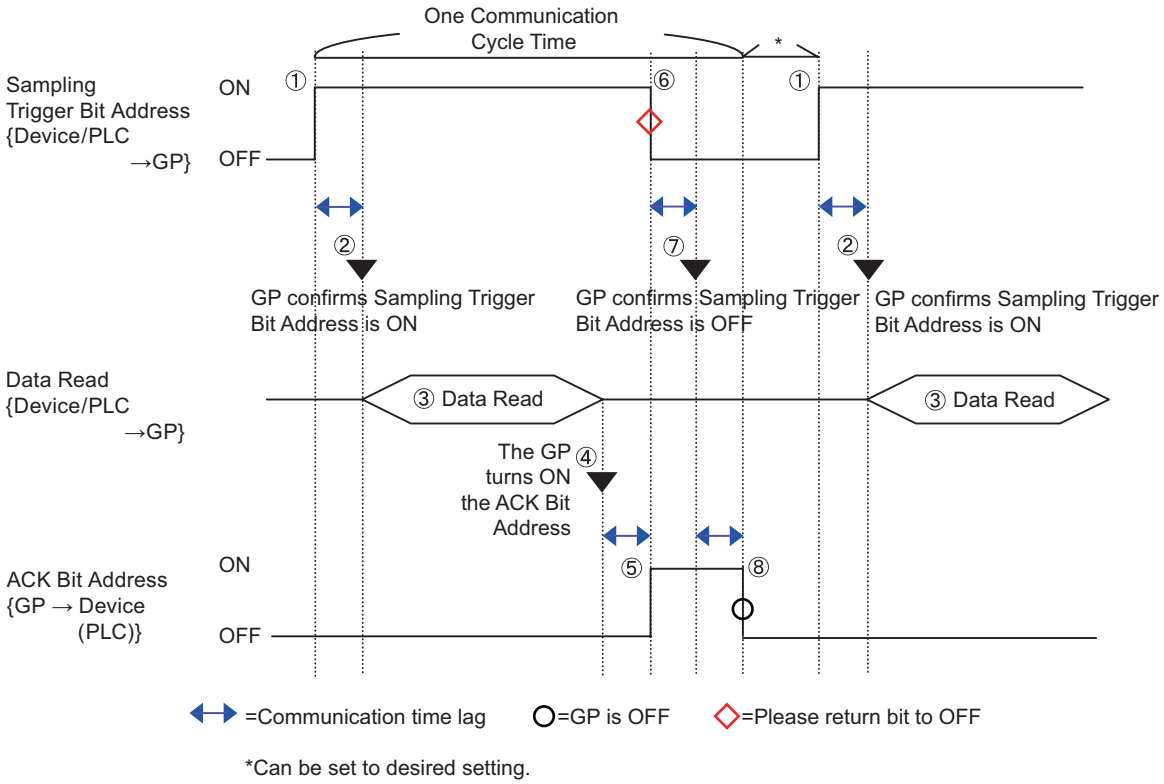
NOTE

- The above figure illustrates the timing of how specified address data is read by the GP. The diagram does not indicate the actual speed.
- The time period from when the [Sampling Permit Bit Address] turns ON to the time the sampling actually begins can be up to one second.
- When using the Direct Access method to communicate with the device/PLC, set the [Sampling Cycle] to the communication cycle time or 50 ms, whichever is longer. For the Memory Link method, set the [Sampling Cycle] to 50 ms or more. Communication cycle time is stored in the GP internal device's (Special Relay Area) LS2037.
- Please plan the action settings to take into consideration cases where the GP's power is turned OFF while an action is running. Please ensure that each Bit Address such as the [Sampling Permit Bit Address] and [Data Full Bit Address] is in the OFF state when power is turned ON.

◆ Bit ON

When the device/PLC [Sampling Triggered Bit Address] turns ON, the designated address data is read to the GP. When the GP finishes reading data, the [ACK Bit Address] is turned ON.

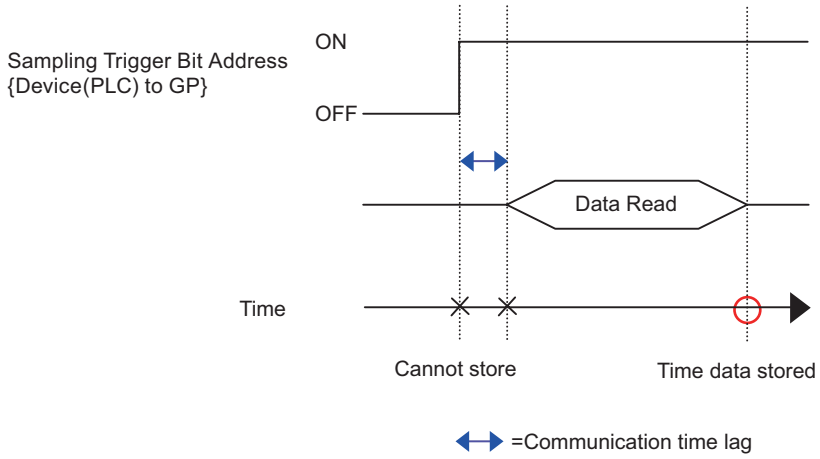
When you detect that the device/PLC [ACK Bit Address] has turned ON, please turn OFF the [Sampling Triggered Bit Address].When you turn OFF the [Sampling Triggered Bit Address], the [ACK Bit Address] will be turned OFF.



*Can be set to desired setting.

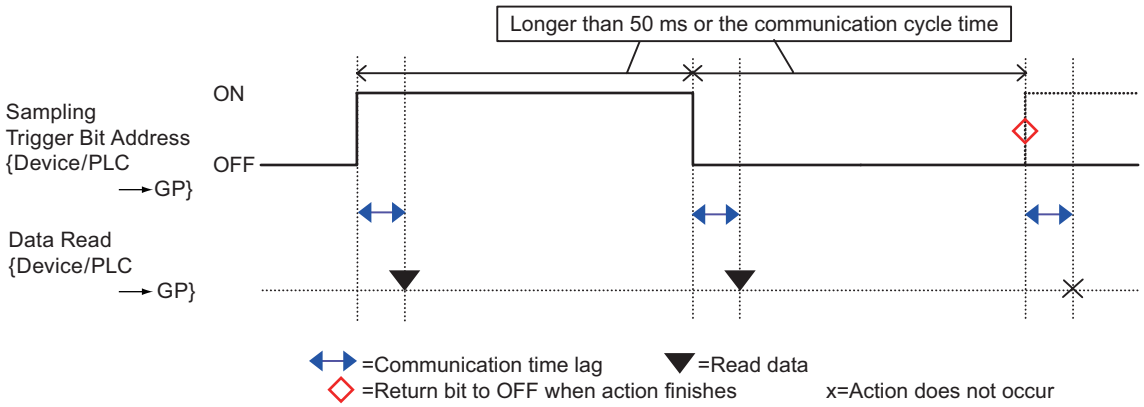
NOTE

- The above figure illustrates the timing of how specified address data is read by the GP. The diagram does not indicate the actual speed.
- Please confirm that the [ACK Bit Address] is turned OFF before sampling.
- Please plan the action settings to take into consideration cases where the GP's power is turned OFF while an action is running. Please ensure that each bit address such as the [Sampling Triggered Bit Address] and [ACK Bit Address] is in the OFF state when power is turned ON.
- When you add the data obtain time (Time Data), the time data is a time when the data reading completed, not when [Sampling Trigger Bit Address] is ON.



◆ Bit Change

When the device/PLC [Sampling Triggered Bit Address] turns ON or turns OFF, the designated address data is read to the GP.



NOTE

- The above figure illustrates the timing of how specified address data is read by the GP. The diagram does not indicate the actual speed.
- Please plan the action settings to take into consideration cases where the GP's power is turned OFF while an action is running. Please ensure that each bit address such as the [Sampling Triggered Bit Address] and [Data Full Bit Address] is in the OFF state when power is turned ON.
- The [Sampling Triggered Bit Address] will not function correctly if turned OFF immediately after being turned ON. Please wait until the GP can recognize the bit state as ON or OFF. (When using the Direct Access method, the wait time should be the communication cycle time or 50 ms, whichever is longer. For the Memory Link method, 50 ms or more.)

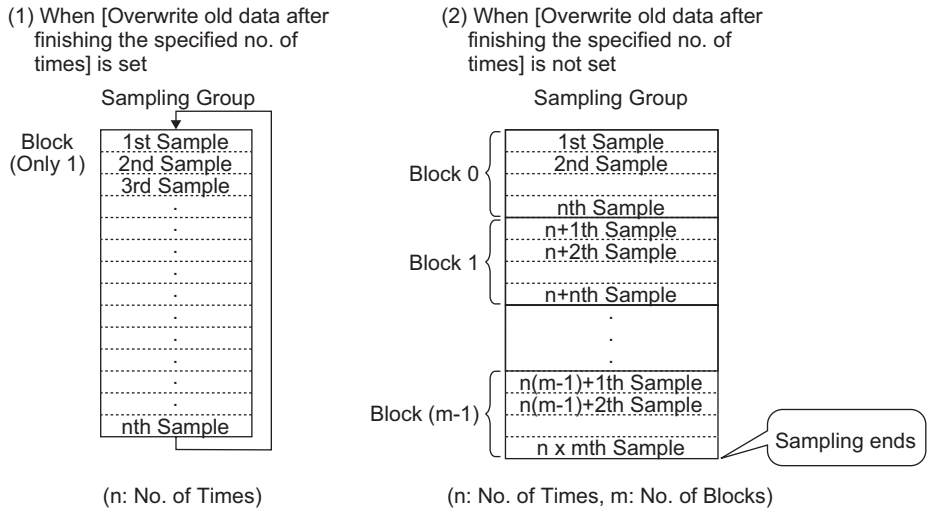
■ Data Storage Methods

Sampled data is stored in the GP backup SRAM (or DRAM) in Sampling Group units.
Data sampled from the designated Cycles is stored with one of the following two methods.

(1) Overwrite old data and store the latest data.

(2) Do not overwrite data and store as a separate block.

The above storage methods are set by the [Overwrite old data after finishing the specified cycles] check box in the [Mode] tab's Extended area.
When the execution condition is [Constant Cycle], [Constant Cycle when Bit is ON], or [Bit Change], only method (1) is possible.
When the execution condition is [Time Specification] or [Bit ON], you can select method (1) or (2).



(1)When [Overwrite old data after finishing the specified cycles] is selected.

Even after data has been sampled the designated Cycles, because old data stored in the GP is overwritten with new data, sampling automatically continues.

NOTE

- After sampling for the designated Cycles finished, the [Data Full Bit Address] turns ON. This only indicates that data has been stored for one round. Sampling will automatically continue. After confirming that one round of data sampling has finished, please turn OFF the [Data Full Bit Address] so that it can detect when the next round finishes.

(2) When [Overwrite old data after finishing the specified cycles] is cleared

After data has been sampled the designated Cycles, the next data is stored as a separate block. (A block is the sampling data collected from the designated Cycles.) Data from the designated Cycles x Blocks is stored. After that, data is not sampled.
When you store data into multiple, separate blocks, you can display and print each block. For example, if you want to sample data 10 times per day from Monday to Friday, store Monday's data in "block 0", Tuesday's data in "block 1", and so on. You can now print data for each day's information.

NOTE

- When one block finishes, the [Block Termination Bit Address] is turned ON. After you confirm that the block has finished, please turn OFF the [Block Termination Bit Address] so that it can detect when the next block finishes. Also, please confirm that the [Block Termination Bit Address] is turned OFF before sampling.
- When all data sampling finishes (Cycles x Blocks), the [Data Full Bit Address] turns ON and further sampling will not occur. To start the sampling action again, turn ON the designated [Data Clear Bit Address] and erase the stored data.

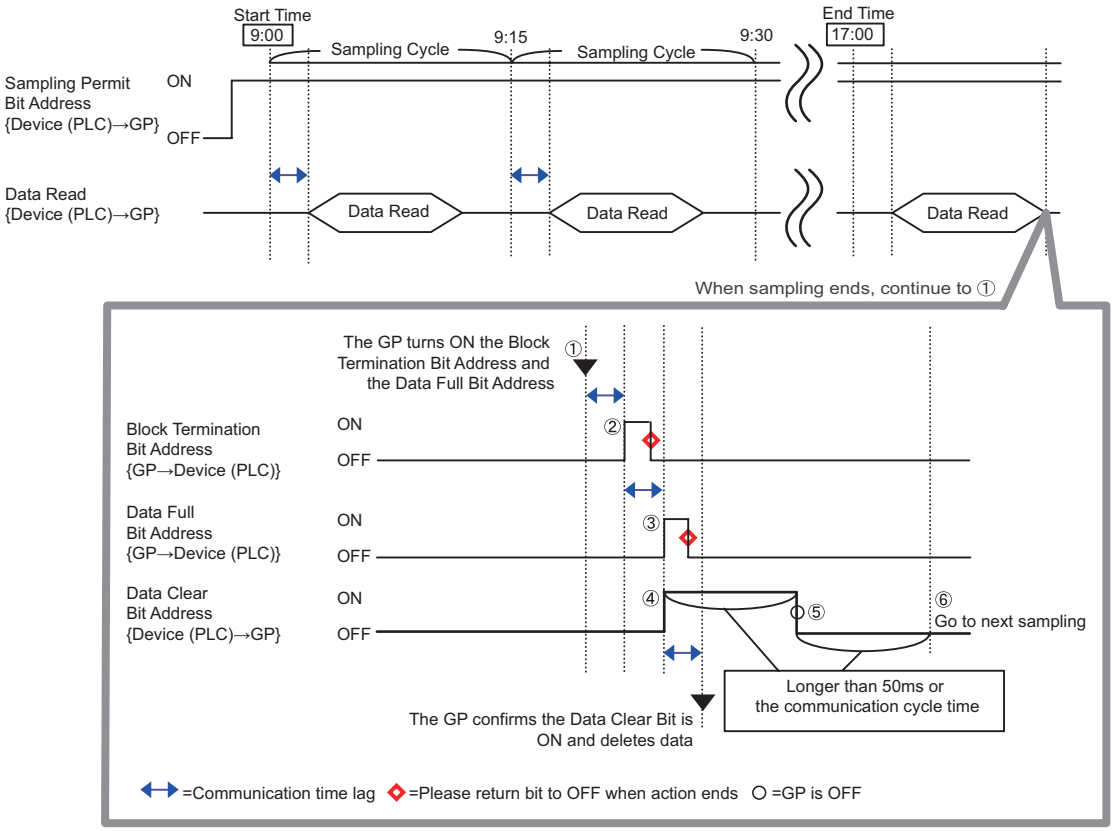
☞ " ■ Deleting Data" (page 24-114)

■ Deleting Data

If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, sampling will not occur after data has been stored for the designated Cycles x Blocks. To start sampling again, you must delete sampling data stored in the GP.

When data has been sampled from the Cycles x Blocks, the designated [Data Full Bit Address] is turned ON. Please confirm that this bit is ON and turn ON the [Data Clear Bit Address].

(For example, Execution Condition: Time Specification)



(1) When data has been sampled from the Cycles x Blocks, the GP turns ON the [Block Termination Bit Address] and [Data Full Bit Address].
(2) The [Block Termination Bit Address] turns ON.
(3) The [Data Full Bit Address] turns ON.
(4) Acknowledge that the [Data Full Bit Address] is ON and turn ON [Data Clear Bit Address]. After the GP recognizes this, it starts to delete the Sampled Data.
(5) When the data deletion completes, the GP automatically turns OFF the [Data Clear Bit Address].

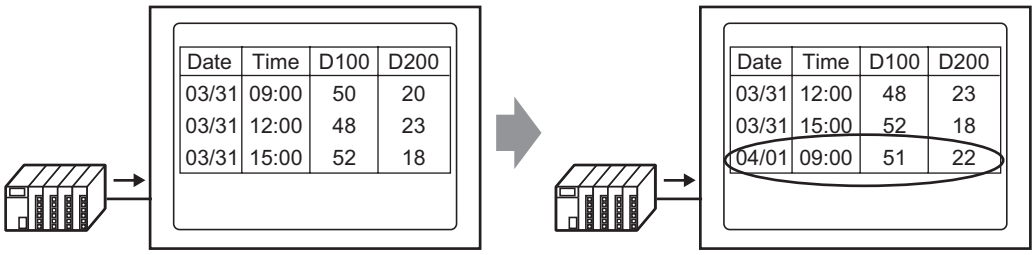
(6) You can now start the sampling action again. Data will be stored starting from the top (the first sample cycle in "block 0".

NOTE

- The [Data Clear Bit Address] will not function correctly if turned OFF immediately after being turned ON (or if turned ON immediately after being turned OFF). When using the Direct Access method to communicate with the device/PLC, maintain the bit's state for the communication cycle time or 50ms, whichever is longer. For the Memory Link method, 50ms or more.

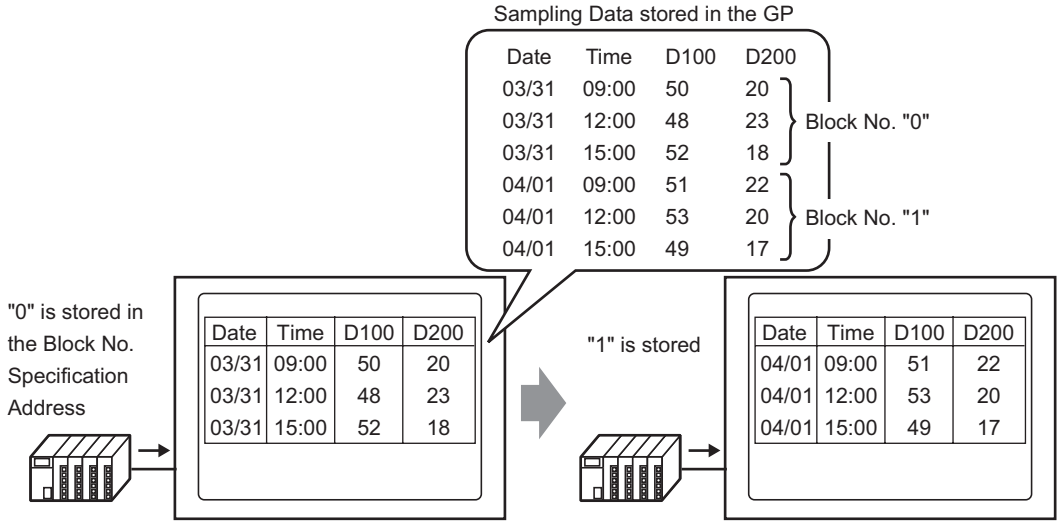
24.9.3 About Sampling Data Display

Data is displayed on a Sampling Data Display on the GP screen every time sampling occurs. When the data surpasses the designated [Display Rows], the old data will shift up and the new data will be added.



Each time data is sampled, old data is shifted up and the new data is added and displayed.

If [Overwrite old data when designated block count finishes] is not set in the Action, only the sampling data from the block number stored in the [Block Number Storage Address] will be displayed. When the last data from the block is displayed, the display will not be updated again.
To display another block's data, change the value in the [Block Completed Bit Address] and the display will change.



The Sampling Data Display's Block No. Specification Address changes and...

The displayed block changes.

NOTE

- If a block number that does not exist is specified, data will not be displayed.

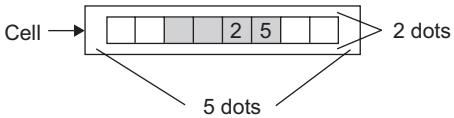
■ Display Example for Basic Settings

In the Basic Settings mode, a fixed preset format (such as the following) can be used to create a simple format.

- Data columns and Time columns are displayed sequentially line by line, then data columns for all of the Addresses set after the Date/Time are displayed.
- The 1st row displays the Item Name row. The Data columns' item names each display an address.
- When the Total row is displayed, it appears in the row after the data display rows. The item name is displayed as "Total".
- If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, only one data row will be displayed. If it is not checked, the data rows will equal the designated Cycles.

NOTE

- The data, except Item Name in a Data column, Time column, and Data column, are displayed in the center of each cell on the Sampling Data Display.
  (For example, Display Format Settings: Number of Item Name Characters = 8, Number of Display Digits = 4, Align Right)



◆ When [Overwrite old data when designated block count finishes] is Set

Display Format Settings

(For example, Total row = checked, Number of Item Name Characters = 8)

	Date	Time	D00100	D00200	D00300	D00301
	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
Total			****.*	****.*	****.*	****.*

Sampling Data Display

(For example, Display Rows = 6, Display Columns = 7)

	Date	Time	D00100	D00200	D00300	D00301
	05/03/31	12:00	323.6	26.4	26.4	6.4
	05/03/31	15:00	324.4	28.6	27.6	6.2
	05/03/31	18:00	320.2	30.7	28.7	6.5
	05/04/01	09:00	321.0	26.9	29.9	6.3
Total			1289.2	112.6	112.6	25.4

To shift the old data up, every time sampling occurs, the data display rows are shifted up and the new data is displayed.

Calculated Data is the value of the calculated data stored on the GP at that time. Overwritten data is not subject to calculation.

◆ When [Overwrite old data after finishing the specified cycles] is Cleared

Display Format Settings

(For example, Total row = checked, Number of Item Name Characters = 8)

	Date	Time	D00100	D00200	D00300	D00301
No.1	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.2	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.3	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.4	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
Total			*****.*	*****.*	*****.*	*****.*

Sampling Data Display

(For example, Display Rows = 6, Display Columns = 7)

	Date	Time	D00100	D00200	D00300	D00301
No.1	05/03/31	09:00	322.8	30.3	25.3	6.1
No.2	05/03/31	12:00	323.6	26.4	26.4	6.4
No.3	05/03/31	15:00	324.4	28.6	27.6	6.2
No.4	05/03/31	18:00	320.2	30.7	28.7	6.5
Total			1291.0	116.0	108.0	25.2

Only the designated block's data is displayed.

The calculation data are values calculated from data from the designated Cycles.

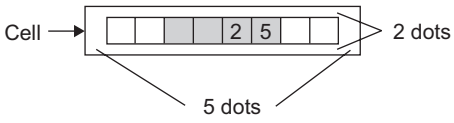
■ Display Example for Custom Settings

You can create a customized format with Custom Settings.

- You can set each data column's Display Range and Total Display Digits.
- You can add Date columns, Time columns, Data columns, Text columns, and Text rows.
- You can directly input text in Text columns, Text rows, and Item Name rows.
- When in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, you can set the calculation rows (Total, Average, Max, Min).

NOTE

- The data, except Item Name and Text in a Data column, Time column, and Data column, are displayed in the center of each cell on the Sampling Data Display.
  (For example, Display Format Settings: Number of Item Name Characters = 8, Number of Display Digits = 4, Align Right)



◆ When [Overwrite old data when designated block count finishes] is Set

Display Format Settings

		1	2	3	4	5	6
		Item Name (Vertical)	Data1	Time	Data2	Data3	Data4
1	Item Name (Horizontal)		Voltage	Time	Temp.1	Temp.2	Pressure
2	Show Data	Data	****	hh:mm	** *	** *	* *
3	Calculation	Sum	*****		*** *	*** *	** *
4	Calculation	Average	****		** *	** *	* *

Sampling Data Display

	Voltage	Time	Temp. 1	Temp. 2	Pressure
Data	3236	12:00	26.4	26.4	6.4
Data	3244	15:00	28.6	27.6	6.2
Data	3202	18:00	30.7	28.7	6.5
Data	3210	09:00	26.9	29.9	6.3
Sum	12892		~~112.6~~	~~112.6~~	~~25.4~~
Average	3223		28.1	28.1	6.3

To shift the old data up, every time sampling occurs, the data display rows are shifted up and the new data is displayed.

Calculated Data is the value of the calculated data stored on the GP at that time. Overwritten data is not subject to calculation.

NOTE

- Text rows are not displayed even if you set them.

◆ When [Overwrite old data after finishing the specified cycles] is Cleared

Display Format Settings

		1	2	3	4	5	6
		Item Name (Vertical)	Data1	Time	Data2	Data3	Data4
1	Item Name (Horizontal)		Voltage	Time	Temp.1	Temp.2	Pressure
2	No.1	1	****	hh:mm	** *	** *	* *
3	No.2	2	****	hh:mm	** *	** *	* *
4	No.3	3	****	hh:mm	** *	** *	* *
5	No.4	4	****	hh:mm	** *	** *	* *
6	Calculation	Sum	*****		*** *	*** *	** *
7	Calculation	Average	****		** *	** *	* *

Sampling Data Display

	Voltage	Time	Temp. 1	Temp. 2	Pressure
1	3228	09:00	30.3	25.3	6.1
2	3236	12:00	26.4	26.4	6.4
3	3244	15:00	28.6	27.6	6.2
4	3202	18:00	30.7	28.7	6.5
Sum	12910		~~116.8~~	~~108.8~~	~~25.2~~
Average	3227		29.0	27.0	6.3

The designated block's data is displayed.

The calculation data are values calculated from data from the designated Cycles.

■ What Happens When Data Cannot be Sampled?

If data sampling cannot occur, for example due to a communication error occurring during sampling, that round of data will be saved in CSV as follows according to the execution condition.

◆ When the Execution Condition is [Time Specification] or [Bit ON]

As a read error, [***] is displayed.
(For example, Execution Condition = Time Designation, Start Time = 17:00, Sampling Cycle = 30 min., Cycles = 5)

When a communication error occurs at 18:00

17:00	100
17:30	200
18:00	***
18:30	400
19:00	500

When the GP is turned ON after 17:30

17:00	***
17:30	***
18:00	300
18:30	400
19:00	500

◆ When the Execution Condition is [Constant Cycle], [Constant Cycle when Bit is ON], or [Bit Change]

The read data will appear immediately before a communication error occurs.
(For example, A communication error occurred right after the second sampling round, and the error state continued until right before the third sampling round)

1st Sample	100
2nd Sample	200
3rd Sample	200
4th Sample	400
5th Sample	500

Data that existed before the error is displayed

NOTE

- The previous sampling cycle data will remain displayed if the [Sampling Cycle] is shorter than the communication cycle time, or the communication cycle time becomes longer due to a screen change/scroll display occurring and exceeds the [Sampling Cycle], or because sampling is performed before the device/PLC data is read.
- When the [Sampling Cycle] is short (1 to 2 sec., or 100 ms), and a large process occurs such as a screen change, sampling will be omitted for a set period of time. As shown above, the previous data will also be treated as the omitted round of data.

24.9.4 About Save in CF Card/USB Storage

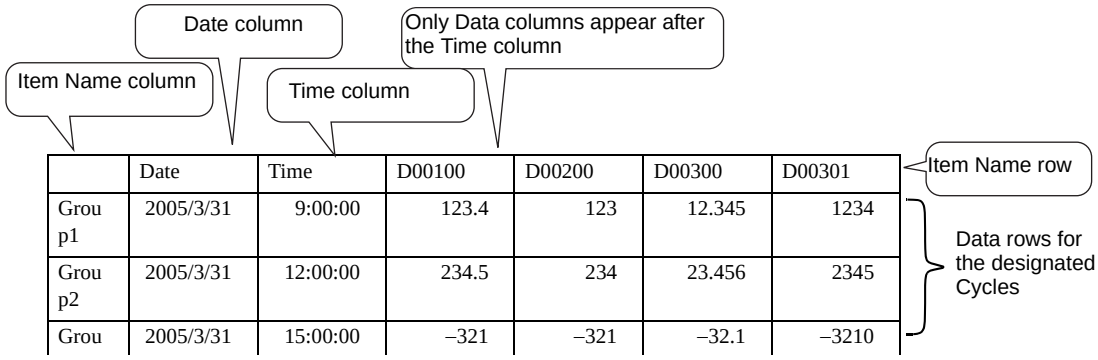
The sampling data saved in CF Card/USB storage (SA*****.csv) is not same as the [Display/Save in CSV] tab setting. The format is partially fixed as follows.

- Regardless of the settings, the calculation row will not be exported to a CSV file. Only the Item Name row and data display rows will be outputted.
- One Date column and one Time column will be displayed in a fixed position. When outputting as CSV, the Display Format is fixed as "yy/mm/dd" and "hh:mm:ss". However, when the [Sampling Cycle] is set to milliseconds in the Action, the Time column will be fixed as "hh:mm:ss.000".
- The Date/Time column item names are fixed as "Date" and "Time". In Custom Settings, the Item Name row is not set and will appear in the first row. In that case, the data column item name will be blank.
- Even if you set a Text row or Text column in the Custom Settings, they will not be outputted in the CSV file.

■ Displays the data saved in CF Card/USB storage with Excel.

You can edit a CSV file saved on a CF Card/USB storage device using general spreadsheet software (such as Excel) on a computer.

When a sampling data CSV file is opened in Excel



	Date	Time	D00100	D00200	D00300	D00301
Group1	2005/3/31	9:00:00	123.4	123	12.345	1234
Group2	2005/3/31	12:00:00	234.5	234	23.456	2345
Grou	2005/3/31	15:00:00	–321	–321	–32.1	–3210

NOTE

- If [Add Time Data] is not designated in the Action, the Date column and Time column will be blank and only the item name will be displayed.
- In Custom Settings, if the Item Name column is not set, the far left is the Date column, the 2nd is the Time column, and the 3rd and other columns are the Data columns. The order of the data columns will follow the order set in the Custom Settings.

◆ Excel Display Example for Basic Settings

The following example shows how data is saved to the CF Card with custom settings (CSV save), and how the CSV file looks in Excel.

Action

Action: Time Specification, [Overwrite old data after finishing the specified cycles] is cleared
Start Time: 09:00
Sampling Cycle: 3 hours
Cycles: 4
Blocks: 2

Display/Save in CSV Settings

	Date	Time	[PLC1]D00100	[PLC1]D00200	[PLC1]D00300	[PLC1]D00301
No.1	mm/dd	hh:mm	*****.*	*****.*	*****.*	*****.*
No.2	mm/dd	hh:mm	*****.*	*****.*	*****.*	*****.*
No.3	mm/dd	hh:mm	*****.*	*****.*	*****.*	*****.*
No.4	mm/dd	hh:mm	*****.*	*****.*	*****.*	*****.*
Total			******.*	******.*	******.*	******.*

Excel Display

	Date	Time	D00100	D00200	D00300	D00301
No.1	2005/3/31	9:00:00	322.8	30.3	25.3	6.1
No.2	2005/3/31	12:00:00	**** *	**** *	**** *	**** *
No.3	2005/3/31	15:00:00	324.4	28.6	27.6	6.2
No.4	2005/3/31	18:00:00	320.2	30.7	28.7	6.5
No.1	2005/4/1	9:00:00	321	26.9	29.9	6.3
No.2	2005/4/1	12:00:00	323.6	26.4	26.4	6.4

When a read error occurs, [****] is displayed.

A blank row is inserted between blocks.

The Date data is "2005/04/01" when outputted in CSV format. In Excel, it is displayed as "2005/4/1".

The data is outputted in CSV format as "321.0". However, in Excel the final "0" after the decimal point is dropped, and "321" is displayed.

◆ Excel Display Example for Basic Settings

The following will introduce an example for when data is saved to the CF Card with custom settings (CSV save) and the CSV file is then opened in Excel.

- When [Overwrite old data when designated block count finishes] is set

Display/Save in CSV Settings

		1	2	3	4	5	6
		Item Name (Vertical)	Data1	Time	Data2	Data3	Data4
1	Item Name (Horizontal)		Voltage	Time	Temp.1	Temp.2	Pressure
2	Show Data	Data	****	hh:mm	**.*	**.*	*.*
3	Calculation	Sum	*****		***.*	***.*	**.*
4	Calculation	Average	****		**.*	**.*	*.*

Excel Display

	Date	Time	Voltage	Temp.1	Temp.2	Pressure
Data	2005/3/31	9:00:00	3228	30.3	25.3	6.1
Data	2005/3/31	12:00:00	3236	26.4	26.4	6.4
Data	2005/3/31	15:00:00	3244	28.6	27.6	6.2
Data	2005/3/31	18:00:00	3202	30.7	28.7	6.5
Data	2005/4/1	9:00:00	3210	26.9	29.9	6.3

- When [Overwrite old data after finishing the specified cycles] is cleared

Display/Save in CSV Settings

		1	2	3	4	5	6
		Item Name (Vertical)	Data1	Time	Data2	Data3	Data4
1	Item Name (Horizontal)		Voltage	Time	Temp.1	Temp.2	Pressure
2	No.1	1	****	hh:mm	**.*	**.*	*.*
3	No.2	2	****	hh:mm	**.*	**.*	*.*
4	No.3	3	****	hh:mm	**.*	**.*	*.*
5	No.4	4	****	hh:mm	**.*	**.*	*.*
6	Calculation	Sum	*****		***.*	***.*	**.*
7	Calculation	Average	****		**.*	**.*	*.*

Excel Display

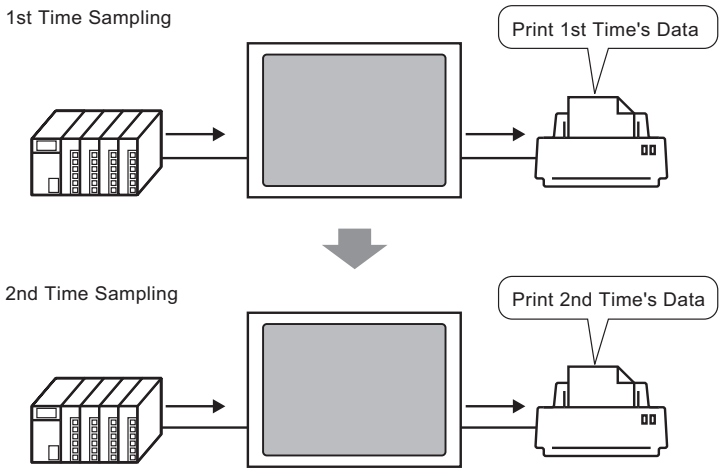
	Date	Time	Voltage	Tmp.1	Temp.2	Pressure
1	2005/3/31	9:00:00	3228	30.3	25.3	6.1
2	2005/3/31	12:00:00	3236	26.4	26.4	6.4
3	2005/3/31	15:00:00	3244	28.6	27.6	6.2
4	2005/3/31	18:00:00	3202	30.7	28.7	6.5
1	2005/4/1	9:00:00	3210	26.9	29.9	6.3

24.9.5 Printing

There are two methods for printing sampling data: (Real Time Printing) which prints data every time sampling occurs, or (Block Unit Printing) which prints data in collected groups.

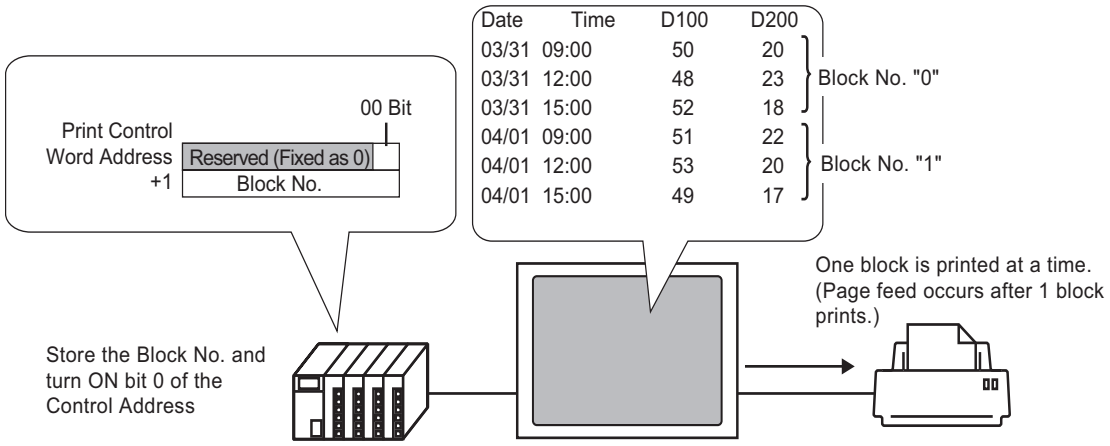
Real-time Print

Data is printed each time sampling occurs.

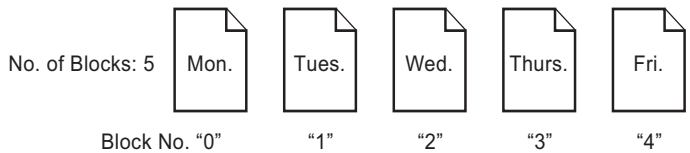


Batch

Designate the block number, turn ON bit 0 of the [Print Control Word Address], and all the data from the designated block will be outputted.



A daily report can be printed.



NOTE

- When in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is selected, only the Real Time Print option can be selected.
- Before printing data, you must connect a printer to the GP and configure the printer settings.
  ☞ "34.3.2 Printer Setup Procedure" (page 34-11)
- If [Add Time Data] is not set in the Action, the Date column and Time column will be blank.
- You cannot configure the Position Settings (Align Right/Align Left) for Date columns and Time columns. Item Names are always aligned left and data is printed in the center.

Example) Display Characters = 12

```
+-----------+-----------+--
|Date       |Time       |
+-----------+-----------+--
|  05/03/31 |    09:00  |
|  05/03/31 |    12:00  |
 └┘└───────┘└┘└───┘└───┘└─┘
  2    8    2   4    5   3
```

■ Print Example for Basic Settings

In the Basic Settings, a simple printing format can be created with only a few settings using the fixed preset formats.
The format is different depending on whether the [Overwrite old data after finishing the specified cycles] is selected or cleared.

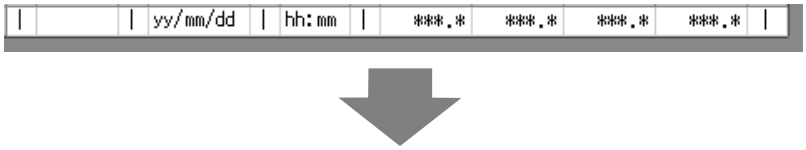
◆ When [Overwrite old data after finishing the specified cycles] is Selected (Real-time Print)

Print Format Settings

Print Mode: Real-time Print
Item Name (Vertical): checked

Ruled Line: Enable

```
|          | yy/mm/dd | hh:mm |   ***.*   ***.*   ***.*   ***.* |
```



Print Image

```
|          |05/03/31|09:00    |    322.8    30.3    25.3    6.1|
|          |05/03/31|12:00    |    323.6    26.4    26.4    6.4|
|          |05/03/31|15:00    |    324.4    28.6    27.6    6.2|
|          |05/03/31|18:00    |    320.2    30.7    28.7    6.5|
|          |05/04/01|09:00    |    321.0    26.9    29.9    6.3|
|          |05/04/01|12:00    |    321.9    29.2    24.0    6.0|
|          |05/04/01|15:00    |    322.7    31.1    25.1    6.3|
|          |05/04/01|18:00    |    323.5    27.3    26.3    6.1|
```

- All of the selected addresses data is printed.

◆ When [Overwrite old data after finishing the specified cycles] is Cleared

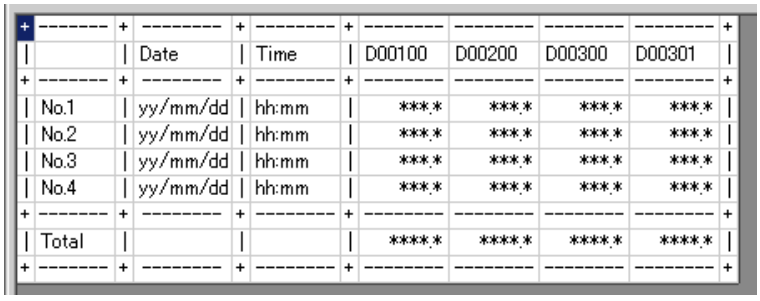
Print Format Settings

Print Mode: Real-time Print/Batch
Item Name (Horizontal): checked

Item Name (Vertical): checked

Total row: checked

Ruled Line: Enable



	Date	Time	D00100	D00200	D00300	D00301
No.1	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.2	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.3	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
No.4	yy/mm/dd	hh:mm	***.*	***.*	***.*	***.*
Total			*****.*	*****.*	*****.*	*****.*

Print Image

	Date	Time	D00100	D00200	D00300	D00301
No. 1	05/03/31	09:00	322.8	30.3	25.3	6.1
No. 2	05/03/31	12:00	323.6	26.4	26.4	6.4
No. 3	05/03/31	15:00	324.4	28.6	27.6	6.2
No. 4	05/03/31	18:00	320.2	30.7	28.7	6.5
Total			1291.0	116.0	108.0	25.2

These values are calculated from data sampled from the designated No. of Times (1 block)

- The Item Name row is printed in the 1st row. The Date column and Time column appear as [Date] and [Time]. Each data column has an address printed as its item name.
- All of the selected addresses data is printed.
- In the Item Name column is printed the sampling round. For example, 3rd round → Number 3
- The Total row is printed after the data display rows.
- Regardless of whether Real-time Print or Batch is used, a form feed occurs after printing.

■ Print Example for Custom Settings

You can create the following type of customized format with Custom Settings.

- You can set each data column's Display Range and Total Display Digits.
- You can add Date columns, Time columns, Data columns, Text columns, and Ruled Line.
- You can directly input text in Text columns, Text rows, and Item Name rows.
- When the [Overwrite old data after finishing the specified cycles] check box is cleared, you can print the header/footer and calculation rows (Total, Average, Max, Min).

NOTE

- The maximum number of columns is 521, and the maximum number of rows 4,204.
- Text in the Text row or Text column can only be inputted in the language set in the [Sampling List] tab's [Language].

◆ When [Overwrite old data after finishing the specified cycles] is Selected (Real-time Print)

Print Format Settings

Print Mode: Real-time Print

		1	2	3	4	5	6	7	8	9	10	11	12
			Time		Text	Data1		Text	Data2		Text	Data4	
1	Text	|	Time	|		D100	|		D200	|		D301	|
2		+	----------	+	-------	----------	+	----------	----------	+	----------	----------	+
3	Show Data	|	hh:mm	|	Voltage	*****	|	Temp.1	**.*	|	Pressure	**.*	|

Print Image

```
|  09:00 |Voltage 3228| Temp.1  30.3|Pressure 6.1|
|  12:00 |Voltage 3236| Temp.1  26.4|Pressure 6.4|
|  15:00 |Voltage 3244| Temp.1  28.6|Pressure 6.2|
|  18:00 |Voltage 3202| Temp.1  30.7|Pressure 6.5|
|  09:00 |Voltage 3210| Temp.1  26.9|Pressure 6.3|
|  12:00 |Voltage 3219| Temp.1  29.2|Pressure 6.0|
|  15:00 |Voltage 3227| Temp.1  31.1|Pressure 6.3|
|  18:00 |Voltage 3235| Temp.1  27.3|Pressure 6.1|
```

NOTE

- Only the data display rows will be printed. Ruled Line rows and Text rows are not printed. When the Header/Footer is set, printing will not be performed.

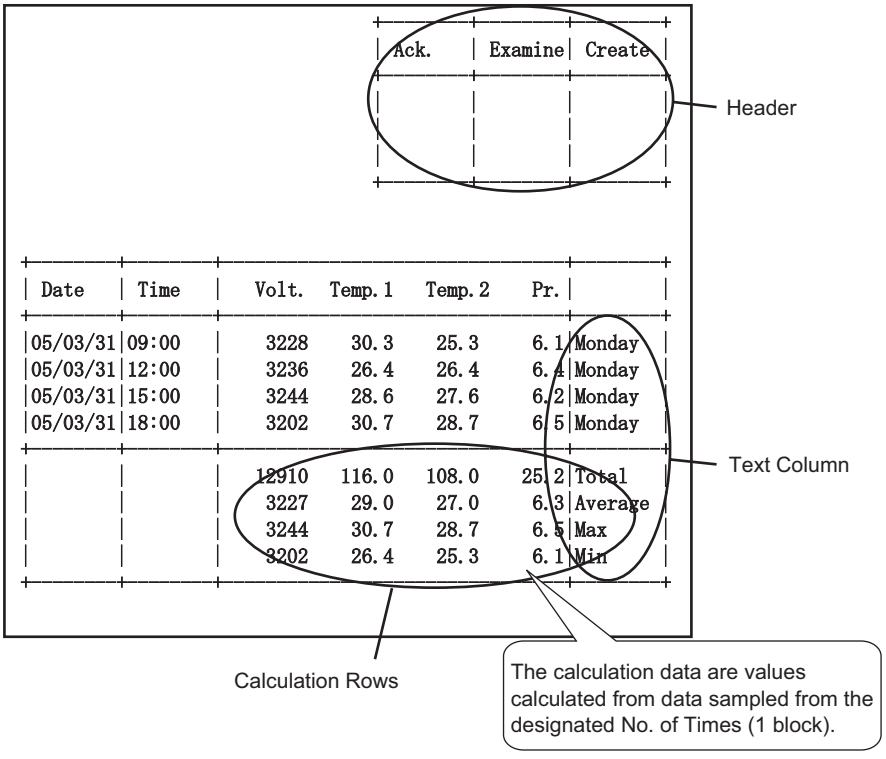
◆ When [Overwrite old data after finishing the specified cycles] Cleared

Print Format Settings

Print Mode: Real-time Print/Batch
Header is set.

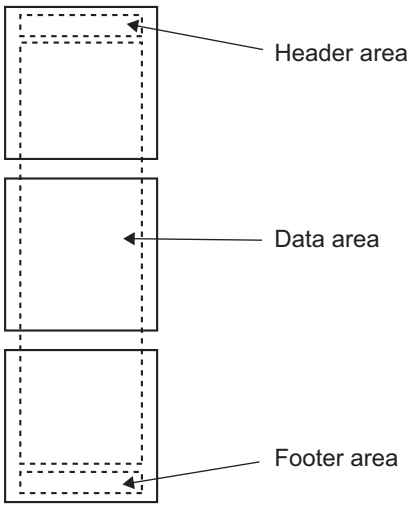
		1	2	3	4	5	6	7	8	9	10	11	12
			Date		Time		Data1	Data2	Data3	Data4		Text	
1		+	----------	+	----------	+	----------	----------	----------	----------	+	----------	+
2	Text	|	Date	|	Time	|	Voltage	Temp1	Temp2	Pressure	|		|
3		+	----------	+	----------	+	----------	----------	----------	----------	+	----------	+
4	Number1	|	yy/mm/dd	|	hh:mm	|	****	**.*	**.*	**.*	|	Monday	|
5	Number2	|	yy/mm/dd	|	hh:mm	|	****	**.*	**.*	**.*	|	Monday	|
6	Number3	|	yy/mm/dd	|	hh:mm	|	****	**.*	**.*	**.*	|	Monday	|
7	Number4	|	yy/mm/dd	|	hh:mm	|	****	**.*	**.*	**.*	|	Monday	|
8		+	----------	+	----------	+	----------	----------	----------	----------	+	----------	+
9	Calculation	|		|		|	*****	***.*	***.*	**.*	|	Total	|
10	Calculation	|		|		|	****	**.*	**.*	**.*	|	Average	|
11	Calculation	|		|		|	****	**.*	**.*	**.*	|	Maximum	|
12	Calculation	|		|		|	****	**.*	**.*	**.*	|	Minimum	|
13		+	----------	+	----------	+	----------	----------	----------	----------	+	----------	+

Print Image



NOTE

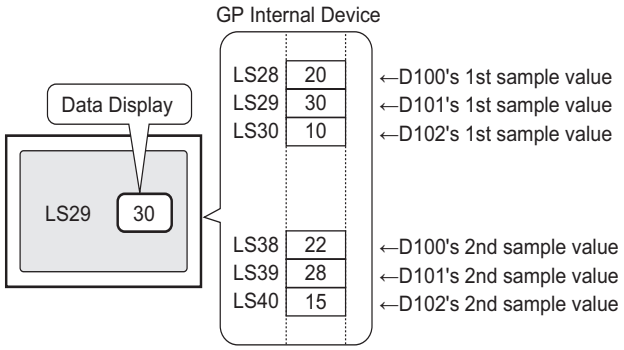
- The printing format consists of the three areas: the header, the main area, and the footer.



- For Real-time Print, the header area is printed when the block's initial data is printed. The calculation row(s) and the footer are printed when the block's final data is printed.
- Regardless of whether Real-time Print or Batch is used, a form feed occurs after printing.
- If you changed the [Cycles] in the Action after setting the Print Format, change the [Number of Data Display Rows] according to the number of times.

24.9.6 Writing to the Internal Device

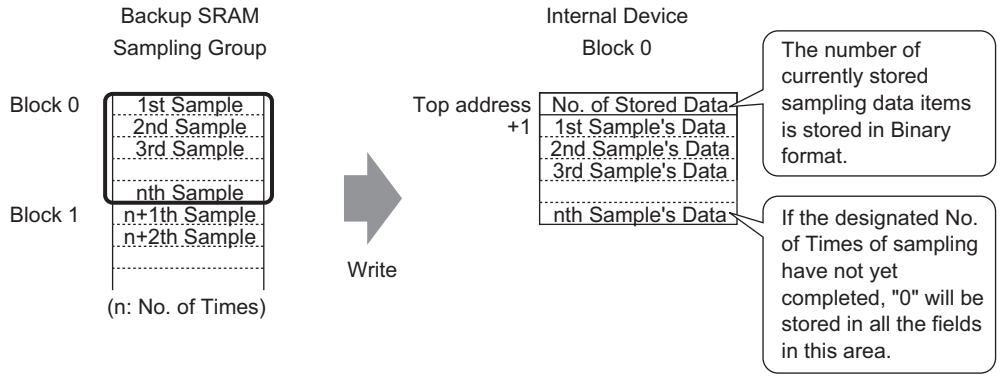
By writing sampling data to the GP internal device (LS Area, USR Area), you can display one data item from among the sampled data using a Data Display or Graph Part, and use that data independently.



■ Writing to the Internal Device

Turn ON the designated [Write Triggered Bit Address], and sampling data stored in backup SRAM (or DRAM) is written to the internal device.
If in the [Mode] tab's Extended area the [Overwrite old data after finishing the specified cycles] check box is cleared, you can write each block.

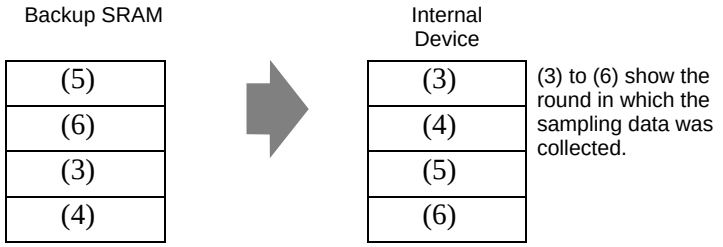
Writing Sampled Data



When storing sampling data to the internal device, the stored data of the current sampling round is saved in the top address in Binary format.
For example, if the Cycles is 5, and the current sampling round is 2, then [Number of Stored Data] will be "2". At that time, "0" will be stored in sampling data storage area for sample 3 and later.

NOTE

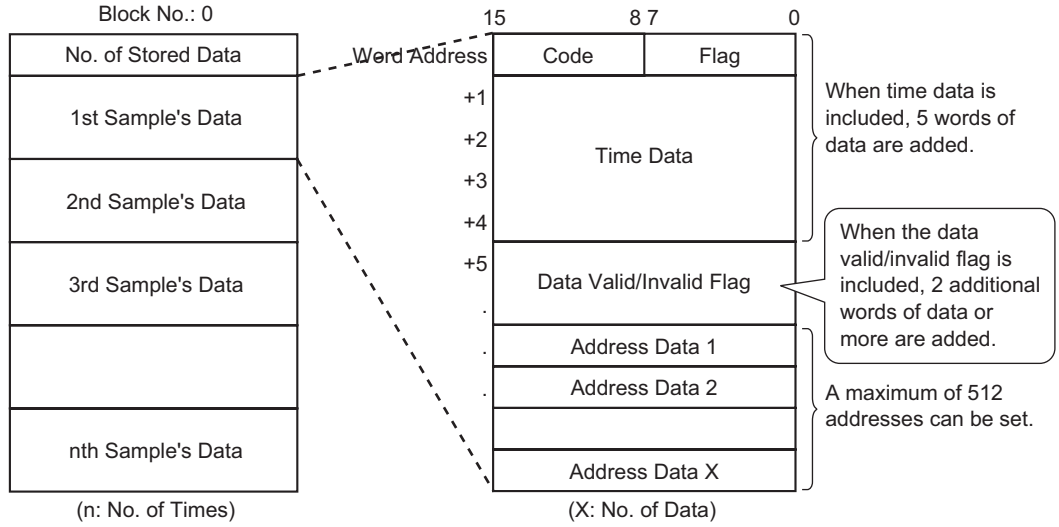
- If the [Overwrite old data after finishing the specified cycles] check box is selected, sampling data will be transferred, in order, starting with old data.



- If no block number is stored, data from block number "0" will be written.
- If you set a calculation row with the [Display/Save in CSV] tab, you can also write calculation data to the internal device. Sampling data and calculation data are written separately.
- If the size of blocks or calculation data to be written is larger than the internal device's storage area, they cannot be written.

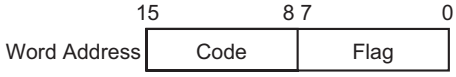
◆ The Structure of Sampled Data Stored in the Internal Device

When the internal device is 16 bit



- Code/Flag

  If the [Add Time Data] check box is selected in the [Mode] tab's Extended settings, you can monitor whether sampling is completed and whether the sampling was read normally or a read error occurred.



  Flag

  The flag's value is "1" when sampling is complete, and "0" when sampling is not occurring.

Code

The code's value is "0" when data is being read correctly, and "1" when there is a read error.

- Time Data

If the [Add Time Data] check box is selected in the [Mode] tab's Extended settings, the sample's time data is stored as in the following picture. The data is 2 digits long and saved in BCD format.

When the sampling cycle is set in seconds:

	15 8	7 0
+1		Year
+2	Mon.	Sun.
+3	Hour	Minute
+4		Second

When the sampling cycle is set in milliseconds:

	15 8	7 0
+1		Year
+2	Mon.	Sun.
+3	Hour	Minute
+4	Second	Millisecond

NOTE

- When the Execution Condition is set to [Bit ON], the Time data will represent the time when the data read completes.
- When the sampling cycle is set in milliseconds, the data will be stored in 10 ms units.

Example) March, 31, 2005 17h 30m 25s 600ms

	15 8	7 0
+1		05
+2	03	31
+3	17	30
+4	25	60

60 x 10ms

- Data Valid/Invalid Flag

The [Data Valid/Invalid Flag], which monitors whether address data is valid or invalid, is added to the sampling data if the Execution Condition is set to [Time Specification] or [Bit ON]. Valid data is marked with "1" invalid data with "0".

For example, when a read error occurs during sampling, "1" is stored in [Code], and each address's valid/invalid bit is "0". When the value of erroneous sampling data (data displayed with "****") is corrected, that data changes from invalid to valid, and the corrected address's valid/invalid bit changes from "0" to "1".

The storage area for the data valid/disabled flags fluctuates from 2 to 32 addresses.

Each address' data valid/invalid bit

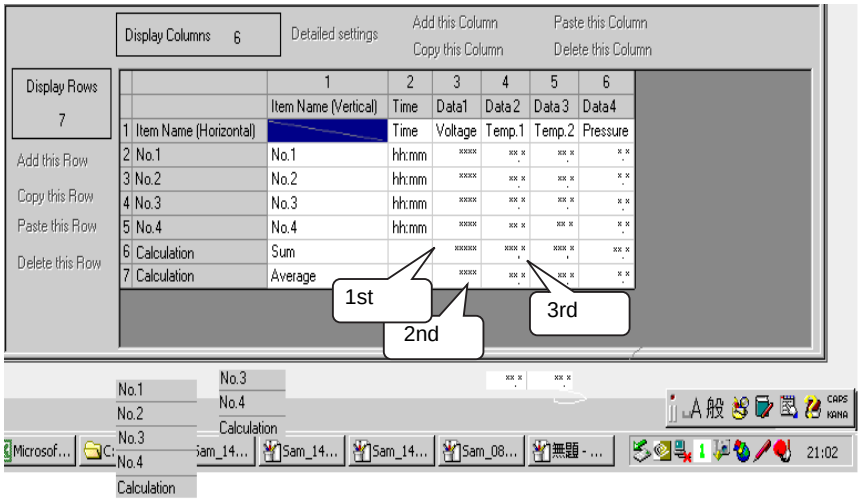
	15															0
+1	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
+2	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
.																
.																
.																
+32	512	511	510	509	508	507	506	505	504	503	502	501	500	499	498	497

◆ The Structure of Calculated Data Stored in the Internal Device

The structure of calculation data (Total, Average, Max, Min) is set according to settings in the [Display/Save in CSV] tab and is shown in the following diagram. Bit length is 32 bit and data is stored in the internal device.

Calculated values are stored in order from the top down, starting with the left most data column designated in the [Display/Save in CSV] format.

When Total and Average are set



	1	2	3	4	5	6
	Item Name (Vertical)	Time	Data1	Data2	Data3	Data4
1 Item Name (Horizontal)		Time	Voltage	Temp.1	Temp.2	Pressure
2 No.1	No.1	hh:mm	****	** *	** *	**
3 No.2	No.2	hh:mm	****	** *	** *	**
4 No.3	No.3	hh:mm	****	** *	** *	**
5 No.4	No.4	hh:mm	****	** *	** *	**
6 Calculation	Sum		*****	*** *	*** *	** *
7 Calculation	Average		****	** *	** *	**

Internal Device

Save in

Word Address	
+1	Data column 1's total
+2 +3	Data column 1's average
+4 +5	Data column 2's total
+6 +7	Data column 2's average
+8 +9	Data column 3's total
+10 +11	Data column 3's average

24.10 Restrictions

24.10.1 Data Sampling Restrictions

- Up to 64 Sampling Groups can be set in the system.
- The maximum number of data item (number of addresses) that can be sampled at one time is 512 for 16 bit length, and 256 for 32 bit length.
- The number of times settings can be made in a sampling group (or Occurrences x Number of Blocks) depends on the check or non check [Mode]-[Backup to SRAM][*1], number of sampling data in one time (number of address), data length or mode.
- Please read the following for details on the backup SRAM and DRAM, and how to calculate the sampled data capacity.
  ☞ " ■ Backup SRAM" (page 24-100)
- When you use a display unit with 320 KB of SRAM, the estimated number of samples you can save is as follows.
  Only one sampling group

Specified Addresses	Data Length: 16 bit	Data Length: 32 bit
1	for 81,332	for 81,332
16	for 10,166	for 5,082
64	for 2,540	for 1,270
256	for 634	for 316
512	for 316	-

  (The number provided is the estimation calculated from the backup SRAM capacity, and the actual sampling occurrence that you can set is Max 65535.)
  To check the Backup SRAM capacity, from the [Project] menu, point to [Properties], and then select [SRAM Information].
- After the GP is powered ON and the internal programs are prepared, one second maximum of delay time may occur before the sampling starts.
- If a large amount of data is set to be sampled in a short cycle, then updating the display or changing the screen will not only slow down but the communication cycle time[*2] also increases. In that case, because the next sampling occurs before reading data from the device/PLC, the previous data is treated as that round's sampling data.
- For the Execution Condition - [Constant Cycle], [Constant Cycle when Bit is ON], and [Bit Change], because all the set address data is being read, the communication may put a burden on the system if the number of addresses to sample is large.
- If the Execution Condition is [Constant Cycle], or [Constant Cycle when Bit is ON], even if the [Sampling Cycle] is longer than the communication cycle time, the communication cycle time Å¶2 may exceed the [Sampling Cycle], due to a screen change or scroll display. In that case, because sampling occurs before reading data from the device/PLC, the previous data is treated as that round's sampling data.

- When the [Sampling Cycle] is short (1 to 2 sec., or 100 ms), and a large process occurs such as a screen change, sampling will be disabled (sampling will be omitted) for a set period of time. As shown above, the previous data will be displayed as that round's data. If [Random] is selected, it will take longer to communicate with the device than when [Sequential] is selected.

*1In the [Action] tab select the [Backup to SRAM] check box to store sampling data in SRAM. Clear the check box to store sampling data in DRAM. You can define a different storage location in each sampling group.

*2The Communication Cycle Time is the time it takes from the point the GP requests data until the GP receives the data from the device. This time is stored in internal device address LS2037 as a binary value in 10 ms increments.

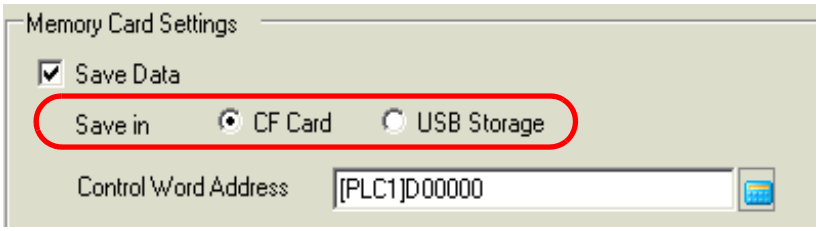
24.10.2 Display Restrictions

- One Sampling Data Display can be placed per screen. If multiple Displays are on one screen, only the Display set first is active.
- A Sampling Data Display cannot be set to the screen at the same time as a Special Data Display [Show CSV] or a Data Display which uses a pop-up keypad.
- The calculation operations are carried out in 32 bit length. If the calculation data has more digits (exceeds 32 bits), the calculation will not display correctly.
- When the [Overwrite old data after finishing the specified cycles] check box is selected, the calculation rows (Total, Average, Max, Min) will show the calculated value of the data housed in the GP. Overwritten data is not included in the calculations.
- In the sampling group's Address, if the [Bit Length] or [Addressing] change, the [Display/Save in CSV] format will be reset.
- When changing the [Display/Save in CSV] settings from [Custom Settings]→[Basic], all customized settings will be reset.

24.10.3 Restrictions on CF Card/USB Storage Save

- Set [CSV Save Control Word Address] with no overlap among each sampling group or control word address to save on a CF Card/USB storage device. If you set overlapped, it will not operate normally and the status cannot be obtained.

System Settings [Main Unit] - [Action tab



- You cannot save a multiple sampling group on a CF Card/USB storage at the same time. You must save the next [CSV Save Control Word Address] group after one group saving is complete. If you save multiple groups at the same time, the saving order is not fixed.
- You cannot save the CF card/USB storage for the other data (Alarm history Data, Recipe data) and sampled data together.
- When you save automatically, and the sampling cycle time is short (sampling frequency is short or number of times is small), data writes to the CF Card/USB storage device may take longer than the actual sampling. If so, the sampling operation continues only after the writing process for the sampled data is complete.
- When you save automatically, be careful not to set very short sampling cycles (sampling frequency is short or number of times is small). This can cause increased data writes and shorten the life of the CF Card/USB storage.
- In the sampling group's Address, if the [Bit Length] or [Addressing] change, the [Display/Save in CSV] format will be reset.
- When changing the [Display/Save in CSV] settings from [Custom Settings]→[Basic], all customized settings will be reset.

■ CF Card/USB storage Save Cautions

- While data is written to the CF Card, changes in the display of parts and screens may slow down.
- It may take several seconds to write data, depending on the volume.
- After the Status data is read out from the GP, before the next command can be written be sure to allow time equal to at least one communication cycle[*1] or one Display Scan Time[*2] period, whichever is longer.
- Please do not call up screens that use the CF Card when it is not installed in the GP. Otherwise, they will not function properly.
- If a write error occurs, any file that has not finished loading may remain on the CF Card.
- When overwriting a file by transferring data to the CF Card, the CF Card must have enough free room to allow the data. If the data is larger than the available space, a write error will occur.
- When saving to the CF Card, if the target folder (\SAMP01) does not exist, a folder will be created, and the data will be saved there. However, if the CF Card cannot be initialized or the folder cannot be created, a read error will occur.
- There is a limit to the frequency that data can be written to the CF Card (500 KB of data can be rewritten around 100,000 times).
- When you format the CF Card/USB storage by computer, select the FAT or FAT32. The display unit will not operate correctly if you format with NTFS.
- Connect only single USB storage device. If you connect multiple USB storage devices, they may be not recognized correctly.

*1 The Communication Cycle Time is the time from when the GP requests data from the external device to when the data arrives. This value is stored in internal device LS2037 as a binary value, in units of 10ms.

*2 Display Scan Time is the time required to process one screen. This value is stored in internal device LS2036 as a binary value, in millisecond units.

■ Precautions on CF Card Handling

- When removing the CF Card, please verify that the access lamp is switched off. There is a chance that CF Card data can be lost or damaged.
- While accessing the CF Card, do not turn the GP unit off, reset the GP, or remove the CF Card. Create a preset verification screen for information about CF Card access. Turn off power, reset, open the CF Card cover, or remove the CF Card only after verifying that screen.
- When inserting the CF Card in the GP unit, please make sure you have the correct side up and the correct location for the CF Card connector. If installed incorrectly, damage can occur to the data or to the CF Card/GP unit.
- Please use CF Cards manufactured by Pro-face (Digital Electronics Corporation of Japan.) If using another company's CF Card, damage may occur to the CF Card data.
- Please make sure to back up all CF Card data.
- Please refrain from doing the following, as it can result in damage to data and equipment:
  - •Bending the CF Card
  - •Dropping the CF Card
  - •Spilling water on the card
  - •Touching the CF Card connectors directly
  - •Disassembling or modifying the CF Card

■ USB Storage Handling Instructions

- While accessing the USB device, do not reset the display unit or remove the USB storage device. Data on the USB storage device may become corrupted.
  To remove the USB storage device safely, design the system to remove the device only after turning ON system variable #H_Control_USBDetouch and after confirming #H_Status_USBUsing is OFF.
  ☞ “A.6.2 HMI System Variables (#H system variables) ■ Bit type” (page A-102)
- Please make sure to backup the data on the USB storage device.

24.10.4 Restrictions on Printing

- Up to 160 single-byte characters can be printed in a single line.
- You cannot designate the size of the characters to print.
- When printing sampling data, any portion wider than A4 will not be printed. The number of characters that can be printed on one line depends on the printer.
- Regardless of the printer color settings (monochrome/color), all data is printed in black and white.
- When the sampling group font type is set to [Stroke Font] and the language is set to [Standard Font] of [Chinese (Traditional)], [Chinese (Simplified)], or [Korean], text will be printed out as image data, and it may take some time to print.
- DO NOT enter other printing commands during real-time printing. If an Alarm History printing command occurs during real-time printing, the alarm history and other data will be mixed together during printing.
- If sampling data is deleted during printing, printing will not continue. If the GP is turned OFF during printing, jobs in the queue are lost.
- The calculation operations are carried out in 32 bit length. If the calculation data has more digits (exceeds 32 bits), the correct value will not be printed.
- If sampling data changes when the [Overwrite old data after finishing the specified number of times] check box is selected, the printing speed can be slower than the data overwrite and store speed if the [Number of Times] is small or a short Sampling Cycle is being used. When sampling data is overwritten before printing, the data prior to the overwrite cannot be printed.
- In the sampling group's Address, if the [Bit Length] or [Addressing] change, the print format will be reset.
- When changing the print mode between [Custom Settings] → [Basic], all customized settings will be reset.
- When using Custom Settings, the maximum number of columns that can be set with the print format is 521 columns. The maximum number of rows is 4,204. The maximum number of columns is the total of the Date, Time, Data, Text, and Ruled Line columns. The maximum number of rows is the total of the Data, Calculation, and Ruled Line rows. Calculation rows and the header/footer areas are not included.