Fe Fuji Electric

MONITOUCH

Reference Manual [1]
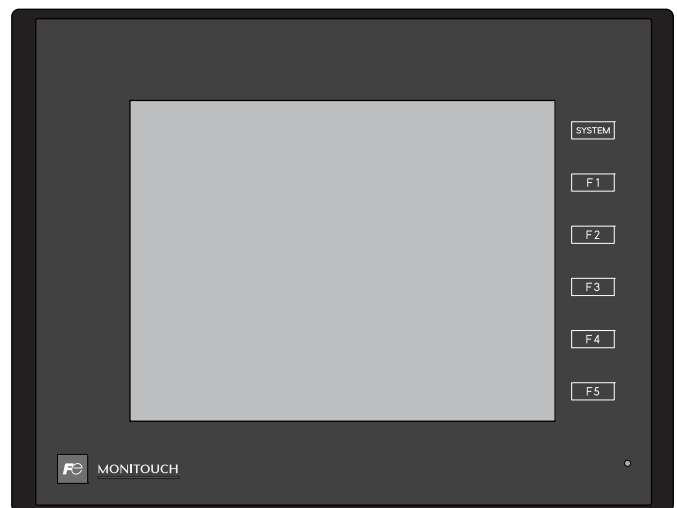
TECHNOSHOT
TS2060 / TS1000 Smart

Record of Revisions

Reference numbers are shown at the bottom left corner on the back cover of each manual.

Printing Date	Reference No.	Revised Contents
July, 2016	1204NE0	First edition
September, 2016	1204NE0a	Correction of errors
August 2018	1204NE1	Second edition Added TS1000 Smart and VNC Server Partial modifications
November, 2019	1204NE2	Third edition Partial modifications
April, 2022	1204NE3	Forth edition Partial modifications
May, 2023	1204NE4	Fifth edition Partial modifications

Preface

Thank you for selecting MONITOUCH TECHNOSHOT (hereafter referred to as "TS").
For correct setup of the TS, you are requested to read through this manual to understand more about the product.
For details on other operating procedures for the TS, refer to the following related manuals.

Manual Name	Contents	Reference No.
TS Reference Manual [1]	Explains the functions and operation of the TS.	1204NE
TS Reference Manual [2]		1205NE
TS2060 Connection Manual [1]	Explains the connection and communication parameters for the TS2060 and controllers in detail.	2204NE
TS2060 Connection Manual [2]		2205NE
TS2060 Connection Manual [3]		2206NE
TS2060 Hardware Specifications	Explains hardware specifications and precautions when handling the TS2060.	2207NE
TS1000 Smart Connection Manual [1]	Explains the connection and communication parameters for TS1000 Smart and controllers in detail.	2213NE
TS1000 Smart Connection Manual [2]		2214NE
TS1000 Smart Connection Manual [3]		2215NE
TS1000 Smart Hardware Specifications	Explains hardware specifications and precautions when handling TS1000 Smart.	2216NE

For details on devices including PLCs, inverters, and temperature controllers, refer to the manual for each device.

TS Types and Model Names

The notations used in this manual and the corresponding models are as shown below.

Notation	Model
TS	TS2060i, TS2060, TS1100Si, TS1070Si, TS1070S
TSi	TS2060i, TS1100Si, TS1070Si
TS2060i	TS2060i
TS2060	TS2060
TS1000 Smart	TS1100Si, TS1070Si, TS1070S
TS1000S	

Available Functions

Note that functions available differ depending on the TS model. For details, refer to the related chapters.

Functions Described in TS Reference Manual 1 (this manual)

○: Available △: Conditionally available ✕: Not available

TS Reference Manual 1		TS2060i	TS2060	TS1100Si TS1070Si	TS1070S	Remarks
Chapter	Description					
2 Overlap	Normal overlap	○	○	○	○	Superimposing not possible
	Call-overlap	○	○	○	○	
	Multi-overlap	○	○	○	○	
	Global overlap	○	○	○	○	
3 Switch	Switch	○	○	○	○	
	Scroll bar	○	○	○	○	
	Slider switch	○	○	○	○	
4 Lamp	Lamp	○	○	○	○	
5 Data Display	Numerical data display	○	○	○	○	
	Character display	○	○	○	○	
	Message display	○	○	○	○	
	Table data display	○	○	○	○	
6 Entry	Numerical data entry	○	○	○	○	
	Character input (including Japanese conversion function)	○	○	○	○	
7 Trends	Historical display	○	△	○	○	△: Storage device not usable
	Real time display	○	○	○	○	
8 Alarm	Historical display	○	△	○	○	△: Storage device not usable
	Real time display	○	○	○	○	
9 Graph	Bar graph	○	○	○	○	
	Pie graph	○	○	○	○	
	Closed area graph	○	○	○	○	
	Panel meter 　　　Numerical data display 　　　Alarm (Area color) 　　　Scale setting extended	○ △ △ △	○ △ △ △	○ △ △ △	○ △ △ △	△: Landscape orientation only △: Landscape orientation only △: 128 colors, landscape orientation only
	Statistic bar graph	○	○	○	○	
	Statistic pie graph	○	○	○	○	
10 Time Display	Time display	○	○	○	○	
	Calendar	○	○	○	○	
11 Graphics	Graphics	○	○	○	○	
12 Message	Message mode	○	○	○	○	
	Displaying comments	○	○	○	○	
13 Others	Data block area	○	○	○	○	
	Memory card mode	○	△	○	○	△: Storage device not usable
	Memo pad	○	○	○	○	
14 Item Show/Hide Function	Item show/hide function	○	○	○	○	
15 Recipes	Recipe	○	✕	○	○	
16 Print	Hard copy	○	△	○	○	△: Serial connection only
	Printing data sheets	○	△	○	○	
	Connecting to a Sato MR-400 barcode printer	○	△	○	○	
17 Barcode	Barcode (one-dimensional, two-dimensional)	○	△	○	○	△: Serial connection only

Functions Described in TS Reference Manual 2

○: Available △: Conditionally available ×: Not available

TS Reference Manual 2		TS2060i	TS2060	TS1100Si TS1070Si	TS1070S	Remarks
Chapter	Description					
1 Image Display	JPEG	△	×	△	△	△: 32k/64k colors only
	Network camera	△	×	△	×	
2 Operation Log	Operation log	○	×	○	○	
3 Security	Security	○	○	○	○	
4 Ethernet Communication Function	Screen data transfer	○	×	○	×	
	PLC communication	○	×	○	×	
	Transferring data between TS units (macro)	○	×	○	×	
	DLL communication	○	×	○	×	
	MES interface function	○	×	○	×	
	E-mail notification	○	×	○	×	
	FTP server	○	×	○	×	
	Remote desktop window display	△	×	△	×	△: 32k/64k colors, landscape orientation only
	Web server	○	×	○	×	
	VNC server	△	×	△	×	△: 32k/64k colors, landscape orientation only
5 Storage device	Storage device	○	×	○	○	
6 Language Changeover	Language selection	○	△	○	○	△: Storage device not usable
7 Tag	Tags	○	○	○	○	
8 Device Memory Map	Device Memory Map	○	○	○	○	
9 Ladder Transfer	Ladder transfer via USB	○	○	○	○	
	Ladder transfer via Ethernet	○	×	○	×	
	Serial ladder transfer	○	○	×	×	

System Setting

○: Available △: Conditionally available ×: Not available

Item		TS2060i	TS2060	TS1100Si TS1070Si	TS1070S	Remarks
Color	64K-Color w/o blinking 32K-Color 128-Color	○	○	○	○	
	256 colors w/o blinking Monochrome 16-grayscale Monochrome	○	○	×	×	
Font Type	Bitmap font	○	○	○	○	
	Stroke font	○	×	×	×	
	Gothic font	○	○	○	○	
	Windows font	○	○	○	○	
Hardware Settings	Ladder monitor	×	×	○	○	
Function Switches	Global function switches	○	○	△	△	△: When using soft function switches
	Local function switches	○	○	△	△	
TechnoShot Settings	VGA center display	×	×	○	○	

Notes on Safe Usage of MONITOUCH

In this manual, you will find various notes categorized under the following levels with the signal words "DANGER" and "CAUTION".

⚠ **DANGER**	Indicates an <u>imminently hazardous situation which, if not avoided, will result in death or serious injury.</u>

⚠ **CAUTION**	Indicates a <u>potentially hazardous situation which, if not avoided, may result in minor or moderate injury and could cause property damage.</u>

Note that there is a possibility that items listed with ⚠ CAUTION may have serious ramifications.

⚠ DANGER

- Never use the output signal of the TS for operations that may threaten human life or damage the system, such as signals used in case of emergency. Design the system so that it can cope with a touch switch malfunction. A touch switch malfunction may result in machine accidents or damage.
- Turn off the power supply when you set up the unit, connect new cables, or perform maintenance or inspections. Otherwise, electrical shock or damage may occur.
- Never touch any terminals while the power is on. Otherwise, electrical shock may occur.
- The liquid crystal in the LCD panel is a hazardous substance. If the LCD panel is damaged, do not ingest the leaked liquid crystal. If leaked liquid crystal makes contact with skin or clothing, wash it away with soap and water.
- Never disassemble, recharge, deform by pressure, short-circuit, reverse the polarity of the lithium battery, nor dispose of the lithium battery in fire. Failure to follow these conditions will lead to explosion or ignition.
- Never use a lithium battery that is deformed, leaking, or shows any other signs of abnormality. Failure to follow these conditions will lead to explosion or ignition.
- Switches on the screen are operable even when the screen has become dark due to a faulty backlight or when the backlight has reached the end of its service life. If the screen is dark and hard to see, do not touch the screen. Otherwise, a malfunction may occur resulting in machine accidents or damage.
- Tighten the mounting screws on the fixtures of the TS uniformly to the specified torque. Excessive tightening may cause distortion, damage, and incorrect touch switch activation, leading to machine damage and accidents. Insufficient tightening may cause the unit to fall down, malfunction, or short-circuit.

⚠ CAUTION

- Check the appearance of the unit when it is unpacked. Do not use the unit if any damage or deformation is found. Failure to do so may lead to fire, damage, or malfunction.
- For use in a facility or as part of a system related to nuclear energy, aerospace, medical, traffic equipment, or mobile installations, please consult your local sales representative.
- Operate (or store) the TS under the conditions indicated in this manual and related manuals. Failure to do so could cause fire, malfunction, physical damage, or deterioration.
- Observe the following environmental restrictions on use and storage of the unit. Otherwise, fire or damage to the unit may result.
  - Avoid locations where there is a possibility that water, corrosive gas, flammable gas, solvents, grinding fluids, or cutting oil can come into contact with the unit.
  - Avoid high temperatures, high humidity, and outside weather conditions, such as wind, rain, or direct sunlight.
  - Avoid locations where excessive dust, salt, and metallic particles are present.
  - Avoid installing the unit in a location where vibrations or physical shocks may be transmitted.
- Equipment must be correctly mounted so that the main terminal of the TS will not be touched inadvertently. Otherwise, an accident or electric shock may occur.
- Check periodically that terminal screws on the power supply terminal block and fixtures are firmly tightened. Loosened screws may result in fire or malfunction.
- Tighten the terminal screws on the power supply terminal block of the TS uniformly to the specified torque. Improper tightening of screws may result in fire, malfunction, or other serious trouble.
- The TS has a glass screen. Do not drop the unit or impart physical shocks to the unit. Otherwise, the screen may be damaged.
- Correctly connect cables to the terminals of the TS in accordance with the specified voltage and wattage. Overvoltage, overwattage, or incorrect cable connection could cause fire, malfunction, or damage to the unit.
- Always ground the TS2060. The FG terminal must be used exclusively for the TS2060 with the level of grounding resistance less than 100 Ω. Otherwise, electric shock or a fire may occur.
- Do not use a positive ground for the 24-V power supply to the TS1000 Smart. If a positive ground is used and an external communication device such as a computer is connected, the 24-V power supply may short circuit and cause damage. If a positive ground is unavoidable, refer to "Positive Grounding" in the TS1000 Smart Hardware Specifications.
- Prevent any conductive particles from entering the TS. Failure to do so may lead to fire, damage, or malfunction.
- Do not attempt to repair the TS yourself. Contact Hakko Electronics or the designated contractor for repairs.

⚠ CAUTION

- Do not repair, disassemble, or modify the TS. Hakko Electronics Co., Ltd. is not responsible for any damages resulting from repair, disassembly, or modification of the unit that was performed by an unauthorized person.
- Do not use sharp-pointed tools to press touch switches. Doing so may damage the display unit.
- Only technicians are authorized to set up the unit, connect cables, and perform maintenance and inspection.
- Lithium batteries contain combustible material such as lithium and organic solvents. Mishandling may cause heat, explosion, or ignition resulting in fire or injury. Read the related manuals carefully and correctly handle the lithium battery as instructed.
- Take safety precautions during operations such as changing settings when the unit is running, forced output, and starting and stopping the unit. Any misoperations may cause unexpected machine movement, resulting in machine accidents or damage.
- In facilities where the failure of the TS could lead to accidents that threaten human life or other serious damage, be sure that such facilities are equipped with adequate safeguards.
- When disposing of the TS, it must be treated as industrial waste.
- Before touching the TS, discharge static electricity from your body by touching grounded metal. Excessive static electricity may cause malfunction or trouble.
- Insert an SD card into the unit in the same orientation as pictured on the unit. If an SD card is accidentally inserted in the wrong orientation, the SD card or the slot on the unit may be damaged.
- Never remove a storage device (SD card or USB flash drive) when the storage device is being accessed. Doing so may destroy the data on the storage device. Only remove a storage device when the Main Menu screen is displayed or after pressing the [Storage Removal] switch.
- Do not press two or more positions on the screen at the same time. If two or more positions are pressed at the same time, a switch located between the pressed positions may be activated.
- Be sure to remove the protective sheet that is attached to the touch panel surface at delivery of the TS2060 before use. Use with the protective sheet attached may result in incorrect recognition of touch operations.

[General Notes]

- Never bundle control cables or input/output cables with high-voltage and large-current carrying cables such as power supply cables. Keep control cables and input/output cables at least 200 mm away from high-voltage and large-current carrying cables. Otherwise, malfunction may occur due to noise.
- When using the TS in an environment where a source of high-frequency noise is present, it is recommended that the FG shielded cable (communication cable) be grounded at each end. However, when communication is unstable, select between grounding one or both ends, as permitted by the usage environment.
- Be sure to plug connectors and sockets of the TS in the correct orientation. Failure to do so may lead to damage or malfunction.
- If a LAN cable is inserted into the MJ1 or MJ2 connector, the device on the other end may be damaged. Check the connector names on the unit and insert cables into the correct connectors.
- Do not use thinners for cleaning because it may discolor the TS surface. Use commercially available alcohol.
- If a data receive error occurs when the TS unit and a counterpart unit (PLC, temperature controller, etc.) are started at the same time, read the manual of the counterpart unit to correctly resolve the error.
- Clean the display area using a soft cloth to avoid scratching the surface.
- Avoid discharging static electricity on the mounting panel of the TS. Static charge can damage the unit and cause malfunctions. Discharging static electricity on the mounting panel may cause malfunction to occur due to noise.
- Avoid prolonged display of any fixed pattern. Due to the characteristic of liquid crystal displays, an afterimage may occur. If prolonged display of a fixed pattern is expected, use the backlight's auto OFF function.
- The TS is identified as a class-A product in industrial environments. In the case of use in a domestic environment, the unit is likely to cause electromagnetic interference. Preventive measures should thereby be taken appropriately.

[Notes on the LCD]

Note that the following conditions may occur under normal circumstances.

- The response time, brightness, and colors of the TS may be affected by the ambient temperature.
- Tiny spots (dark or luminescent) may appear on the display due to the characteristics of liquid crystal.
- There are variations in brightness and color between units.

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1 System

1.1   System Settings

1.1.1 System Setting

System settings cover a variety of settings including those initially required for the TS unit to communicate with the PLC, unit settings, and screen program settings. This section only describes the settings important for initial setup.
For details, refer to the relevant item.

⚠ Before transferring a screen program to the TS unit, be sure to check the system settings.
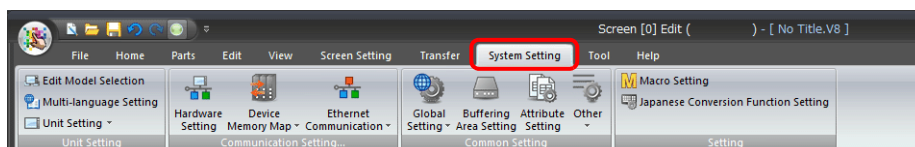
Group	Item		Refer to
Unit Setting	Edit Model Selection		"Edit Model Selection" page 1-2
	Multi-language Setting		"Multi-language Setting" page 1-4
	Unit Setting	SRAM/Clock	"SRAM/Clock" page 1-6
		Backlight	"Backlight" page 1-9
		Buzzer	"Buzzer" page 1-10
		System/Mode Switch	"System/Mode Switch" page 1-11
		Blink/Flash	"Blink/Flash" page 1-11
		Overlap	"2 Overlap"
		Snap setting	TS Reference Manual 2 1.2 Network Camera
		General Setting	"General Settings" page 1-12
		TECHNOSHOT Setting	" TECHNOSHOT Setting (TS1000 Smart Only)" page 1-21
Communication Setting	Hardware Setting		"Hardware Setting" page 1-22
	Device Memory Map		TS Reference Manual 2 8 Device Memory Map
	Ethernet Communication	Local Port Address	TS Reference Manual 2 4 Ethernet Communication Function
		Network Table	
		E-Mail	
		FTP Server	
		VNC Server	
Common Setting	Global Setting	Global Function Switch Setting	"Global Function Switch Setting" page 1-31
		Global Overlap Setting	"2.5 Global Overlap"
	Buffering Area Setting		Trends "7.2.1 Buffering Area" Alarm "8.2.1 Buffering Area"
	Attribute Setting		"15 Recipes"
	Other	Storage Setting	TS Reference Manual 2 5 Storage Device
		Memory Card Setting	"13.2 Memory Card"
		MES Setting	TS Reference Manual 2 4 Ethernet Communication Function
		Operation log Setting	2 Operation Log
		Security Setting	3 Security
		Remote Desktop Table Setting	4 Ethernet Communication Function
		Time Display Format Setting	"Time display format setting" page 10-12
Setting	Macro Setting		Macro Reference Manual
	Japanese Conversion Function Setting		-

1.1.2   Unit Setting

This section explains the items in the [Unit Setting] group.
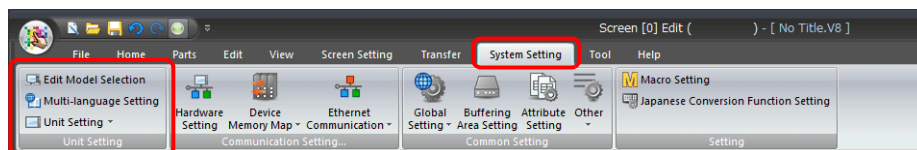
☞   For information on other settings, refer to "1.1.1 System Setting" page 1-1.

Edit Model Selection

Select the model of the TS for which you wish to configure a screen program.
Location of setting: [System Setting] → [Edit Model Selection] or [System Setting] → [Hardware Setting] → [Edit Model]

TS2060i   TS1070S
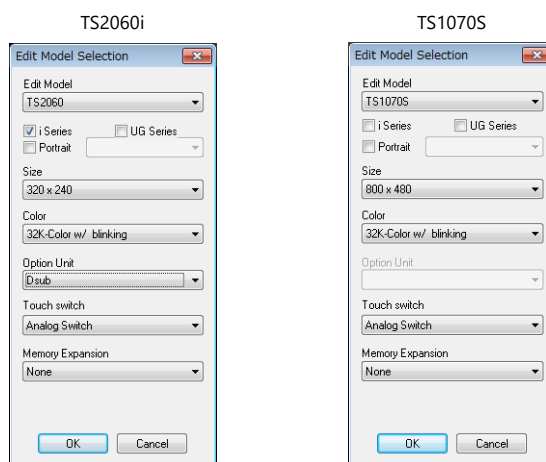
Model	Edit Model	i Series	Portrait	Size	Color	Option Unit
TS2060i	TS2060	Selected	Unselected (Landscape orientation)	320 × 240	64K-Color w/o blinking 32K-Color w/ blinking 256 colors w/o blinking 128-Color Monochrome 16-grayscale Monochrome	Dsub (DUR-00 installed)
TS2060		Unselected				Not available
TS1100Si	TS1100Si	Selected	Selected (Portrait orientation) * Left rotation Right rotation	800 × 480	64K-Color w/o blinking 32K-Color w/ blinking 128-Color	None
TS1070Si	TS1070S	Selected				
TS1070S		Unselected				

*   32 k/64 k colors only

⚠️   The screen program of the TS unit cannot be converted into an earlier version (for example, V7 or V6 series).

Specification Difference Between TS2060i and TS2060

	Specifications	TS2060i	TS2060
Unit Specifications	Screen size	5.7-inch	
	Display device	TFT color	
	Resolution	320 × 240 dots	
	Touch switch	Analog resistive film type	
	Power supply specifications	DC power supply	
Function	Screen program capacity (FROM)	10.5 MB	2.5 MB
	Backup memory (SRAM)	512 KB	128 KB
	Stroke font	○	×
External I/F	MJ1, MJ2	○	○ *
	LAN	○	×
	Optional unit (DUR-00)	○	×
	Communication I/F unit (CUR-xx)	○	×
	USB-A	○	×
	USB mini-B	○	○
	SD card slot	○	×

* External power supply of +5 V not available

Specification Difference Between TS1000 Smart Models

	Specification	TS1100Si	TS1070Si	TS1070S
Unit Specifications	Screen size	10.2-inch widescreen	7.0-inch widescreen	
	Display device	TFT color		
	Resolution	800 × 480 dots		
	Touch switch	Analog resistive film type		
	Power supply	DC power supply		
Function	Screen program capacity (FROM)	26 MB		
	Backup memory (SRAM)	128 KB		
	Stroke font	×		
External I/F	COM1/COM2/COM3	○		
	LAN	○		×
	USB-A	○		
	USB mini-B	○		

Multi-language Setting

Select the language for display on the TS unit.
Location of settings: [System Setting] → [Multi-language Setting].
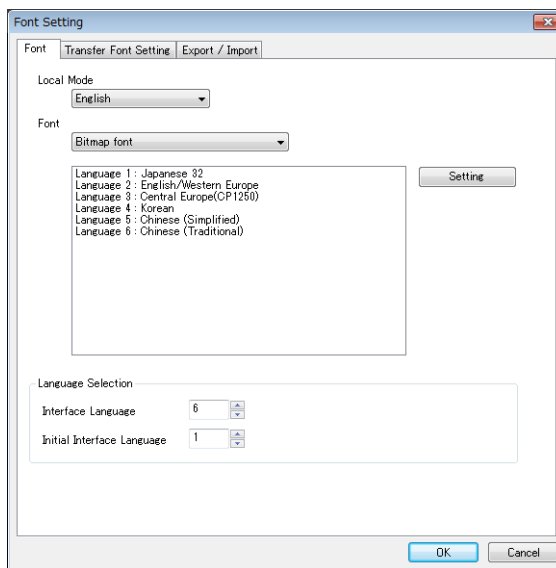
☞   For details, refer to "6 Language Changeover" in the TS Reference Manual 2.

Item	Description
Local Mode	Select the interface language for the Main Menu screen of MONITOUCH. Selectable languages vary with the [Font] setting. The interface language can also be selected on the Main Menu screen of MONITOUCH. Japanese, English, Chinese (Traditional), Chinese (Simplified), Korean
Font	Select a font type from [Bitmap font], [Stroke font] and [Gothic font].
Setting	Set the languages to use.
Interface Language	Set the number of interface languages. 1 to 16 Example: Specifying "5" means Languages 1 to 5 can be set.
Initial Interface Language	Select the language to display upon switching to RUN mode. 1 to 16

Font Type

Fonts are roughly categorized into three types: bitmap fonts, Gothic fonts, and stroke fonts.
Because the mixed use of fonts is not permitted on MONITOUCH, select one font type in the [System Setting] → [Multi-language Setting] → [Font Setting] window when creating a screen program.

Type	Size Specification Method	Features	Image
Bitmap font	XY magnification factor specification	Font data designed in sizes of 16 × 16 dots and 32 × 32 dots (two-byte characters). This font type occupies less memory but is not suitable if a smoother-line typeface is required.	1x1 運転 停止 モニタッチ 2x2 運転 停止 モニタッチ 3x3 運転 停止 モニタッチ 4x4 運転 停止
Gothic font / Stroke font	Point specification	Since the font data of each point size is transferred to MONITOUCH, the required memory capacity is larger than that of bitmap fonts while the displayed typeface has smoother lines. In the case of Gothic fonts, depending on the function assigned to the part or item, some limitations, such as automatic or manual setting for fonts, may apply.	- Gothic font 8ポイント 運転 停止 モニタッチ 10ポイント 運転 停止 モニタッチ 12ポイント 運転 停止 モニタッチ 16ポイント 運転 停止 モニタッチ 18ポイント 運転 停止 モニタッチ 24ポイント 運転 停止 モニタッチ - Stroke font 8ポイント 運転 停止 モニタッチ 10ポイント 運転 停止 モニタッチ 12ポイント 運転 停止 モニタッチ 16ポイント 運転 停止 モニタッチ 18ポイント 運転 停止 モニタッチ 24ポイント 運転 停止 モニタッチ

Supported Language List

The following table lists the fonts and corresponding languages supported by the TS.

Font Setting [*1]		Supported Language	Supported Character Code
Bitmap font	Japanese	Japanese, English	JIS level 1, level 2 + ANK code
	Japanese 32	Japanese, English	JIS level 1 + ANK code
	English/Western Europe	English, Icelandic, Irish, Italian, Dutch, Spanish, Danish, German, Norwegian, Portuguese, Finnish, Faroese, French, Swedish	ISO-8859-1: Latin1 (Extended ASCII code)
	Chinese (Traditional)	Chinese (traditional), English	BIG5 code (A141 to C67E) + ASCII code
	Chinese (Simplified)	Chinese (simplified), English	GB2312 code (A1A1 to FEFE) + ASCII code
	Korean	Hangul, English	KS code (A1A2 to C8FE) + ASCII code
	Central Europe	Croatian, Czech, Hungarian, Polish, Romanian, Slovakian, Slovene, Hrvatska (Croatian)	CP1250 code
			ISO code[*2] (ISO-8859-2: Latin2)
	Cyrillic	Russian, Ukrainian, Bulgarian, Kazakh, Uzbek, Azerbaijani	CP1251 code
			ISO code[*2] (ISO-8859-5: Latin5)
	Greek	Greek	CP1253 code
			ISO code[*2] (ISO-8859-7: Latin7)
	Turkish	Turkish	CP1254 code
			ISO code[*2] (ISO-8859-9: Latin9)
	Baltic	Estonian, Latvian, Lithuanian	CP1257 code
Gothic font	Gothic	Japanese, English	JIS level 1 + level 2 + ANK code
	Gothic (IBM Extended Character)	Japanese, English	JIS level 1 + level 2 + IBM extended code (FA40 to FC4B) + ANK code
	English/Western Europe HK Gothic	English, Icelandic, Irish, Italian, Dutch, Swedish, Spanish, Danish, German, Norwegian, Portuguese, Finnish, Faeroese, French	ISO-8859-1: Latin1 (Expanded ASCII code)
	English/Western Europe HK Times		
Stroke font[*3]	Japanese stroke	Japanese, English	JIS X 0201 JIS X 0208 NEC special characters IBM extensions NEC selection of IBM extensions
	English/Western Europe stroke	English, Icelandic, Irish, Italian, Dutch, Swedish, Spanish, Danish, German, Norwegian, Portuguese, Finnish, Faeroese, French	CP1252 code
	Chinese (Traditional) stroke	Chinese (Traditional), English	BIG5 code (A141 to F9FE) + ASCII code
	Chinese (Simplified) stroke	Chinese (Simplified), English	GB2312 code (A1A1 to F7FE) + ASCII code
	Korean stroke	Hangul, English	KS code (A1A1 to FDFE) + ASCII code
	Central Europe stroke	Croatian, Czech, Hrvatska (Croatian), Hungarian, Polish, Romanian, Slovakian, Slovene	CP1250 code
	Cyrillic stroke	Russian, Ukrainian, Kazakh, Bulgarian, Uzbek, Azerbaijani	CP1251 code
	Greek stroke	Greek	CP1253 code
	Turkish stroke	Turkish	CP1254 code
	Baltic stroke	Estonian, Latvian, Lithuanian	CP1257 code

*1   Bitmap fonts, gothic fonts and stroke fonts cannot be used together.
*2   Select the [ISO Code] checkbox when selecting the corresponding fonts in the [System Setting] → [Multi-language Setting] → [Font Setting] window.
*3   Only for TS2060i

Unit Setting

The settings to be configured on the TS unit are described below. Select the functions to use and configure the required settings.
Location of settings: [System Setting] → [Unit Setting]

SRAM/Clock

Configure the following settings when using SRAM or the built-in clock of the TS unit.
Location of settings: [System Setting] → [Unit Setting] → [SRAM/Clock]
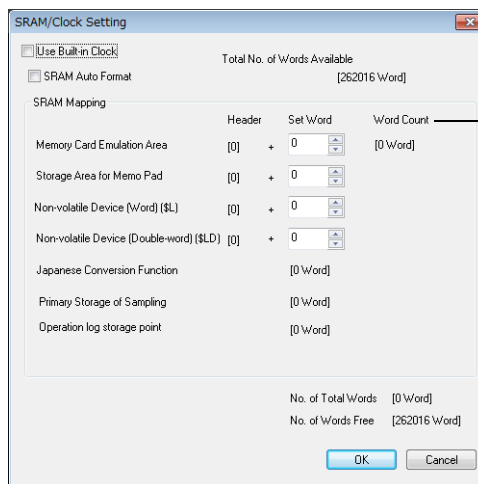
The contents of the SRAM area is retained by battery after power to the unit is turned off.

Item	Description	Refer to

Use SRAM Calendar	Set the reading target of the clock.
	
	Selected
	  Use the built-in clock of the TS unit.
	
	Unselected
	  Use the clock in the PLC.
		"10 Calendar"

SRAM Auto Format	Set the SRAM format method.
	
	Selected
	  Perform auto-formatting.
	
	Unselected
	  Perform formatting from [SRAM/Clock] on the Main Menu screen.
		"Formatting SRAM" page 1-8

Memory Card Emulation Area	Allocate an area that stores the memory card mode data. [Word Count] indicates the number of words set at [System Setting] → [Other] → [Memory Card Setting] → [Type: Data File]. Set so that the set number of words is equal to or greater than [Word Count].	"13.2 Memory Card" page 13-6
Storage Area for Memo Pad	Allocates an area that stores the memo pad data.	"13.3 Memo Pad"
Non-volatile Device (Word) ($L)	Allocates areas used by the addresses $L (word area) and $LD (double word area) in user device memory. The available range is determined by the specified device memory address. Example: When the set number of words for $L is 10, $L0 to $L9 can be used.	"Non-volatile $L (word) and non-volatile $LD (double-word)" page 1-8 "Formatting SRAM" page 1-8
Non-volatile Device (Double-word) ($LD)		
Japanese Conversion Function	When the Japanese conversion function is used, 18,728 words are allocated.	-
Primary Storage of Sampling	When trend sampling or the alarm history function is used, the required number of words is allocated.	"7.2.1 Buffering Area" "8.2.1 Buffering Area"
Operation log storage point	When operation logs are used, the required number of words is allocated.	TS Reference Manual 2 2 Operation Log
No. of Total Words No. of Words Free	Indicates the number of used and free words with the current settings. Set the items within the number of words available.	-

SRAM Capacity and Area Size

- The capacity of the internal SRAM is shown below:

MONITOUCH	Internal SRAM	Built-in clock
TS2060i	512 kB	Checked
TS2060/TS1000 Smart	128 kB	Checked

- The allocation as well as the maximum capacity of the internal SRAM is shown below:

		TS2060i 512 kB	TS2060/TS1000 Smart 128 kB
	Header area (128 words)		
	Header area (1024 words)		
A	Memory card emulation area	= 260,992 words	64,384 words
	Header area (16 words)		
B	Memo pad storage area	= 262,000 words	65,392 words
	Header area (32 words)		
C	Non-volatile word memory area $L	= 261,984 words	65,376 words
	Header area (32 words)		
D	Non-volatile double-word memory area $LD	= 261,984 words	65,376 words
	Header area (4 words)		
E	Japanese conversion function (Fixed to 1024 words)		
F	Primary Storage of Sampling		
G	Operation log storage area		

*   The size of "F" (primary storage area of sampling data) varies depending on the buffering area setting. The size is automatically calculated in the editor and cannot be changed.
The size of "G" (operation log storage area) changes according to the number of logging times.

Non-volatile $L (word) and non-volatile $LD (double-word)

- Difference
  The difference between "Word" and "Double-word" is whether only the specified address (word) is guaranteed or two words (double-word) from the address are guaranteed when a power failure occurs.

- Data protection when a power failure occurs
  When a power failure occurs while writing data to $L or $LD, the data value just before writing is guaranteed. (In case of $L, the top word of data just before writing is guaranteed; in case of $LD, the top two words of data just before writing is guaranteed.)
  However, note that when performing processing where two or more words for $L and three or more words for $LD are written simultaneously, the data is not guaranteed.

  Example: Character display, "BMOV" macro command, [Screen Setting] → [Screen Setting] → [PLC Device Transfer] etc.

  *1   Use $LD to access two word data. To verify whether writing was successful or not, check system device memory addresses $s721 to $s726.

Device Memory	Description	Device Type

$s721	Writing result of $L address where data was written last
	  0: Normal
	  1: Error
		← TS
		(writing from TS to $s)

$s722	$L address where data was written last if $s721 indicates [1: Error] at power-up	
$s723		

$s724	Writing result of $LD address where data was written last
	  0: Normal
	  1: Error	

$s725	$LD address where data was written last if $s724 indicates [1: Error] at power-up	
$s726		

Formatting SRAM

When settings are configured in the [SRAM/Clock Setting] window, always format SRAM on the Main Menu screen of the TS before use.
If SRAM is not formatted, the message "Error: 161 (or 163)" will appear and the screen program will not run.
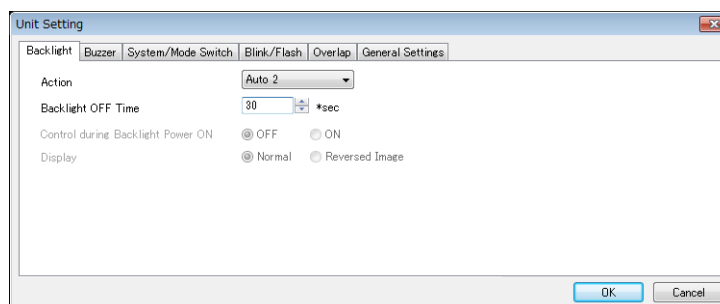
- SRAM auto format
  For example, if the data storage destination or number of words for storage of history data changes in accordance with the logging and alarm functions, the sizes displayed in the [SRAM/Clock Setting] window may also change. In such a case, SRAM needs formatting every time the size changes.
  This formatting can be performed automatically. When the [SRAM Auto Format] checkbox is selected, SRAM will automatically be formatted each time a screen program is transferred. For details, refer to the following table.

  When the [SRAM Auto Format] checkbox is selected

SRAM Area	Condition	Auto Format
Memory Card Emulation Area	The size is different from the setting.	No
	The memory card setting is changed.	Yes (All the data in the emulation area is cleared.)
Storage Area for Memo Pad	Size increases	No
	Size decreases	Yes
Non-volatile Device (Word) ($L) Non-volatile Device (Double-word) ($LD)	Size increases	Only the increased device memory area is formatted while the existing area is not formatted.
	Size decreases	Only the decreased device memory area is deleted while the existing area is not formatted.
Japanese Conversion Function	-	No
Primary Storage of Sampling	The buffering area setting of [Primary storage target: SRAM] is made or changed.	Yes (All the data at the primary storage area is cleared.)

Backlight

Configure how the backlight is controlled by the TS unit.

Item		Description
Action	Always ON	The backlight is always on.
	Auto 1	Backlight OFF conditions: The backlight is turned off when the time specified by [Backlight OFF Time] has elapsed from the instant when all the following conditions are met. [*1] • Bit 11 of read area "n + 1": OFF • Screen display (lamp, data display, calendar, etc.): No change • Touch switch: OFF Backlight ON conditions: The backlight is turned on when any of the following conditions is met. [*2] • Bit 11 of read area "n + 1": ON (always ON) • Screen display: Changed • Somewhere on the screen is touched. • Normal/call-overlap: ON/OFF_ • Multi-/global overlap: ON/OFF, overlap number changed
	Auto 2	Backlight OFF conditions: The backlight is turned off when the time specified by [Backlight OFF Time] has elapsed from the instant when all the following conditions are met. [*1] • Bit 11 of read area "n + 1": OFF • Touch switch: OFF Backlight ON conditions: The backlight is turned on when any of the following conditions is met. [*2] • Bit 11 of read area "n + 1": ON (always ON) • Somewhere on the screen is touched.
	Auto 3	Backlight OFF conditions: The backlight is turned off when the time specified by [Backlight OFF Time] has elapsed from the instant when all the following conditions are met. [*1] • Bit 11 of read area "n + 1": OFF • Touch switch: OFF Backlight ON conditions: The backlight is turned on when any of the following conditions is met. [*2] • Bit 11 of read area "n + 1": ON (always ON) • Screen changeover • Somewhere on the screen is touched. • Normal/call-overlap: ON/OFF • Multi-/global overlap: ON/OFF, overlap number changed
	Manual	Backlight OFF conditions: The backlight is turned off when either of the following operations is performed. • Press [SYSTEM] → [F5] on MONITOUCH. [*3] • Bit 11 of read area (n + 1): OFF (bit changes from 1 to 0) Backlight ON conditions: The backlight is turned on when any of the following conditions is met. [*2] • Somewhere on the screen is touched. • [SYSTEM] → [F5] is pressed on MONITOUCH. [*3] [*5] • Bit 11 of read area (n + 1): ON (bit changes from 0 to 1)
	Manual 2 [*4] [*5]	Backlight OFF conditions: The backlight is turned off when either of the following operations is performed. • Press [SYSTEM] → [F5] on MONITOUCH. [*3] • Bit 11 of read area (n + 1): OFF (bit changes from 1 to 0) Backlight ON conditions: The backlight is turned on when any of the following conditions is met. [*2] • [SYSTEM] → [F5] is pressed on MONITOUCH. [*3] • Bit 11 of read area (n + 1): ON (bit changes from 0 to 1)

Item	Description
Backlight OFF Time	0~65535 (sec) This setting is only available when [Auto 1], [Auto 2] or [Auto 3] is selected for [Action]. Set the length of time that elapses before the backlight is turned off after the OFF conditions have been met.
Control during Backlight Power ON	This setting is only available when [Manual/Manual 2] is selected for [Action]. Select the backlight ON/OFF status for when the power is turned on and when the mode changes from STOP to RUN.
Display	This is valid for MONITOUCH with monochrome display. This setting determines whether or not the display on MONITOUCH should be shown in reverse video.

V-SFT	Normal		Reversed Image	
	Black	White	Black	White
MONITOUCH	Black	White	White	Black

*1 When the entire screen display is refreshed, such as when changing over the entire screen or turning on/off or switching an overlap display, the time measured for [Backlight OFF Time] is cleared.

*2 No switch data is output if a switch is pressed with the backlight off. When a switch is pressed with the backlight off, the backlight is turned on. Switch data is output from switch operations made after 500 ms has elapsed since the backlight was turned on.

*3 Invalid when bit 11 of read area "n + 1" is set (ON)

*4 Switches on the screen can still be operated when the backlight is off. (V4 series compatible)
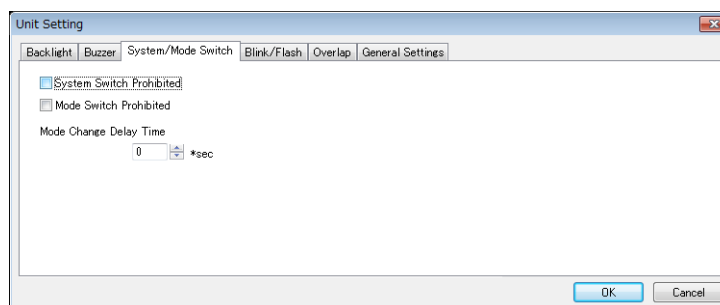
*5 Not available with the TS1000S

Buzzer
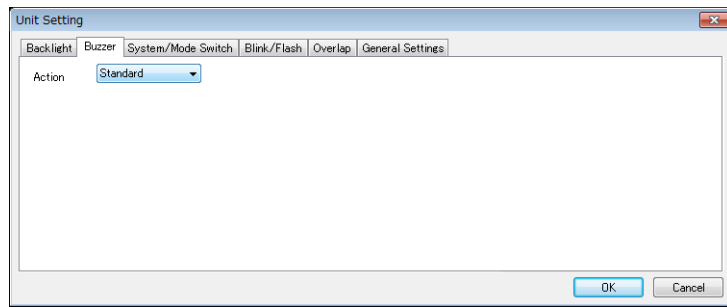
Item	Description
Action	Set the buzzer sound that is output when a switch is pressed. • Standard: 100 msec • Short: 10 msec • Continuous: Continuous • OFF: No buzzer sounding

System/Mode Switch

These settings relate to the operation of the [SYSTEM] switch and [MODE] (F1) switch in RUN mode.

Item	Description
System Switch Prohibited (TS2060 only)	Prohibit the display of the system menu. The menu is not displayed even if the [SYSTEM] switch is pressed.
Mode Switch Prohibited (TS2060 only)	Prohibit the [MODE] switch on the system menu (for displaying the Main Menu screen). Other menu switches (brightness adjustment, backlight control) remain available.
Mode Change Delay Time	0 ~ 30 (sec) Set the mode change delay time for switching from RUN mode to the Main Menu screen. * The same delay time is applied when disabling [System Switch Prohibited] and [Mode Switch Prohibited].

## Switching from RUN mode to the Main Menu screen

The procedure varies depending on the setting for [System Switch Prohibited] and [Mode Switch Prohibited].
Mode Change Delay Time: t (0 to 30 seconds)

Settings	Method
Not prohibited	Press [SYSTEM] to display the system menu and hold down the [MODE] switch for "t" seconds.
System Switch Prohibited	Hold down [SYSTEM] and [F5] together for "t" seconds.
Mode Switch Prohibited	Press [SYSTEM] to display the system menu and hold down [F1] and [F5] together for "t" seconds.

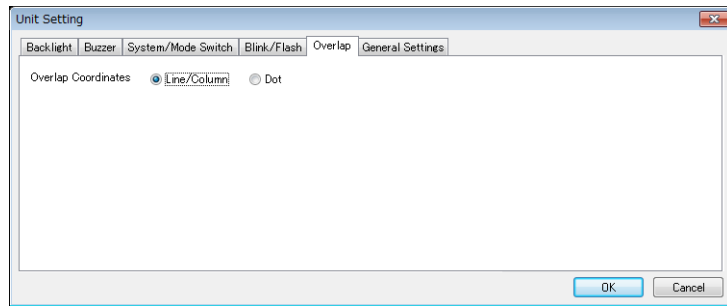## Blink/Flash

The blink/flash time for the blink color can be set.
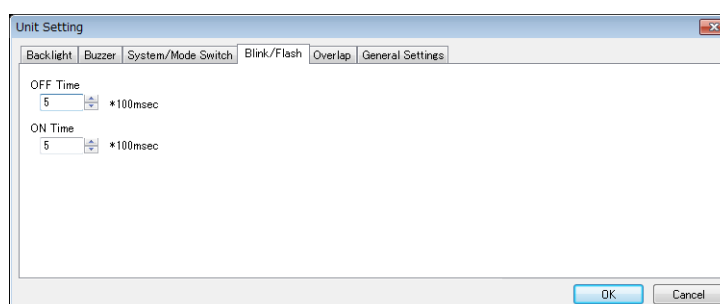
Item	Description
OFF Time (× 100 msec)	0: Blinking at about 500 msec intervals 1 to 100: Blinking at about × 100 msec intervals
ON Time (× 100 msec)	

Overlap

Select the unit for overlap coordinates. This is used when displaying an overlap by an external command or macro command.

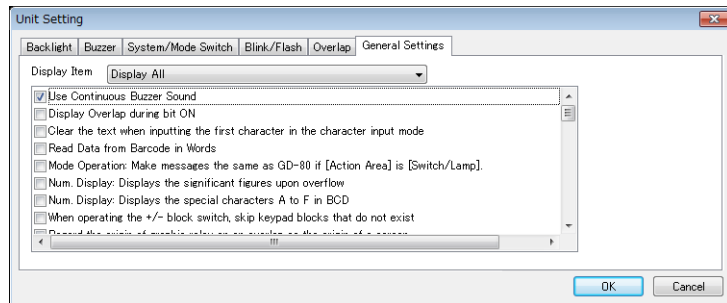| Item	Description
Overlap Coordinates	Line/Column X coordinate in 8 dots, Y coordinate in 20 dots (= one-byte) Dot X coordinate in 4 dots, Y coordinate in 1 dot

Snap

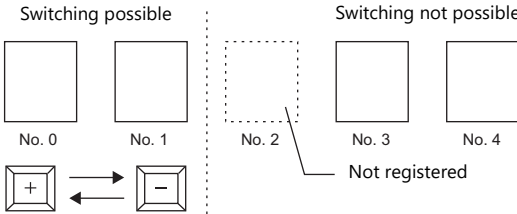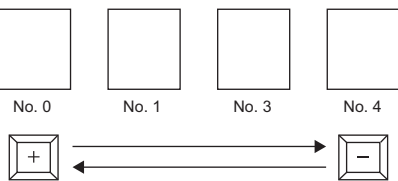Configure settings when outputting network camera images to a storage device.

☞   For details, refer to "1 Image Display" in TS Reference Manual 2.

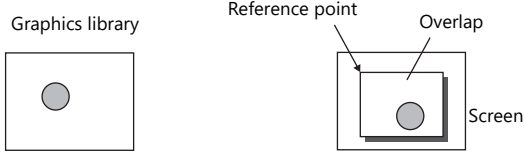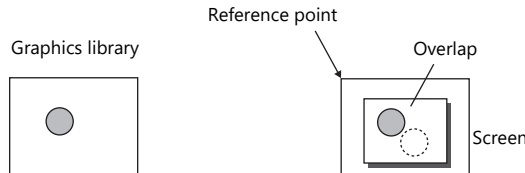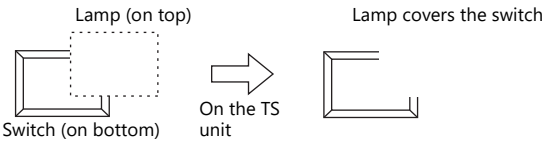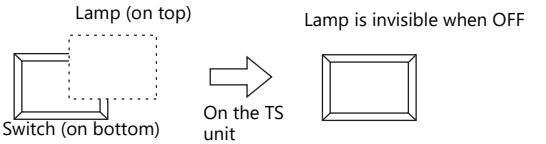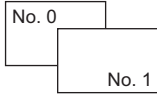## General Settings

These options are classified into two groups: settings compatible with older models, and other additional settings.
Settings compatible with older models are set automatically when converting screen programs to the TS.

Item	Description
Use Continuous Buzzer Sound	Used to set whether or not to use a continuous buzzer. • Unselected Do not use a continuous buzzer. • Selected The buzzer sounds continuously while bit 10 of read area "n" of the buzzer is set (ON). For details, refer to page 1-10.
Display Overlap during bit ON	Used to set the operation of normal/call-overlaps (when using control device memory). • Unselected Recognized at the edge. Even if the bit is ON when a screen is opened, the overlap is not displayed. • Selected Recognized at the level. The overlap is displayed while the bit is ON.
Clear the text when inputting the first character in the character input mode	Used to set the operation performed when a character key is first pressed in the character input mode. • Unselected Existing text remains in the entry display part. • Selected Existing text in the entry display part is automatically cleared.

Item	Description

Read Data from Barcode in Words	Used to set the unit of counting read data to be output to the I/F device memory for barcode setting.
	
	• Unselected
	  Unit: bytes
	
	• Selected
	  Unit: words (same as GD-80)

Mode Operation: Make messages the same as GD-80 if [Action Area] is [Switch/Lamp].	This is valid when [Action Area: Switch/Lamp] is selected for bit order alarming, page mode or direct mode. Used to set the message display format on a switch or lamp part.
	
	• Unselected
	  If the message cannot be held in one line, it is wrapped and shown. ABCDEFGHIJKLMNOPQRSTU
	
	• Selected
	  If the message cannot be held in one line, the portion that cannot be held in the area is not shown. ABCDEFGHIJKLMNO

Num. Display: Displays the significant figures upon overflow	Used to set the display on MONITOUCH when an overflow occurs on a numerical display part.
	
	Example: When D100 = 1234
	• Unselected
	  4-digit display: "1234" 2-digit display "--"
	
	• Selected
	  4-digit display: "1234" 2-digit display "34"

Num. Display: Displays the special characters A to F in BCD

Used to set the display on MONITOUCH when BCD is selected for a numerical display part.

PLC	Display on MONITOUCH	
	Unselected	Selected
0~9	0 ~ 9	0 ~ 9
A	0	.
B	0	:
C	0	−
D	0	+
E,F	0	(Space)

When operating the +/−block switch, skip keypad blocks that do not exist

Used to set the operation performed if there is an unregistered block between the block numbers [Min. Block] and [Max. Block] for the target of switching the keypad block.

• Unselected
Switching is stopped when an unregistered block is encountered.

Switching possible   Switching not possible

No. 0   No. 1   No. 2   No. 3   No. 4

Not registered

+ → −

• Selected
Switching is performed while skipping unregistered blocks.

No. 0   No. 1   No. 3   No. 4

+ → −

Item	Description
Regard the origin of graphic relay on an overlap as the origin of a screen	Used to set the reference position when the graphic relay function is set for an overlap. • Unselected Graphics are placed with respect to the origin of the overlap display part. • Selected Graphics are placed with respect to the origin of the screen.
If a switch/lamp OFF color is the same as the base, do not make it solid filled	Used to set the OFF color display when the screen background color is the same as the OFF color of a switch or lamp. • Unselected The switch or lamp part placed on top covers the part that is underneath it on both the editor and MONITOUCH. • Selected The part on top covers the part underneath it on the editor. On MONITOUCH, the OFF color becomes transparent.
If a switch is overlaid on another, enable the upper switch	Used to set the operation that is performed when two switches overlap each other. <Display on the editor> The switches are displayed in the order of placement. Switch No. 0, which was placed earlier is superimposed by switch No. 1 which was placed later. <Operation on MONITOUCH> • Unselected The switch that is placed earlier (No. 0) becomes valid. • Selected The switch that is placed later (No. 1) becomes valid.
Make the action of bit items the same as GD-80.	Select this checkbox when the Hitachi HIDIC-S10 is connected and a screen program created for the GD-80 or V4 series converted for use on a TS unit. If this checkbox is not selected, compatibility cannot be retained because bit weights are inverted from the GD-80 and V4 processing when they are converted for use on a TS unit.
Make the offset processing for graphic call the same as GD-80	If two or three conditions shown below are present, the graphic display position at bit ON is different from that on the GD-80. To make it the same as the GD-80, select this checkbox. • Graphic relay used • Graphic call used • Graphic call with offset and parameter settings

Item	Description
Use Vertical Text	If you want to place Japanese characters, select this checkbox.
Use Internal Flash ROM as Back-up Area	Select this checkbox to use part of the FROM area on MONITOUCH as a device memory backup area (PLC and internal). This function cannot be used with the station number table. Station number table Station numbers of target devices can be set as desired for PLC communication or temperature control network communication using the following devices. • PLC: Mitsubishi QnA series (Ethernet), 1:n connection only • PLC: Mitsubishi QnH (Q) series (Ethernet), 1:n connection only • PLC: OMRON SYSMAC CS1/CJ1 (Ethernet Auto), 1:n connection only • PLC: OMRON SYSMAC CS1/CJ1 DNA (Ethernet Auto), 1:n connection only • Temperature controller: Fuji Electric F-MPC04P (loader) • Temperature controller: Fuji Electric F-MPC04S (UM03)

Print Alarm Logging Data (V8 compatible) in the Displayed Format	Used to make print settings for alarm logging.
	
	• Unselected
	  Both bit ON data and bit OFF data are printed.
	
	• Selected
	  Data is printed in the currently displayed format (if bit ON data is shown, only bit ON data is printed).

Convert DIO Input Device to Bit Device	Bit conversion of DIO output device memory is performed but not for DIO input device memory. When connecting to the following PLC models, bit conversion of the DIO input device memory is required because the bit arrays are special. Check this box when using E-I/O or V-I/O with these PLCs. • Fuji Electric MICREX-F (other than I/O device memory for T-LINK) • Hitachi HIDIC-S10α (other than I/O device memory for JPCN-1) • SIEMENS S5, S7 series (device memory with byte addresses)

Validate the Character Order Setting for Text in JIS Codes	Used to set the display of JIS codes for character display parts.
	
	• Unselected
	  Displayed in MSB → LSB format regardless of the setting for [Text Process] ([Char. Display] → [Text Process]).
	
	• Selected
	  The setting for [Text Process] ([Char. Display] → [Text Process]) takes effect.

Relay: Priority Display on Screen Call	Used to set the action taken with [Action Area: Switch] or [Use sub-display: Screen Call] for bit order alarming.
	
	Example:
	Assume that three mode switches are placed on the screen and some error messages are shown on these three mode switches. When an error bit of higher priority has been set, the action taken varies as shown below.
	
	• Unselected
	  There is no change in the messages that are shown.
	
	• Selected
	  The message for the bit of higher priority is displayed.

Use 3-D Parts	If a screen program that uses 3D parts for a 128-color monitor has been converted into data for a 64k-color or 32k-color monitor, this checkbox is selected automatically. Use the setting as is.

Hide Check Screen	Used to set the display on the monitor for the interval from when MONITOUCH is turned ON to when RUN mode starts.
	
	• Unselected
	  "Data Loading..." → RUN mode
	
	• Selected
	  Black screen → RUN mode

Convert NULL to Space with the LD/RD Macro	Used to set how NULL data processing is performed when reading a CSV file that contains NULL data (attribute table type: CHAR).
	
	Applicable commands
	LD_RECIPE, LD_RECIPE2, LD_RECIPESEL, LD_RECIPESEL2, RD_RECIPE_FILE, RD_RECIPE_COLUMN, RD_RECIPE_LINE
	
	• Unselected
	  Loaded as NULL (00H)
	
	• Selected
	  Converted into space (20H) and loaded

Item	Description
Permit Double-Word Transfer by BMOV	Used to set the action to be taken when the transfer source (transfer target) device is a double-word device. Example: Fuji Electric MICREX-F series BD (data device) • Unselected: Only the lower-order word is transferred. $u100 = BD100 C:4 (BMOV)
Set the Height of the Windows Font to Gothic	Used to set the font size to be applied when the screen program created using Windows fonts on V-SFT version 2.1.3.0 or earlier is opened on V-SFT version 2.1.4.0 and later. • Unselected Created with version 2.1.3.0 or earlier → Opened with version 2.1.4.0 or later
Perform Drawing in the Background	Used to reduce flickering of data display parts placed on a switch or lamp part. • Unselected Switch, lamp and data display parts flicker slightly. • Selected Flickering of switch, lamp and data display parts is reduced.
Decimal Point Compatible in Reading Recipe File	Used to set the action to take when a CSV file contains values without a decimal point even though "with decimal point" is set on the attribute table.
Fix the Width of the Windows Font	Used when numerical data display or character display parts are created using Windows fonts on Windows XP/Vista/7/8/8.1/10. • Unselected Depending on the OS, text width may change on MONITOUCH. • Selected Regardless of the OS, text width is standardized on MONITOUCH.

Permit Double-Word Transfer by BMOV

$u100	1111H	←	BD100	22221111H
$u101	3333H	←	BD101	44443333H
$u102	5555H	←	BD102	66665555H
$u103	7777H	←	BD103	88887777H

• Selected: Both the upper- and lower-order words are transferred. $u100 = BD100 C:4 (BMOV) (D)

$u100	1111H	←	BD100	22221111H
$u101	2222H			
$u102	3333H	←	BD101	44443333H
$u103	4444H			

Set the Height of the Windows Font to Gothic

abcdefg   abcdefg   (Arial 36pt)

• Selected
Retains compatibility with screen programs created with version 2.1.3.0 or earlier.

Decimal Point Compatible in Reading Recipe File

Example:
Attribute table
Type: DEC, decimal point: 1, word count: 1

CSV file	123.4	12.34	0.123	1234	12340

• Unselected: Data is read assuming that the decimal point is specified

	D100	D101	D102	D103	D104
Data in device memory	1234	123	1	12340	57864
MONITOUCH display	123.4	12.3	0.1	1234.0	5786.4

Overflow ↰

• Selected: Data is read without assuming that the decimal point is specified

	D100	D101	D102	D103	D104
Data in device memory	1234	123	1	1234	12340
MONITOUCH display	123.4	12.3	0.1	123.4	1234.0

Item	Description

Delete folders from the oldest if Storage is lacking in space for backup	Used to set the operation that is performed when the storage device capacity is not sufficient for creating a backup file of sampled data.
	
	• Unselected
	  A backup file is not created.
	
	• Selected
	  - If a folder for the previous day or earlier exists, the folder with the oldest date is retrieved and deleted entirely.
	  - If only the folder for the current day exists, only the file with the oldest date in the history of the specified buffering area number is retrieved and deleted.

Do Not Delete the Alarm Now Occurring	Used to set the action to take when the [DEL] key on an alarm display is pressed.
	
	• Unselected
	  All the alarms being displayed can be deleted using the [DEL] key.
	
	• Selected
	  The alarms currently occurring cannot be deleted using the [DEL] key.

Adjust the position of Windows Font Multi Text	Used for position correction when using a Windows Font in multi-text.
	
	• Unselected
	  Process character height of multi-text as a fixed value.
	
	• Selected (default):
	  Correct the character height of multi-text so it fits within the specified area.

Follow to the PLC1 setting for the text process in a recipe file.	Used to determine how to recognize LSB and MSB when processing text strings in recipe files. • Unselected: Depends on the attribute setting • Selected: Depends on the [Text Process] setting of PLC1

SW Word Operation (Transfer) Code Conversion	When a switch with [Word Operation] set for [Function] is operated under the following conditions, the action performed depends on this setting.
	Condition 1: [Hardware Setting] → [PLC Properties] → [BCD] for [Code]
	Condition 2: [Word Operation] for switch [Function] → [→ (Transfer)] for [Operation Mode]
	Condition 3: [Constant (DEC/DEC-)] for [Operation Memory]
	Condition 4: [PLC Device] for [Operand Device]
	
	• Unselected
	  The constant (DEC/DEC-) specified in the operation device memory is stored as DEC/DEC- data in the PLC.
	
	• Selected
	  The constant (DEC/DEC-) specified in the operation device memory is converted into BCD and stored in the PLC.

Avoid the use of upper three bits in the Read Area (n + 2)	This option determines how the three high-order bits in the read area "n + 2" (screen number designation) are treated following specification changes relevant to screen number extension.
	
	• Unselected: The three high-order bits are used for screen number designation.
	
	• Selected: The three high-order bits are system reserved (0).
	  Screen number designation range
	  - DEC: 0 to 4095
	  - BCD: 0 to 1999 (values "2000" and after invalid)

File name designation in Recipe Macro (V7 compatible)	This option determines the number of characters used to specify a recipe macro file name. • Unselected: 8 characters • Selected: 10 characters (as with the case of V7) → automatically selected during TS conversion Applicable commands SET_RECIPEFOLDER, RD_RECIPE_FILE, RD_RECIPE_LINE, RD_RECIPE_COLUMN, WR_RECIPE_FILE, WR_RECIPE_LINE, WR_RECIPE_COLUMN, GET_RECIPE_FILEINFO

Sampling CSV output: convert the value depending on the connected device	Used to set the CSV output setting for sampling data.
	
	• Unselected
	  PLC-specific numeral conversion is not performed.
	
	• Selected
	  PLC-specific numeral conversion is performed.
	
	Applicable PLC models
	• Hitachi: All models
	• Yaskawa: Memobus (transfer mode 1)
	• Siemens: All models
	• OMRON: All models (transfer mode 2)
	• Fuji Electric: MICREX-F series and MICREX-F T-link
	• General-purpose PROFIBUS-DP

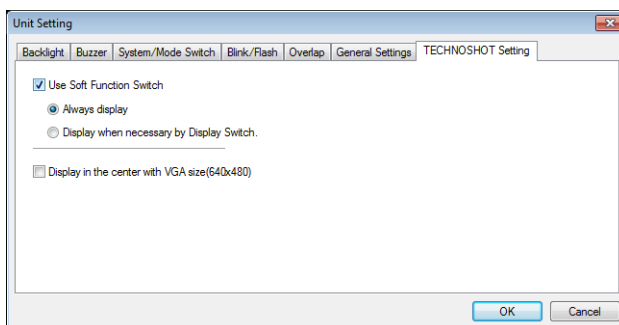| Item	Description
Save the pitch setting of the texts of Switch/Lamp	Used to set [Char. Prop.] → [Set line spacing] in the switch and lamp settings window. • Unselected The value specified for line spacing is cleared at the end of screen program editing. The setting is unselected for the next editing. • Selected The value specified for line spacing is saved in the screen program. The setting is selected and the value is also displayed for the next editing.
Maintain the letter alignment of a switch/lamp	Used to set the text alignment in the switch and lamp settings window. • Unselected The text alignment setting is cleared at the end of screen program editing. The alignment setting for every switch and lamp is cleared for the next editing. • Selected The text alignment setting is saved in the screen program. The setting is retained for the next editing.
Allow to use Insert/DELETE keys when entering values	This option is relevant to using the [←] and [→] keys for data insertion and using the [DELETE] and [BS] keys for deletion. For details, refer to "6.1 Numerical Data Entry" "Style" page 6-11.
Hide "Battery not set" message on the Main Menu	This option applies to the Main Menu screen display when the battery is not installed. • Unselected Regardless of whether or not SRAM is in use, the message "Battery not set" appears if the battery connector is disconnected. • Selected - When using SRAM/built-in clock: The message "Battery not set" is not displayed. - When not using SRAM/built-in clock: The messages "Battery not set" and "Warning: 215" are displayed.
Format the SRAM forcefully	This option determines the action taken when "Error: 161 (0:)" occurs, which indicates an SRAM formatting error, no SRAM data immediately after shipment, or loss of SRAM data due to battery disconnection. • Unselected (default) Formatting the SRAM is executed on the Main Menu screen while the battery is connected to the TS unit. • Selected Forced formatting is executed. Whether automatic formatting was executed can be checked at $s1085. (After execution, "1" is stored at $s1085. Switching to the Main Menu screen again clears the value to "0".)
Retain compatibility with negative value handling of CVFD macro command	Used to set the action to taken when converting negative values. • Unselected (default): An action according to the value at $s99 is taken. • Selected: A truncation is performed irrespective of the value at $s99. * For details on the "CVFD" macro command and address $s99, refer to the Macro Reference Manual.
Backup the recipe file	Used to set the action taken when an error occurs in writing to a CSV file in recipe mode. • Unselected (default): No backup file is created. • Selected - Normally ended: A CSV file and backup file "xxx.BAK" are created. - Abnormally ended: A temporary file from "xxx.000" to "xxx.999"* is created. * If temporary files "xxx.000" through "xxx.999" already exist, the oldest file is retrieved and deleted.
Display the recipe mode after executing SV/WR macro commands	Used to set whether or not to update the data in recipe mode when the RECIPE folder on the storage device is reread at the time of execution of the macro commands given below. • Unselected (default): The recipe mode item is not updated. • Selected The recipe mode item is updated. The recipe mode item is reset to the default status. If editing is disabled by the command device memory, the current display status is kept. Applicable commands SV_RECIPE, SV_RECIPE2, SV_RECIPESEL, SV_RECIPESEL2, WR_RECIPE_FILE, WR_RECIPE_LINE, WR_RECIPE_COLUMN

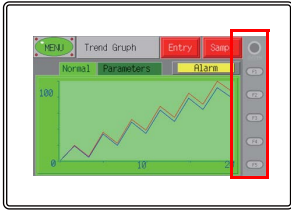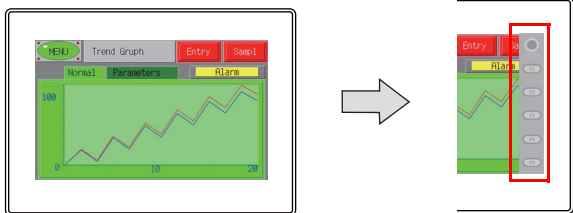| Item	Description
Return switch prohibited when switching the screen by an external command	Used to set the action taken when a switch with [Return] set for [Function] is used. • Unselected (default): It is possible to go back to the previously displayed screen even if it was switched by an external command. • Selected It is not possible to go back to the previously displayed screen if it was switched by an external command.
Cancel the restriction on the number of registerable characters for Switch and Lamp (127 characters)	Used to set the number of characters that can be displayed on a switch or lamp. • Unselected (default): The number of registerable characters is limited according to the width of the item. • Selected A maximum of 127 characters can be registered regardless of the width of the item. * When the [Char. Prop.] → [Auto-adjust the size according to the style] checkbox is selected in the switch/lamp settings window, the settings of [Auto-adjust the size according to the style] take precedence.

Scale the upper/lower limit of the alarm for num. display	Used to set the range of values associated with issuing alarms for numerical data display.
	
	Example: Numerical data display to be colored blue for a value 101 or above
	
	  Numerical data display device memory : D100
	  Alarm maximum value device memory : $u1000, Alarm color: Blue
	  Before range change : 0 - 1000
	  After range change : 0 to 100 (101 or above: Normal color → Blue)
	
	• Unselected (default):
	The maximum and minimum values for alarms are set in the range according to "After range change."
	- Alarm maximum value: $u1000 = 100
	
	• Selected
	The maximum and minimum values for alarm are set in the range according to "Before range change."
	(With constant designated, the operation in the case of "unselected" will take place.)
	- Alarm maximum value: $u1000 = 1000

Change the display from "00:00 AM/PM" to "12:00 AM/PM"	Used to set the time display to the 12-hour format. Applicable parts Time Display • Unselected Midnight → Displayed as "00:00 AM" Noon → Displayed as "00:00 PM" • Selected (default): Midnight → Displayed as "12:00 AM" Noon → Displayed as "12:00 PM"
Adjust Windows Font with +1 dot in the Y direction	This option sets whether or not to adjust the positions of characters in Windows fonts. • Unselected (default) The display position of characters is shifted by one dot in the Y axis direction on MONITOUCH compared to that on the editor. • Selected Characters are displayed in the same positions as set on the editor.
Card Format (V7 Compatible)	Used to set the action taken when the [Function: Card Format] switch is used. • Unselected (default) SRAM (primary storage area) is not formatted. • Selected SRAM (primary storage area) is formatted.
Use acknowledgement display bit memory of Alarm Tracking	Used to set the action taken when the alarm acknowledge function is used. • Unselected (default) No acknowledgement bit is used. An error check is performed by using the [Sample: Acknowledge] function of a switch. • Selected An error check is performed by using an acknowledgement bit.
Output operation of Write Area (V7 compatible)	This option determines whether the switch action or the outputting to write area has priority immediately after the screen is switched over. • Unselected The switch action is performed prior to output to the write area. • Selected (default) The switch action is performed after output to the write area is complete.

Item	Description
Use Network Table/PLC Table CSV edit function	This option sets whether or not to use Network Table/PLC Table CSV edit function and to allocate FROM to network tables and PLC tables. Use the system program Ver. 2.380 or later. • CSV editing function: When not used Use Network Table/PLC Table CSV edit function: Unselected Allocate FROM to network tables and PLC tables: Selected ↓ FROM: Not used • CSV editing function: When used Use Network Table/PLC Table CSV edit function: Unselected Allocate FROM to network tables and PLC tables: Unselected ↓ FROM: Used (screen data capacity reduced) If error 36 occurs after the system program is updated, select [Allocate...] and transfer the screen data again.

Allocate FROM to network tables and PLC tables	• CSV editing function: When used
	Use Network Table/PLC Table CSV edit function: Selected
	Allocate FROM to network tables and PLC tables: Selected
	↓
	FROM: Used (screen data capacity reduced)
	
	If you change the setting of [Allocate...], transfer the screen data by the following procedures.
	
	When the system program Ver. 2.370 or earlier
	
	1) Transfer the system program (using V-SFT Ver.6.1.3.0).
	2) Turn the power back ON. (Error 36 may be occurred.)
	3) Transfer the screen data.
	
	When the system program Ver. 2.380 or later.
	
	1) Transfer the screen data.
	2) Turn the power back ON.
	  - When the error 36 is occurred, proceed to step 3.
	  - When the error [Transfer the screen data] is occurred, reduce the screen data size and proceed to step 3.
	  - When CSV editing function is not used, select the [Allocate...] setting and proceed to step 3.
	3) Transfer the screen data.

TECHNOSHOT Setting (TS1000 Smart Only)
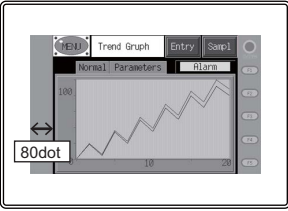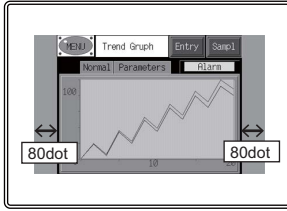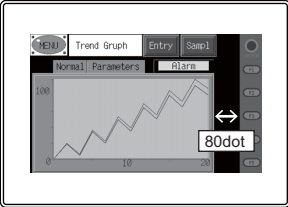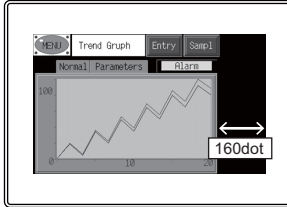
Set the screen display method.
A screen program converted from one for a QVGA (320 × 240 dots) unit can be displayed centered in VGA size (640 × 480 dots). Also, function switches can be displayed on the screen by enabling the soft function switch setting.

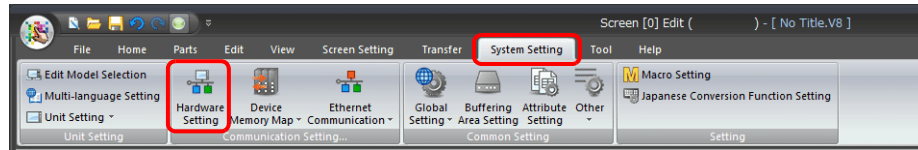| Item	Description
Use Soft Function Switch [*1]	Soft function switches are displayed on the right side of the screen. Use this setting if function switches were used on the model before conversion.
Always display	Soft function switches are always displayed when in RUN mode.
Display when necessary by Display Switch	Soft function switches are displayed when necessary using a switch that has [Function] set to "Display Soft Function Switch". * Any switches that are hidden by the soft function switches are invalid while the soft function switches are displayed.
Display in the center with VGA size (640 × 480)	The screen program is displayed centered in VGA size (640 × 480) on a WVGA size unit (800 × 480). This setting is valid when the screen display size is enlarged to VGA size upon conversion.

*1   Display examples according to each setting

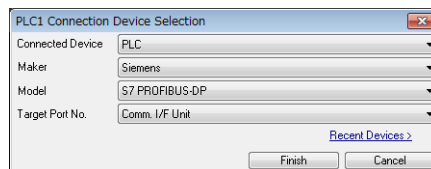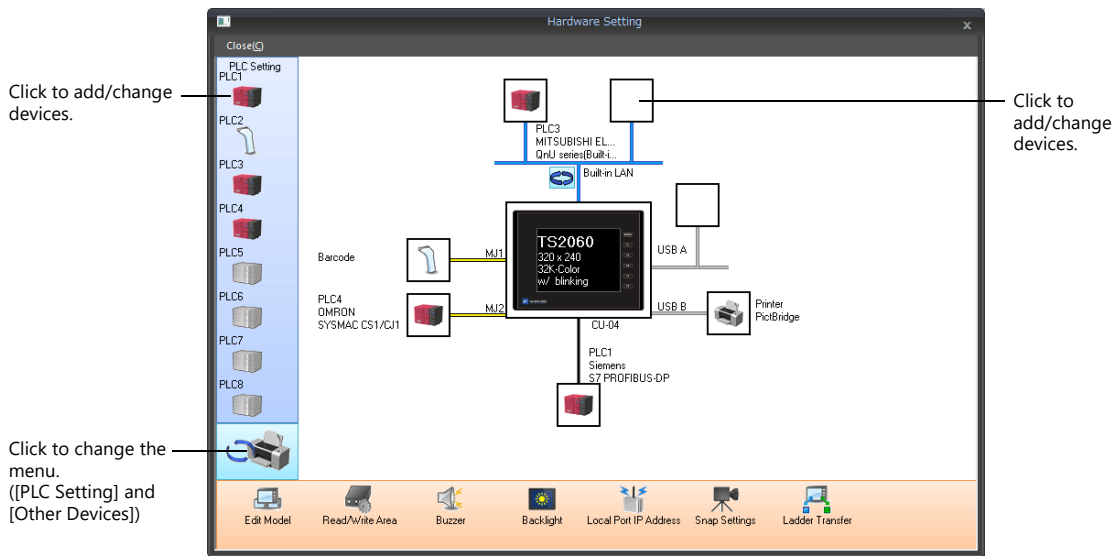| Display in Center	Soft Function Switches Displayed	Soft Function Switches Not Displayed
Selected	80-dot margin on the left side 	80-dot margins on both sides
Unselected	80-dot margin between the screen display and the function switches 	160-dot margin on the right side

1.1.3   Communication Setting

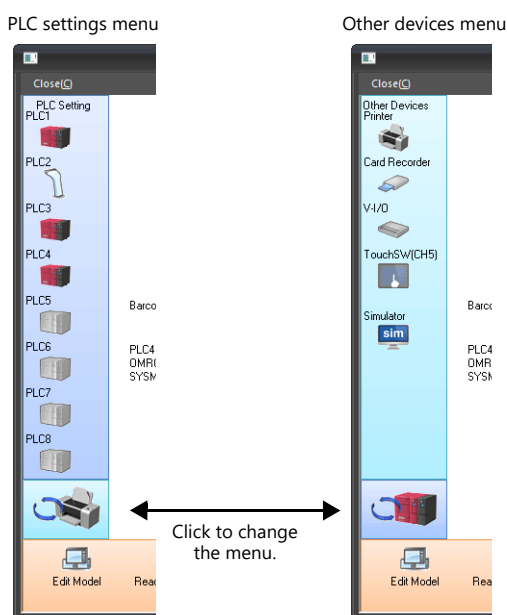This section explains the items in the [Hardware Setting] window.

☞   For information on other settings, refer to "1.1.1 System Setting" page 1-1.

Hardware Setting

Click to add/change devices.

Click to add/change devices.

Click to change the menu.
([PLC Setting] and [Other Devices])

1

PLC Settings and Other Devices (Left Menu)

PLC settings menu   Other devices menu

Click to change
the menu.

Item	Description	Refer to
PLC1 - 8	Configure settings for PLCs, temperature controllers, and inverters etc. Depending on the device connected, the available connection modes vary.	TS2060 Connection Manual TS1000 Smart Connection Manual
Printer	Set this option when connecting a printer for hard copies, data sheet printing, or logging data printing.	"16 Print"
Card Recorder	Configure this setting when using a CREC card recorder.	-
V-I/O	Configure this setting when connecting the serial extension I/O unit "V-I/O".	-
Simulator	Set this option when the simulator communication program and the screen program are to be saved to a storage device using the storage manager application.	-

## Edit Model and Other Options (Bottom Menu)

Item	Description	Refer to
Edit Model	Select the TS model for which you wish to configure a screen program.	"Edit Model Selection" page 1-2
Read/Write Area	Configure the read/write area.	"Read/Write Area" page 1-24
Buzzer	Set the buzzer sound used by the TS unit.	"Buzzer" page 1-10
Backlight	Configure how the backlight is controlled by the TS unit.	"Backlight" page 1-9
Local Port IP Address	Configure the IP address, port number and other settings of the TS unit. This is useful when the IP address is specific to the TS unit on which the screen program is used.	TS Reference Manual 2 4 Ethernet Communication Function
Snap Settings	Configure snapshot file settings.	TS Reference Manual 2 1 Image Display
Ladder Transfer	Configure the ladder transfer settings.	TS Reference Manual 2 9 Ladder Transfer

Read/Write Area
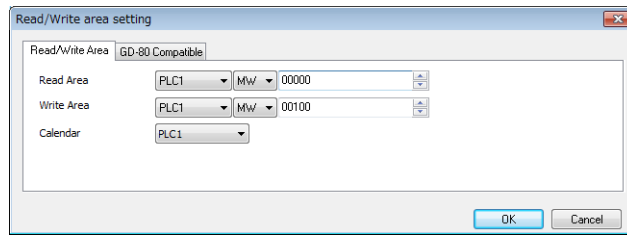
- Read area
  The read area is where the PLC gives commands for display or operation to MONITOUCH. At least 3 words of consecutive device memory addresses are occupied. MONITOUCH always reads data from these 3 words to display and operate according to the commands.
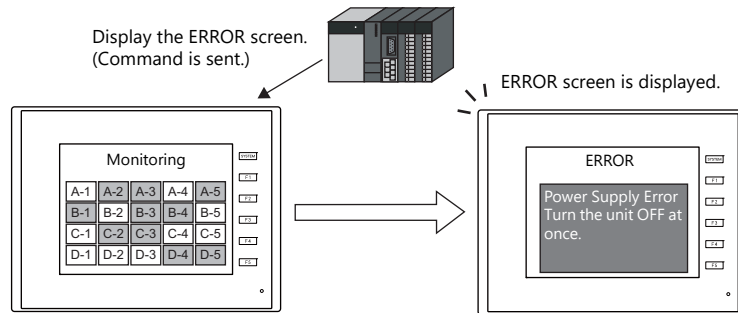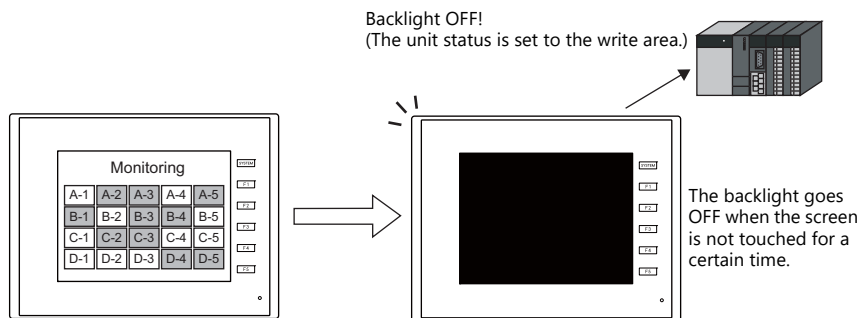

Addresses are allocated as shown below.

Address	Description	Operation
Read area =		
n	Sub command/data	TS ← PLC
n + 1	Screen status command	
n + 2	Screen number command	

    * Data in these addresses is saved at $s460 to 462 of the TS internal device memory. For more information on internal device memory ($s), refer to "1.3.2 System Device Memory Details" page 1-38.

- Write area
  This is the area where data is written from [Read Area], such as the displayed screen number, overlap display status, buzzer sounding status, etc. Three words of consecutive device memory addresses are occupied for this purpose. MONITOUCH writes information to these 3 words during communications with the PLC. When the TS has completed a display operation, sub command/data in [Read Area] "n" is written.
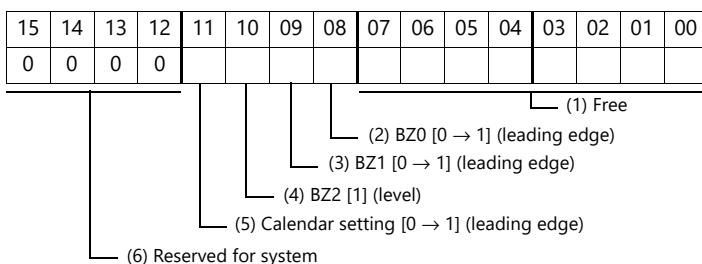

Addresses are allocated as shown below.

Address	Description	Operation
Write area =		
n	Same as data in read area "n"	TS → PLC
n + 1	Screen status	
n + 2	Displayed screen number	

    * Data in these addresses is saved at $s464 to 466 of the TS internal device memory. For more information on internal device memory ($s), refer to "1.3.2 System Device Memory Details" page 1-38.
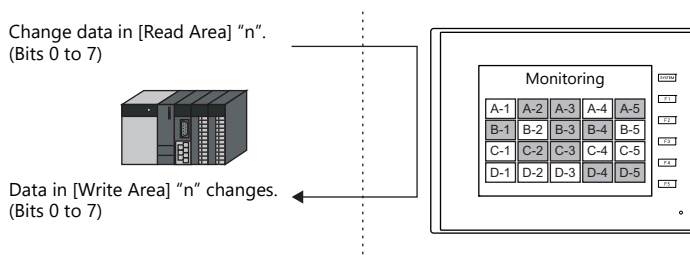
Read area "n" (sub command/data)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0	0	0	0												

- (1) Free
- (2) BZ0 [0 → 1] (leading edge)
- (3) BZ1 [0 → 1] (leading edge)
- (4) BZ2 [1] (level)
- (5) Calendar setting [0 → 1] (leading edge)
- (6) Reserved for system

Read Area "n" (Sub Command/Data)	
(1) Free	When data is saved in this area, the same data is written to [Write Area] "n" (refer to page 1-28) after the screen has been displayed. By utilizing this function, these bits can be used for watchdog monitoring [1] or display scanning [2].
(2) BZ0	A short beep sounds at the leading edge [0 → 1].
(3) BZ1	An error buzzer (short intermittent beep) sounds at the leading edge [0 → 1].
(4) BZ2	A buzzer (long continuous beep) sounds continuously while the bit is set to [1]. The [Use Continuous Buzzer Sound] checkbox must be selected at [Unit Setting] → [General Settings]. (Refer to page 1-12.)
(5) Calendar setting [3]	This bit is valid when the built-in clock is not used. This bit should be used differently depending on whether the connected PLC is equipped with a calendar function. For details on the built-in clock, refer to page 1-6.
	When connecting to a PLC with a calendar function When calendar data in the PLC is updated, it can be forcibly read by setting this bit to ON (leading edge of 0 → 1). In addition, calendar data is also read at the following timings. - At power-on - When the date changes (01:23:45 AM)
	When connecting to a PLC without a calendar function Allocate a tentative calendar data area by setting a device memory address for [Calendar device] in the [GD-80 Compatible] tab window ([Hardware Setting] → [Read/Write Area]) and set the calendar data by setting this bit (ON). For details, refer to page 1-30.
(6) Reserved for system	This bit is reserved for the system. This bit must be "0".

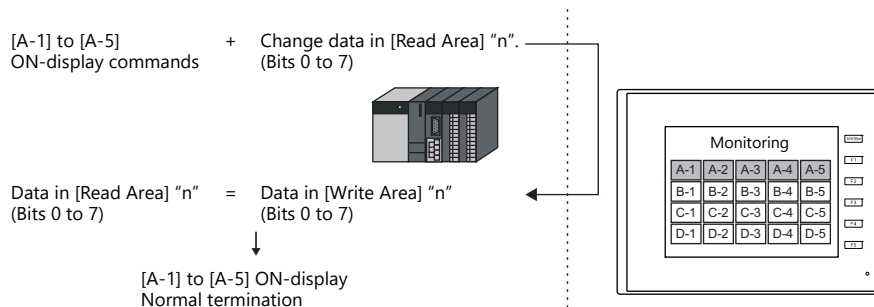[1]   Watchdog
When the PLC is communicating with the TS, there is no means for the PLC to know whether or not the TS is operating correctly. In order to check that the TS is operating correctly through communications with the PLC, forcibly change data in bits 0 to 7 in [Read Area] "n" and check that the same data is saved in bits 0 to 7 in [Write Area] "n". This verification is called "watchdog."
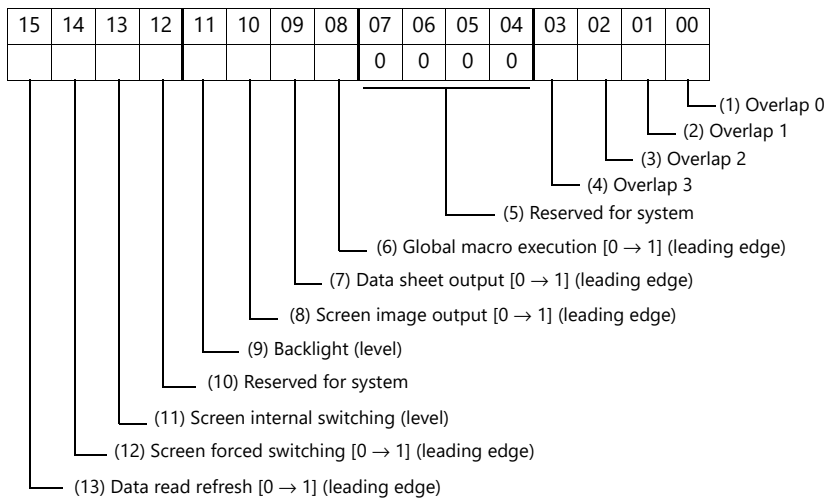
Change data in [Read Area] "n". (Bits 0 to 7)

Data in [Write Area] "n" changes. (Bits 0 to 7)

Monitoring

A-1	A-2	A-3	A-4	A-5
B-1	B-2	B-3	B-4	B-5
C-1	C-2	C-3	C-4	C-5
D-1	D-2	D-3	D-4	D-5

[2]   Display scanning
This is used to verify that the graphic change command is received and executed correctly. Forcibly change data in bits 0 to 7 in [Read Area] "n" when giving a graphic change command and check that the same data is saved in bits 0 to 7 in [Write Area] "n".

[A-1] to [A-5]   +   Change data in [Read Area] "n".
ON-display commands   (Bits 0 to 7)

Data in [Read Area] "n"   =   Data in [Write Area] "n"
(Bits 0 to 7)   (Bits 0 to 7)

[A-1] to [A-5] ON-display
Normal termination

Monitoring

A-1	A-2	A-3	A-4	A-5
B-1	B-2	B-3	B-4	B-5
C-1	C-2	C-3	C-4	C-5
D-1	D-2	D-3	D-4	D-5

[3]   If this bit is used during constant sampling, data sampling timing may be shifted. If this bit is set during constant sampling, we recommend resetting the sampling as well.

Read area "n + 1" (screen status command)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
								0	0	0	0				

- (1) Overlap 0
- (2) Overlap 1
- (3) Overlap 2
- (4) Overlap 3
- (5) Reserved for system
- (6) Global macro execution [0 → 1] (leading edge)
- (7) Data sheet output [0 → 1] (leading edge)
- (8) Screen image output [0 → 1] (leading edge)
- (9) Backlight (level)
- (10) Reserved for system
- (11) Screen internal switching (level)
- (12) Screen forced switching [0 → 1] (leading edge)
- (13) Data read refresh [0 → 1] (leading edge)

Read area "n + 1" (screen status command)	
(1) Overlap 0 (2) Overlap 1 (3) Overlap 2	These bits are used for controlling show/hide operations of overlap displays. • Normal overlap or call-overlap [0 → 1] (leading edge [*1]): Show [1 → 0] (falling edge [*1]): Hide • Multi-overlap [0] (level [*2]): Hide [1] (level [*2]): Show It is necessary to specify a library number from No. 0 to 9999 for [Device for Overlap Library No. to Display] for a multi-overlap display.
(4) Overlap 3	This bit is used to show/hide a global overlap display. [0 → 1]: Show [1 → 0]: Hide It is necessary to specify a library number from No. 0 to 9999 for [Device for Overlap Library No. to Display] for a global overlap display.
(5) Reserved for system	This bit is reserved for the system. This bit must be "0".
(6) Global macro execution	The macro set for [Macro Block] is executed once at [0 → 1] (leading edge). It is necessary to specify a macro block number for [Global Macro Device] in the [Macro Setting] window that is displayed by selecting [System Setting] → [Macro Setting]. For details, refer to the Macro Reference Manual.
(7) Data sheet output	The data sheet is printed out at [0 → 1] (leading edge). This bit becomes valid when the data sheet function is set. For details, refer to "16.3 Printing Data Sheets" page 16-19.
(8) Screenshot output	The TS screenshot is printed out at [0 → 1] (leading edge). This bit becomes valid when a printer is connected. It is also possible to output a screenshot internally using a switch [Function: Hard Copy].
(9) Backlight	This bit becomes valid when an option other than [Always ON] is selected in the [Backlight] tab window that is displayed by selecting [System Setting] → [Unit Setting]. [0] (level): OFF when the conditions are satisfied [1] (level): ON For details, refer to page 1-9.
(10) Reserved for system	This bit is reserved for the system. This bit must be "0".
(11) Screen internal switching	This bit controls screen switching by internal switches. [0]: Screen switching by internal switches is enabled. [1]: Screen switching by internal switches is disabled. * An "internal switch" means a switch you can create for internal processing within MONITOUCH by selecting [Screen] or [Return] for [Function] of the switch.
(12) Screen forced switching	This bit is used for switching the screen using the read area "n + 2" when the required screen number has already been specified in "n + 2". [*3]
(13) Data read refresh	All the data display items on the screen are refreshed at [0 → 1] (leading edge). This is applied to every data display item regardless of the setting for [Process Cycle]. For details on [Process Cycle], refer to "1.2.1 Setting the Processing Cycle" page 1-33.

*1   It is possible to make this function work with the bit in the level. For details, refer to "General Settings" page 1-12.
*2   As an exception, a multi-overlap may appear/disappear at the edge.

*3 Usage Example
Step a: Screen change according to read area "n + 2"
Step b: Screen change with an internal switch
Step c: Screen change to the same screen number as step 1 according to read area "n + 2"
In this case, however, the same value is stored in read area "n + 2" so the command is not valid. In such a case, it is possible to forcibly switch the screen to the screen number contained in read area "n + 2" at the leading edge [0 → 1] of bit 14.
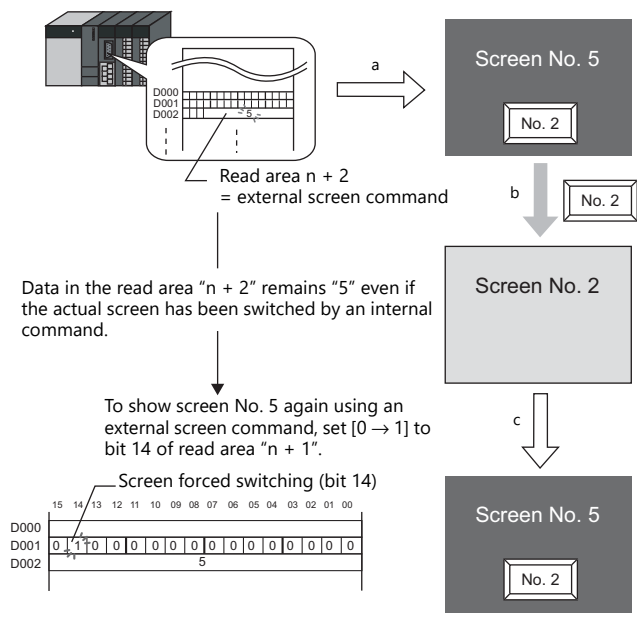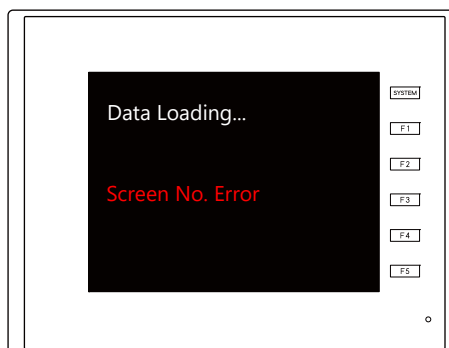

Read area "n + 2" (screen number command)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Screen No.

Read area "n + 2" (screen number command)	
Screen number command [1]	0 ~ 9999 These bits are used for switching the screen via an external command. When a screen number is specified to these bits, the screen is displayed. Even if the screen has been switched using an internal switch, it is possible to switch the screen using an external command from the PLC. External commands have priority over internal switches.

*1 Screen No. Error
When MONITOUCH has started communications with the PLC, the screen of the screen number specified in read area "n + 2" is displayed.
If the screen number specified in read area "n + 2" does not exist in the screen program, "Screen No. Error" is displayed on MONITOUCH.

Before starting communications with the PLC, check the data in [Read Area] "n + 2" and confirm that the screen number to be displayed initially is specified.

Write area "n" (same as data in read area "n")

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0	0	0	0					0	0	0	0	0	0	0	0

- (1) Free
- (2) BZ0
- (3) BZ1
- (4) BZ2
- (5) Calendar setting
- (6) Reserved for system
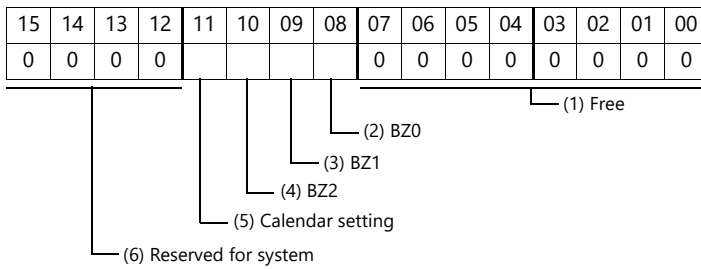
Write Area "n" (output of read area "n")	
(1) Free	These bits reflect the data in read area "n" at the time MONITOUCH finished processing.
(2) BZ0	
(3) BZ1	
(4) BZ2	
(5) Calendar setting	
(6) Reserved for system	Always "0"

Write area "n + 1" (screen status)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
									0	0	0				

- (1) Overlap 0
- (2) Overlap 1
- (3) Overlap 2
- (4) Overlap 3
- (5) Reserved for system
- (6) Serial extension I/O
- (7) Global macro execution
- (8) Printer busy
- (9) Transferring data for printing
- (10) Backlight
- (11) Analog RGB input
- (12) Screen internal switching
- (13) Screen forced switching
- (14) Data read refresh

Write area "n + 1" (screen status)	

(1) Overlap 0
(2) Overlap 1
(3) Overlap 2
(4) Overlap 3
	Overlap display status [1]
	  [0]: Hide
	  [1]: Show

(5) Reserved for system	Always "0"

(6) Serial extension I/O	Serial extension I/O (V-I/O) status
	  [0]: Normal
	  [1]: Error

(7) Global macro execution	This bit reflects the data in bit 8 of read area "n + 1".

(8) Printer busy	Printer status [2]
	  [0]: Not busy
	  [1]: Busy

(9) Transferring data for printing	Print data transferring status when a print command (hard copy, sample print or data sheet) is executed [2]
	  [0 → 1]: Start transferring data for printing
	  [1 → 0]: End transferring data for printing

(10) Backlight	Backlight ON/OFF status [3]
	  [0]: OFF
	  [1]: ON
	  * Even if bit 11 (backlight) in read area "n + 1" is reset (0: OFF), this bit is set to "1" if the backlight is on.

(11) Reserved for system	Always "0"
(12) Screen internal switching	This bit reflects the data in bit 13 of read area "n + 1".

Write area "n + 1" (screen status)	
(13) Screen forced switching	This bit reflects the data in bit 14 of read area "n + 1".
(14) Data read refresh	This bit reflects the data in bit 15 of read area "n + 1".

*1 Example:
  a. Display overlap No. 0 from read area "n + 1" using an external command.
  b. Display overlap No. 0 internally using a [Function: Overlap = ON] switch.
  In either case (a or b), bit 0 of write area "n + 1" is set (ON). In the case of b, the bit in read area "n + 1" remains "0".
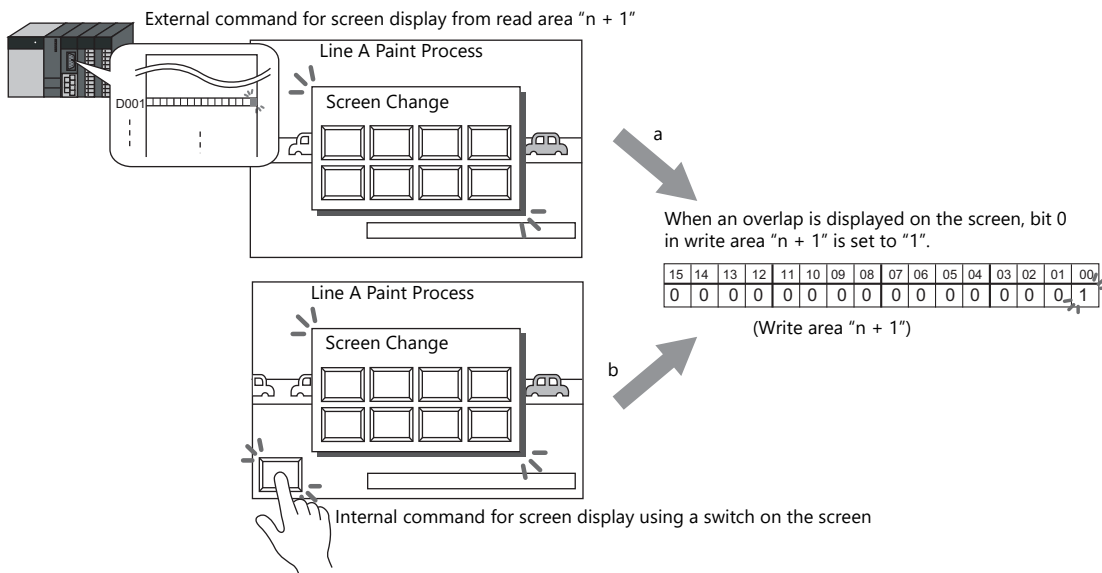
*2 Data of bits 9 and 10 is output to internal device memory address $s16. For details on internal device memory ($s), refer to "1.3.2 System Device Memory Details" page 1-38.
*3 Data of bit 11 is output to internal device memory address $s17. For details on internal device memory ($s), refer to "1.3.2 System Device Memory Details" page 1-38.

Write area "n + 2" (displayed screen number)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

└── Screen No.

Write area "n + 2" (displayed screen number)	
Screen No.	0 ~ 9999 Screen number currently displayed

Calendar

For details on calendar settings, refer to page 10-1.

[GD-80 Compatible] Tab Window
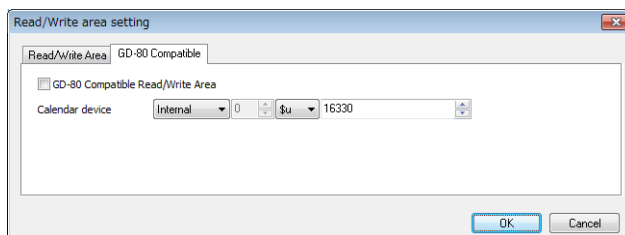
- GD-80 Compatible Read/Write Area
  This option is automatically checked when a GD-80/81S series screen program is converted into a TS screen program. The contents of [Read Area] and [Write Area] differ between the GD-80/81S series and TS.
  When this option is checked, the [Read Area] and [Write Area] contents will be the same as the GD-80/81S series. For details on [Read Area] and [Write Area] of the GD-80/81S series, refer to the GD-80 User's Manual.

- Calendar device
  Use this device memory when the connecting PLC is not equipped with the calendar function and the TS built-in clock is not used.

  Follow the steps below.

  [Step 1]
  Specify the desired device memory address for [Calendar device]. Six words are occupied consecutively.

  [Step 2]
  Save calendar data in the calendar device memory address specified in step 1 in BCD notation.
  The allocation of [Calendar device] is shown below.

Device Memory	Description
n	Year (BCD 0 to 99)
n + 1	Month (BCD 1 to 12)
n + 2	Day (BCD 1 to 31)
n + 3	Hour (BCD 0 to 23)
n + 4	Minute(s) (BCD 0 to 59)
n + 5	Second(s) (BCD 0 to 59)

  The day of the week is automatically recognized from the above data. There is no need to input any data.

  [Step 3]
  Set bit 11 (calendar setting) of read area "n". At the leading edge of this bit (0 → 1), data in the calendar device memory is set as calendar data.

  *1 Calendar data is cleared when the power is turned off. When the power is turned on, set calendar data according to the procedure mentioned above.
  *2 When using the calendar device memory, neither automatic reading of calendar data at the time of PLC connection nor once-a-day automatic correction is performed. Consequently, errors may result. Perform the procedure described above at regular intervals.

Device Memory Map

Configure device memory maps when batch transferring addresses between equipment. 128 addresses can be registered to a single device memory map.

☞   For details, refer to "8 Device Memory Map" in TS Reference Manual 2.

Ethernet Communication

Configure settings to use the Ethernet function for sending e-mail notifications or using the FTP server function.

☞   For details, refer to "4 Ethernet Communication" in TS Reference Manual 2.

1

1.1.4 Common Setting

This section explains the items in the [Common Setting] group.
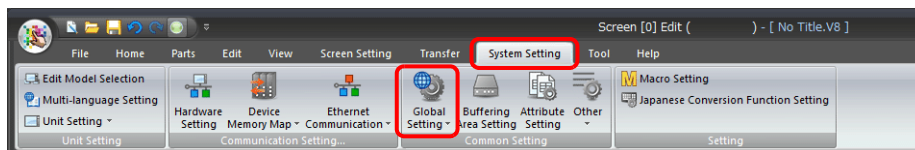
☞   For information on other settings, refer to "1.1.1 System Setting" page 1-1.

Global Setting

Global Function Switch Setting

Function switches [F1] to [F5] can be used on all screens in RUN mode with common functions.
On the TS1000 Smart, the [F1] to [F5] switches are available when soft function switches are enabled.

⚠️   • The unit changes to system menu operation mode when the system menu is displayed by pressing the [SYSTEM] switch.
    • When a screen with a local function switch setting is displayed, the setting of local function switch has priority.
      Location of setting: [Screen Setting] → [Local Function Switch Setting]
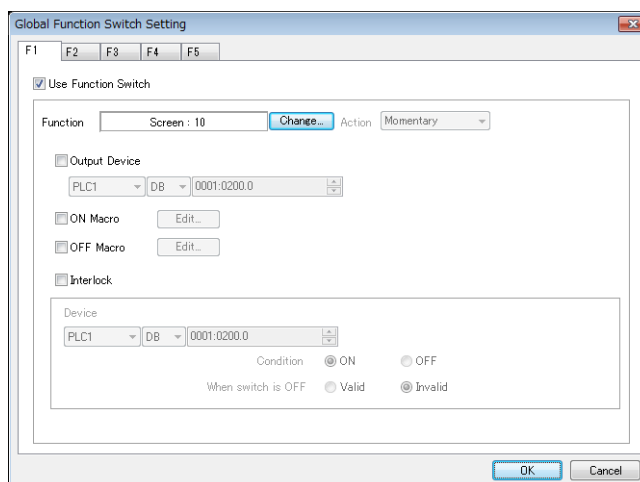
Item	Description
Use Function Switch	Select this checkbox to use the corresponding global function switch.
Function	Set the function of the switch.
Action	This option is available when the [Output Device] checkbox is selected. Select the write operation for the output device memory.
Output Device	When the switch is pressed, output information is written into the specified device memory.
ON Macro	Set the ON macro for the function switch. For details on macros, refer to the Macro Reference Manual.
OFF Macro	Set the OFF macro for the function switch. For details on macros, refer to the Macro Reference Manual.
Interlock	Set an interlock to the function switch.

Global Overlap Setting

Configure settings to keep the same overlap display shown even if the screen changes to another screen.

☞   For details, refer to "2.5 Global Overlap".

Buffering Area Setting

Configure settings when using a sampling function (trend, alarm).

☞ For details, refer to "7.2.1 Buffering Area", "8.2.1 Buffering Area".

Attribute Setting

Configure settings when using the recipe function.

☞ For details, refer to "15 Recipes".

Other

Configure settings when using each function.

Item		Refer to
Other	Storage Setting	TS Reference Manual 2 5 Storage Device
	Memory Card Setting	"13.2 Memory Card"
	MES Setting	TS Reference Manual 2 4 Ethernet Communication Function
	Operation log Setting	2 Operation Log
	Security Setting	3 Security
	Remote Desktop Table Setting	4 Ethernet Communication Function
	Time Display Format Setting	"Time display format setting" page 10-12

1.1.5 Settings

This section explains the items in the [Setting] group.

Macro Setting

Configure settings when using initial macros, a global macro device memory, or event timer macros.

☞ For details, refer to the Macro Reference Manual.

1.2   Process Cycle

The screen display speed during communication between the TS unit and the PLC depends on the number of parts (mainly the number of device memory addresses read from PLC) placed on the screen.

When displaying more parts on the screen, the display speed and switch response may be slower. In such a case, it is possible to speed up the display process by differentiating between the data to be viewed in real time (high speed) and other parts (low speed). This setting can be made at [Detail] → [Process Cycle] in the settings window of each part.

1.2.1   Setting the Processing Cycle

The read timing of PLC device memory addresses can be set. (A lamp part is used in the following example.)
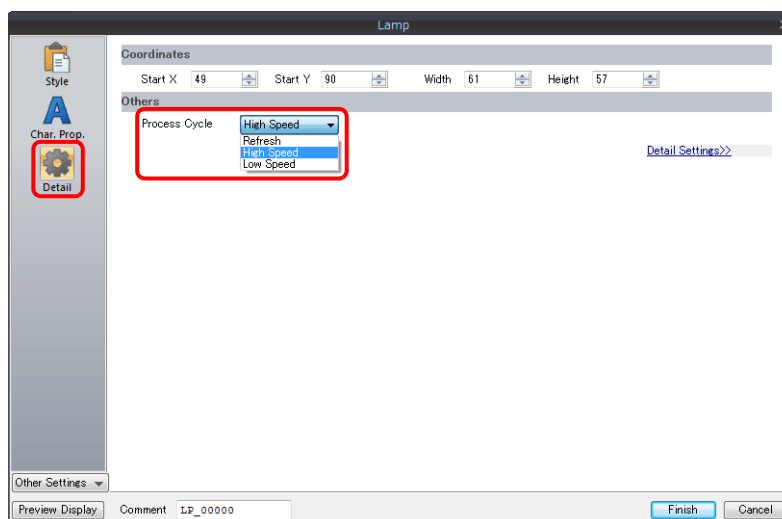
Item	Description
Refresh	• One cycle when the screen is opened • At the leading edge (OFF → ON) of bit 15 (data read refresh) in read area* "n + 1"
High Speed	• Every cycle
Low Speed	• Once per several cycles. (For details, refer to page 1-35.) • One cycle when the screen is opened • At the leading edge (OFF → ON) of bit 15 (data read refresh) in read area* "n + 1"

* Location of [Control Area] settings: [System Setting] → [Hardware Setting] → [Read/Write Area]

☞   For details, refer to "Read/Write Area" page 1-24.

Exceptions

- Regardless of the process cycle setting, all data is read from the device memory at the leading edge (OFF → ON) of bit 15 of read area "n + 1" and in the first cycle when a screen is opened. With this operation, all data is displayed on the screen when the screen is opened.
- When [Internal] or [Memory Card] is selected for the device memory, [High Speed] is automatically selected for [Process Cycle] regardless of any other settings.

1.2.2 Processing Sequence in the TS

Processing in the TS unit is performed in the following order.
- The TS analyzes screen data to be read from the PLC, and reads them in blocks.
- All blocks corresponding to data set as high-speed are read in one cycle.
- Data set as low-speed is read at one block per cycle. The next block is read in the following cycle.
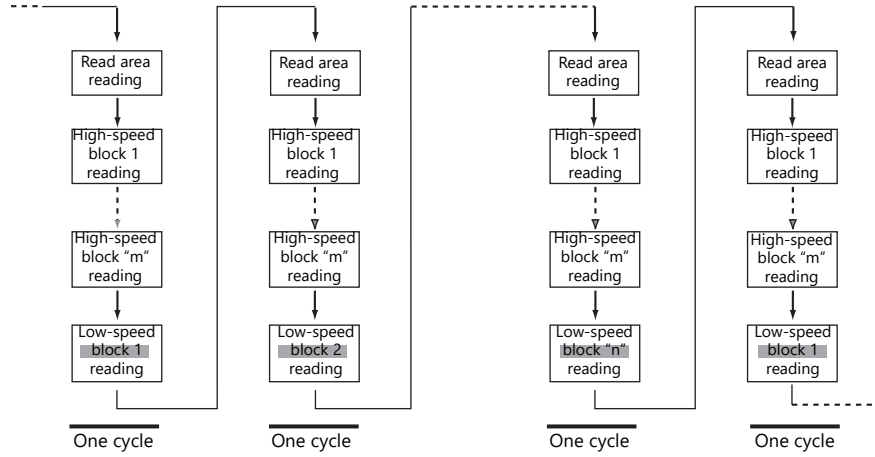
- When activation of bit 15 of read area "n + 1" is detected, all data is read in the next cycle regardless of the setting.
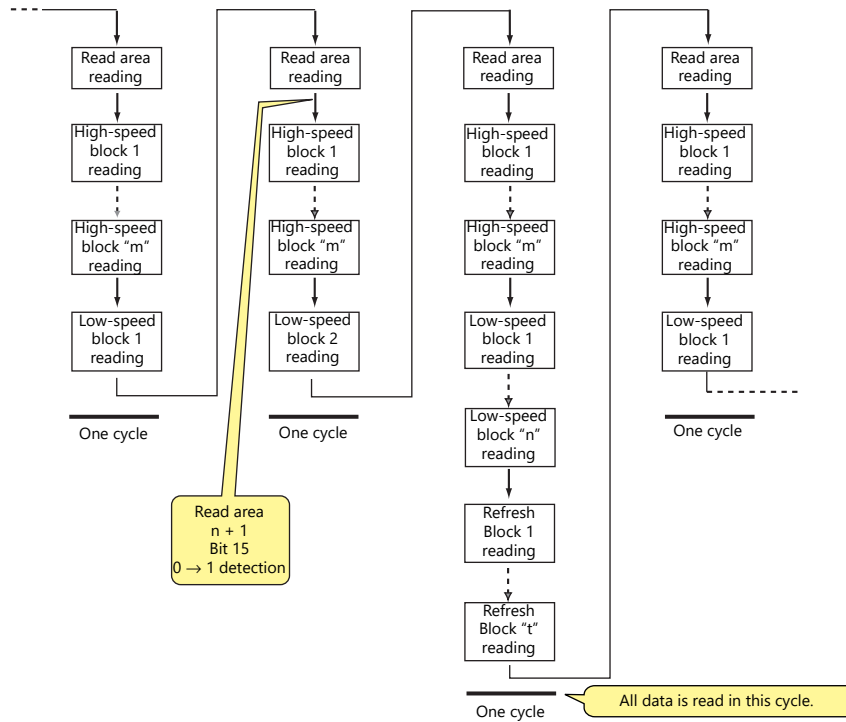
- Reading of the device memory required for display and operation is performed at the same time using two programs.
- Writing of switch activation and other operations is performed in the interval between reading blocks.

1.2.3   One-cycle Processing

The device memory set for [System Setting] → [Hardware Setting] → [Read Area] is read first. Next, the data in the device memory set for the items on the screen is read and drawn. When operations of all the setting data have been performed, the screen display is completed. This series of operations is called "one cycle." Refer to the illustration below.
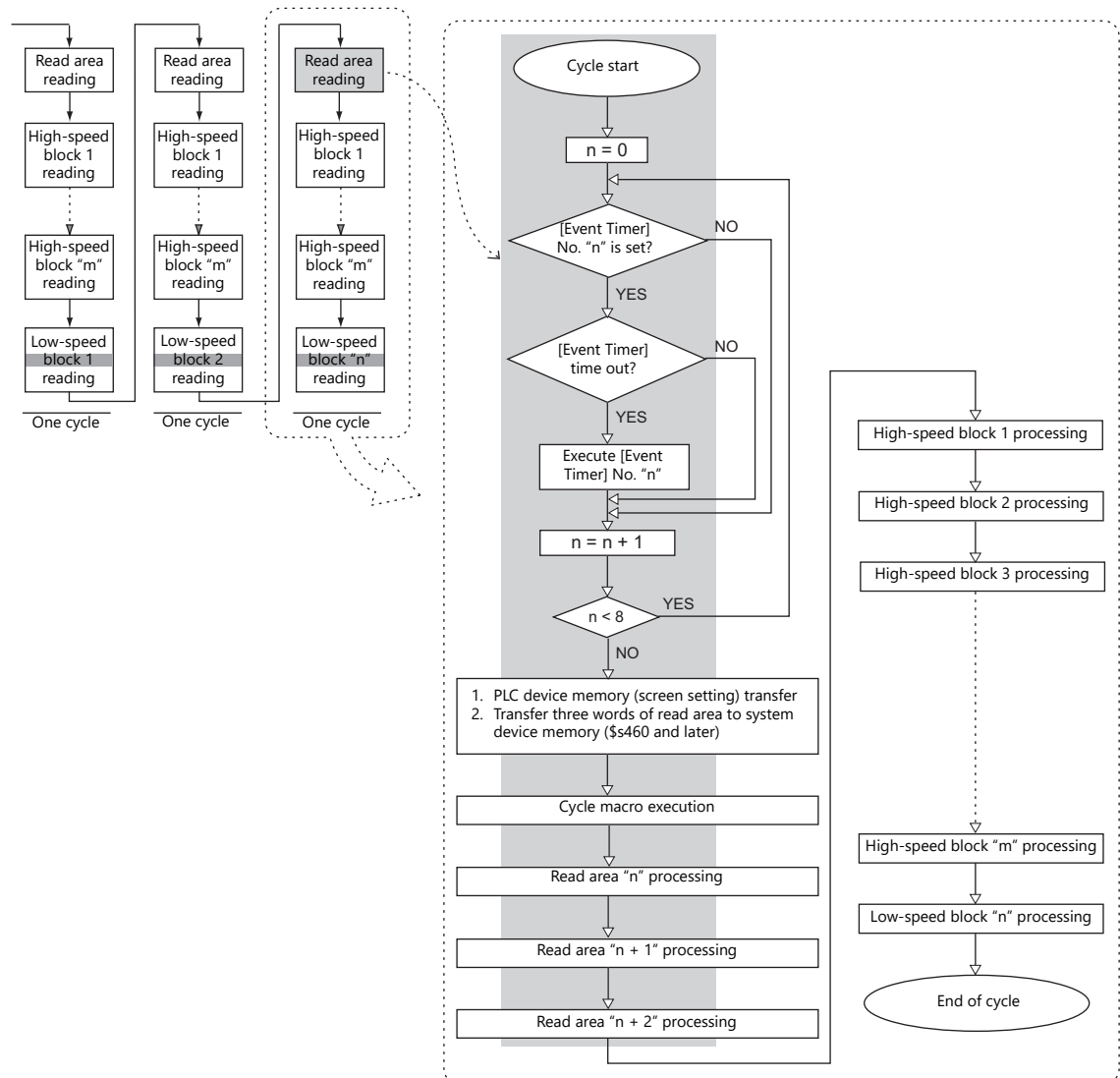
Notes

- The write area is not shown in the above illustration because it is processed at a cycle separate from the read area.
- Processing is not exactly the same as shown above because for the one cycle executed when the screen is opened, the data of all parts placed on the screen is read in addition to the execution of the screen OPEN macro.

1.2.4 If Communication is Slow

Try the following methods to speed up communication.

Methods for Creating Screens

Method		Effect
Consecutively allocate PLC device memory addresses that are used for the same screen.		The number of blocks decreases so the cycle time can be shorter.
Parts	Change the [Process Cycle] setting. [*1]	The number of accesses to the PLC can be reduced.
Macro	Refine commands. [*2]	The number of accesses to the PLC with macros can be reduced.
Sampling	Select [Use Read Area] in the [Buffering Area Setting] window, and set the device memory addresses of read area "n + 3" and later as the sampling data device memory. When specifying device memory addresses individually, allocate the addresses consecutively.	The number of blocks decreases so the cycle time can be shorter.
Multi-link Multi-link2	Place all connected TS units in RUN mode.	This eliminates recovery confirmation access on ports where communication is not possible.

*1 Example of changing [Process Cycle]:
- For data display parts where data is written from such as a keypad, and there are no or hardly any changes in the PLC, select [Refresh].
- For data display parts where the display speed on the TS unit does not need to be fast in response to data changes in the PLC, select [Low Speed].
- For data display parts that must be displayed in real time, select [High Speed].

*2 Example of refining macro commands:
[MOV] command, 5 lines
Line No. 0 D200 = $u200 (W)
Line No. 1 D201 = $u201 (W)
Line No. 2 D202 = $u202 (W)   PLC is written to five times
Line No. 3 D203 = $u203 (W)
Line No. 4 D204 = $u204 (W)

Change to the [BMOV] command

[BMOV] command, 1 line
Line No. 0 D200 = $u200 C: 5 (BMOV)   PLC is written to only once.

Others

- Baud rate setting (serial communications)
  Increase the baud rate between the TS unit and the PLC. The TS unit supports a maximum of 115 kbps (direct connection with Siemens MPI port: maximum 187,500 bps). Set the maximum baud rate that the PLC supports.
- Ethernet communication
  The baud rate available with Ethernet communication is 100 Mbps or 10 Mbps (depending on the PLC model).
  This allows for faster communication than serial communication.
- On the PLC, set a shorter scan time for ladder programs.

1.3　List of Internal Device Memory

Internal device memory is the device memory in the TS unit that is available to users.
Since processing is done internally within the TS unit, communication speed can be made quicker by using for operations that do not require data communication with a PLC.

1.3.1　Types of Internal Device Memory

Internal device memory can be generally divided into two types: user device memory and system device memory.

⚠ • Internal device memory operate with "DEC (with sign)" regardless of the numeric code set via the [System Setting] → [Hardware Setting] window. (Except items for which the numeric code is specified individually.)
  • Text processing depends on the setting for [Text Process] under [Communication Setting] in the [System Setting] → [Hardware Setting] window.

User Device Memory

These device memory allow read/write operations and can be used freely by users.

Symbol	Range	Description
$u [1]	0 - 32767 (32768 words)	This is an area common to all screens.
$L $LD [2]	Depends on user setting	This is an area common to all screens.
$T [1]	0 - 1023 (1024 words)	Each screen can have up to 1024 words. When the screen is switched, all the areas are reset to "0". Therefore, these device memory can be used for macro commands executed for each screen.
$M [1]	0 - 2047 (2048 words)	Each macro command can have up to 2048 words. When the macro command has been executed, or another macro command is called, all the areas are reset to "0". Therefore, these device memory can be used for macro commands that are executed on a macro basis.
$MC [1]	0 - 2047 (2048 bytes)	Each macro command can have up to 2048 bytes. When the macro command has been executed, or another macro command is called, all the areas are reset to "0." Therefore, these device memory can be used for macro commands that are executed on a macro basis. The difference from $M is that these are device memory in byte units, which makes byte access possible.
$C [1]	0 - 4095 (4096 words)	These device memory addresses are exclusively used for component parts. These are available only when editing component parts.

[1] $u, $T, $M, and $MC are volatile device memory. When the Main Menu screen is displayed or the power is turned off (reset), data is erased.
[2] $L and $LD are non-volatile device memory. Data is retained even after the power is turned off. To use $L or $LD, it is necessary to make [SRAM/Clock] settings.

☞　For details, refer to "SRAM/Clock" page 1-6.

System Device Memory

This device memory is for use by the system and there two types: device memory for reading and device memory for writing.

Symbol	Range	Description
$s [1]	0 - 2047 (2048 words)	This device memory is used for performing input and output with the system using, for example, macro commands. Do not use device memory addresses indicated with "Not used" because they may be reserved for future use.
$P [1]	0 - 511 (512 words)	This read/write device memory is used to control 8-way communication or indicate the status of 8-way communication.

[1] $s and $P are volatile device memory. When the Main Menu screen is displayed or the power is turned off (reset), data is erased.

☞　For details on $s, refer to "1.3.2 System Device Memory Details" page 1-38.
　For details on $P, refer to the TS2060 Connection Manual or the TS1000 Smart Connection Manual.

1.3.2   System Device Memory Details

The details of the $s system device memory are shown below.

Meaning of "Device Type" in the table

- ← TS   Data written to $s from MONITOUCH
- → TS   Definitions and settings written to $s by the user

Table

$s	Description			Device Type	Refer to
0	Stores the currently displayed screen number (0 to 9999).			← TS	-
1					
2	Overlap 0	Registration/display status		← TS	page 1-49
3	Overlap 0	Display position X			
4	Overlap 0	Display position Y			
5	Overlap 0	Overlap library number			
6	Overlap 1	Registration/display status			
7	Overlap 1	Display position X			
8	Overlap 1	Display position Y			
9	Overlap 1	Overlap library number			
10	Overlap 2	Registration/display status			
11	Overlap 2	Display position X			
12	Overlap 2	Display position Y			
13	Overlap 2	Overlap library number			
14					
15					
16	Printer status			← TS	page 1-49
17	Backlight status				page 1-49
18					
19					
20	V7 compatible	Buffer 0	Specified number of buffers	← TS	page 1-49
21		Buffer 0	Number of buffers		
22		Buffer 0	Executed number of buffers		
23		Buffer 1	Specified number of buffers		
24		Buffer 1	Number of buffers		
25		Buffer 1	Executed number of buffers		
26		Buffer 2	Specified number of buffers		
27		Buffer 2	Number of buffers		
28		Buffer 2	Executed number of buffers		
29		Buffer 3	Specified number of buffers		
30		Buffer 3	Number of buffers		
31		Buffer 3	Executed number of buffers		
32		Buffer 4	Specified number of buffers		
33		Buffer 4	Number of buffers		
34		Buffer 4	Executed number of buffers		
35		Buffer 5	Specified number of buffers		
36		Buffer 5	Number of buffers		
37		Buffer 5	Executed number of buffers		
38		Buffer 6	Specified number of buffers		
39		Buffer 6	Number of buffers		
40		Buffer 6	Executed number of buffers		
41		Buffer 7	Specified number of buffers		
42		Buffer 7	Number of buffers		
43		Buffer 7	Executed number of buffers		

1

$s	Description			Device Type	Refer to
44	V7 compatible	Buffer 8	Specified number of buffers	← TS	page 1-49
45		Buffer 8	Number of buffers		
46		Buffer 8	Executed number of buffers		
47		Buffer 9	Specified number of buffers		
48		Buffer 9	Number of buffers		
49		Buffer 9	Executed number of buffers		
50		Buffer 10	Specified number of buffers		
51		Buffer 10	Number of buffers		
52		Buffer 10	Executed number of buffers		
53		Buffer 11	Specified number of buffers		
54		Buffer 11	Number of buffers		
55		Buffer 11	Executed number of buffers		
⋮	(Blank)				

64	Switch function Repeat setting
	    Adds the repeat function to a switch not configured with the repeat function.
	    Set a number other than "0" to the switch ON macro.
				→ TS	-

65	Switch function Repeat prohibited setting
	    Prohibits the repeat function for a switch configured with the repeat function.
	    Set a number other than "0" to the switch ON macro.
					-

66	Switch ON Macro repeat setting				page 1-49
⋮	(Blank)				

72	Stores the result of the "SYS" (system call) macro command.
	    0: Normal termination
	    Other than 0 (usually -1): Error (second screen setting, etc.)
				← TS	-

73	Result of switch function
	    Stores the operation result of the switch function when the "SWRET" command is used with the switch ON macro. Use this device memory when the next operation varies depending on the result of the switch function.
	    0: Normal termination
	    Other than 0 (usually -1): Error
					-

74					
75	Buzzer sound for overlap			→ TS	page 1-50

76	Keypad overlap AUTO OFF Prohibited
	    If a keypad is placed on an overlap display, it is possible to close the overlap display with the [ENT] key on the keypad. This device memory can be used to prohibit this function.
	    0: Permitted
	    Other than 0: Prohibited
				→ TS	-

77	Exclusive function of overlap display When a value other than "0" is set, the overlap exclusive function is set.				"2 Overlaps"
78	Entry mode Display type of entry target			← TS	page 1-50
79	Entry mode Selection of entry target			→ TS	page 1-50
80	Universal serial	Switch output 0	Output codes 0 to 15	← TS	TS2060 Connection Manual TS1000 Smart Connection Manual
81	Universal serial	Switch output 1	Output codes 16 to 31		
82	Universal serial	Switch output 2	Output codes 32 to 47		
83	Universal serial	Switch output 3	Output codes 48 to 63		
84	Universal serial	Switch output 4	Output codes 64 to 79		
85	Universal serial	Switch output 5	Output codes 80 to 95		
86	Universal serial	Switch output 6	Output codes 96 to 111		
87	Universal serial	Switch output 7	Output codes 112 to 127		
88	Universal serial	Switch output 8	Output codes 128 to 143		
89	Universal serial	Switch output 9	Output codes 144 to 159		
90	Universal serial	Switch output 10	Output codes 160 to 175		
91	Universal serial	Switch output 11	Output codes 176 to 191		
92	Universal serial	Switch output 12	Output codes 192 to 207		
93	Universal serial	Switch output 13	Output codes 208 to 223		
94	Universal serial	Switch output 14	Output codes 224 to 239		
95	Universal serial	Switch output 15	Output codes 240 to 255		
⋮	(Blank)				
99	"CVFD" macro command setting			→ TS	page 1-50

$s	Description	Device Type	Refer to

100	PLC calendar status
	  The calendar status of the PLC (with built-in calendar) is written.
	  0: Normal
	  1: Error (The calendar information could not be read correctly.)
		← TS	-

101	Setting for writing calendar data to PLC
	  When $s100 = 1, writing calendar data to the PLC is permitted or prohibited.
	  0: Writing prohibited
	  1: Writing permitted at all times (No error handling is performed even if an error is detected.)
		→ TS	-

102	Stores the execution result of the "HMI-FUNC" macro command.
	  0: Normal
	  [Other than 0]: Error
		← TS	-

103			
104	PLC error handling during macro execution	→ TS	page 1-50
105	(When $s104 is other than 0: Result of error handling is written)		page 1-50
106	Memo pad Page number Stores the page number (0 to 7) of the currently displayed memo pad.		-
107	Memo pad Data Registered/ Unregistered		page 1-51
108	Memo pad Remaining storage area Stores the amount of remaining storage area for memo pad data. (Unit: bytes)	← TS	-
109			-
110	Stores the local port number of the TS unit for multi-link/multi-link 2 connections.		TS2060 Connection Manual TS1000 Smart Connection Manual
111	Stores the local port number of the TS unit for 1 : n connection on the universal serial port.		-
112			
113			
114	V7 compatible	1 : n connection PLC1 down information (port number 32 to 47)	← TS	page 1-51
115		1 : n connection PLC1 down information (port number 48 to 63)		
116		1 : n connection PLC1 down information (port number 64 to 79)		
117		1 : n connection PLC1 down information (port number 80 to 95)		
118		1 : n connection PLC1 down information (port number 96 to 111)		
119		1 : n connection PLC1 down information (port number 112 to 127)		
120		1 : n connection PLC1 down information (port number 128 to 143)		
121		1 : n connection PLC1 down information (port number 144 to 159)		
122		1 : n connection PLC1 down information (port number 160 to 175)		
123		1 : n connection PLC1 down information (port number 176 to 191)		
124		1 : n connection PLC1 down information (port number 192 to 207)		
125		1 : n connection PLC1 down information (port number 208 to 223)		
126		1 : n connection PLC1 down information (port number 224 to 239)		
127		1 : n connection PLC1 down information (port number 240 to 255)		
128		1 : n connection PLC1 down information (port number 0 to 15)		
129		1 : n connection PLC1 down information (port number 16 to 31)		
130	MODBUS TCP/IP sub station information Specify the sub station number with the "MOV" macro command.	→ TS	TS2060 Connection Manual TS1000 Smart Connection Manual
131			
132	Cycle time Stores the cycle time of the currently displayed screen. (Unit: 10 msec)	← TS	-
⋮	(Blank)		
160	Calendar Year	← TS	page 1-51
161	Calendar Month		
162	Calendar Day		
163	Calendar Hour		
164	Calendar Minute		
165	Calendar Second		
166	Calendar Day of the week (0: Sunday, 1: Monday, 2: Tuesday, ... 6: Saturday)		

167	Battery voltage drop detection Bit 4
	  0: Battery normal
	  1: Battery voltage drop, no battery
		← TS	-

168	GMT-based UNIX time Stores the Greenwich Mean Time.	← TS	-
169			-

$s	Description	Device Type	Refer to
⋮	(Blank)		
177	Sampling buffer number	→ TS	page 1-51
178	Overflow flag	← TS	page 1-51
179			
180	Buffer Word 0 Average		
181			
182	Buffer Word 0 Maximum		
183			
184	Buffer Word 0 Minimum		
185			
186	Buffer Word 0 Total		
187			
188	Buffer Word 1 Average		
189			
190	Buffer Word 1 Maximum		
191			
192	Buffer Word 1 Minimum		
193			
194	Buffer Word 1 Total		
195			
196	Buffer Word 2 Average		
197			
198	Buffer Word 2 Maximum		
199			
200	Buffer Word 2 Minimum		
201			
202	Buffer Word 2 Total		
203			
204 - 211	Buffer Word 3 Average, maximum, minimum, total	← TS	page 1-52
212 - 219	Buffer Word 4 Average, maximum, minimum, total		
220 - 227	Buffer Word 5 Average, maximum, minimum, total		
228 - 235	Buffer Word 6 Average, maximum, minimum, total		
236 - 243	Buffer Word 7 Average, maximum, minimum, total		
244 - 251	Buffer Word 8 Average, maximum, minimum, total		
252 - 259	Buffer Word 9 Average, maximum, minimum, total		
260 - 267	Buffer Word 10 Average, maximum, minimum, total		
268 - 275	Buffer Word 11 Average, maximum, minimum, total		
276 - 283	Buffer Word 12 Average, maximum, minimum, total		
284 - 291	Buffer Word 13 Average, maximum, minimum, total		
292 - 299	Buffer Word 14 Average, maximum, minimum, total		
300 - 307	Buffer Word 15 Average, maximum, minimum, total		
308 - 315	Buffer Word 16 Average, maximum, minimum, total		
316 - 323	Buffer Word 17 Average, maximum, minimum, total		
324 - 331	Buffer Word 18 Average, maximum, minimum, total		
332 - 339	Buffer Word 19 Average, maximum, minimum, total		
340 - 347	Buffer Word 20 Average, maximum, minimum, total		
348 - 355	Buffer Word 21 Average, maximum, minimum, total		
356 - 363	Buffer Word 22 Average, maximum, minimum, total		
364 - 371	Buffer Word 23 Average, maximum, minimum, total		
372 - 379	Buffer Word 24 Average, maximum, minimum, total		
380 - 387	Buffer Word 25 Average, maximum, minimum, total		
388 - 395	Buffer Word 26 Average, maximum, minimum, total		
396 - 403	Buffer Word 27 Average, maximum, minimum, total		
404 - 411	Buffer Word 28 Average, maximum, minimum, total		
412 - 419	Buffer Word 29 Average, maximum, minimum, total		
420 - 427	Buffer Word 30 Average, maximum, minimum, total		
428 - 435	Buffer Word 31 Average, maximum, minimum, total		

$s	Description	Device Type	Refer to
436	Alarm function Auto operation time	← TS	-
437			
438	Alarm function Auto operation stop time		
439			
440	Alarm function Program stop time		
441			
442	Alarm function Number of stops		
443	Alarm Function Rate of operation (XX.X)		
⋮	(Blank)		
456	Alarm Function Normal Operation Bit	← TS	-
457			
458	Alarm Function Sampling bit	← TS	-
459			
460	Read area n	← TS	-
461	Read area n + 1		
462	Read area n + 2		
463			
464	Write area n	← TS	-
465	Write area n + 1		
466	Write area n + 2		
467			
468	Memory card number	← TS	page 1-52
469	Memory card name		
470	Memory card file name No. 0		
471	Memory card file name No. 1		
472	Memory card file name No. 2		
473	Memory card file name No. 3		
474	Memory card file name No. 4		
475	Memory card file name No. 5		
476	Memory card file name No. 6		
477	Memory card file name No. 7		
478	Memory card file name No. 8		
479	Memory card file name No. 9		
480	Memory card file name No. 10		
481	Memory card file name No. 11		
482	Memory card file name No. 12		
483	Memory card file name No. 13		
484	Memory card file name No. 14		
485	Memory card file name No. 15		
⋮	(Blank)		

496	Storage access status (V-Server)
	    0: No access
	    1: Accessing
		← TS	-

497	Storage device error state		page 1-52
498	Remaining space on storage device Stores the amount of free space on the storage device. (Unit: kbyte)		-
499			

500	[Storage Removal] switch status
	    0: Switch OFF (removal disabled)
	    Other than 0: Switch ON (removal permitted)
			-

⋮	(Blank)		

512	Ethernet Port selection
	    Select the port used for sending and receiving Ethernet macro commands ("EREAD", "EWRITE", "SEND", or "MES").
	
	    0: LAN (built-in)
	    1: Ethernet unit "CUR-03"
		→ TS	-

513			
514	Ethernet Result of macro wait request_	→ TS	page 1-52
515	Ethernet Macro wait request execution result_	← TS	page 1-52

$s	Description	Device Type	Refer to
516			
517			

518	Ethernet Status (for built-in LAN port)
	    0: Normal
	    Other than 0: Error number
		← TS	TS2060 Connection Manual
			TS1000 Smart Connection Manual

519	Ethernet Status (for Ethernet unit)	← TS	-
520	Network table 0 status	← TS	TS2060 Connection Manual TS1000 Smart Connection Manual
521	Network table 1 status		
522	Network table 2 status		
⋮	⋮		
617	Network table 97 status		
618	Network table 98 status		
619	Network table 99 status		
620	FL-net Local node number	← TS	Specifications for Communication Unit FL-Net (OPCN-2)
621	FL-net Local node Area 1 data top address		
622	FL-net Local node Area 1 data top size		
623	FL-net Local node Area 2 data top address		
624	FL-net Local node Area 2 data top size		
625	FL-net Host status		
626	FL-net Protocol version		
627	FL-net FA link status		
628	FL-net Local node status		
629	FL-net Status		
630	FL-net Node table information		
631	FL-net Node table information		
632	FL-net Node table information		
⋮	⋮		
642	FL-net Node table information		
643	FL-net Node table information		
645	FL-net Node table information		
646	FL-net Refresh cycle time		
647	FL-net Node number		
648	FL-net Host status		
649	FL-net Area 1 data top address		
650	FL-net Area 1 data size		
651	FL-net Area 2 data top address		
652	FL-net Area 2 data size		
653	FL-net FA links status		
654	FL-net Minimum allowable frame interval		
⋮	(Blank)		
700	Stores the language number (0 to 15) of the currently displayed language.	← TS	-
⋮	(Blank)		

$s	Description			Device Type	Refer to

720	SRAM Memo pad save result
	   0: Normal
	   1: Data contains an error and is deleted.
				← TS	-

721	SRAM Internal device memory $L save result
	   0: Normal
	   1: Error
					-

722	SRAM Internal device memory $L last written device memory Stores the $L address of the last write operation when $s721 = 1 at power-up.				-
723					-

724	SRAM Internal device memory $LD save result
	   0: Normal
	   1: Error
					-

725	SRAM Internal device memory $LD last written device memory Stores the $LD device memory of the last write operation when $s724 = 1 at power-up.				-
726					-

727	Memo pad save overflow (judgment result of whether data is of a size that can be saved)
	   0: Normal
	   1: Save area insufficient
					-

728	FROM_RD/FROM_WR macro execution result
	   0: Normal
	   1: Error
					-

729	V7 compatible	PLC2	Macro execution result	← TS	TS2060 Connection Manual TS1000 Smart Connection Manual
730		PLC2	Port No. 00 Status		
731		PLC2	Port No. 01 Status		
732		PLC2	Port No. 02 Status		
⋮		⋮			
758		PLC2	Port No. 28 Status		
759		PLC2	Port No. 29 Status		
760		PLC2	Port No. 30 Status		
761		PLC2	Port No. 31 Status		
762		PLC2	Constant/synchronized read Interrupt setting	→ TS	
763		PLC2	TEMP_RD/TEMP_WR macro forced execution setting		
764		PLC2	Constant/synchronized write Interrupt setting		
765		PLC2	Error code	← TS	
766		PLC2	Extended error code 1		
767		PLC2	Extended error code 1		
768		PLC2	Extended error code 1		
⋮	(Blank)				
780	Storage device BMP file load information			← TS	TS Reference Manual 2 5 Storage Device
781	Storage device JPEG file load information				
782	Storage device WAV file load information				
783	Storage device Font file load information				
784	Storage device HTML file load information				
⋮	(Blank)				
800	Modbus slave communication Reference table number			→ TS	Modbus Slave Communication Specifications
801	Modbus slave communication Reference device memory setting				
802	Modbus slave communication Reference device memory setting				
803	Modbus slave communication Reference device memory setting				
804	Modbus slave communication Reference device memory setting				
805	Mo				
⋮	(Blank)				
810 - 813	Stores the IP address of the TS unit. When no IP address is set, "0.0.0.0" is stored.			← TS	-
814 - 817	IP address of another port				page 1-53
818	Network table number designation			→ TS	page 1-53
819					

$s	Description			Device Type	Refer to
820	V7 compatible	PLC2	Port No. 32　　Status	← TS	TS2060 Connection Manual TS1000 Smart Connection Manual
821		PLC2	Port No. 33　　Status		
822		PLC2	Port No. 34　　Status		
⋮		⋮			
885		PLC2	Port No. 97　　Status		
886		PLC2	Port No. 98　　Status		
887		PLC2	Port No. 99　　Status		
888					
889					
890	Japanese conversion function　Number of user-defined words			← TS	-
⋮	(Blank)				
900	Stores the touch switch status.			← TS	"3.1.6 Coordinate Output"
901	Touch switch X coordinate output Stores the X coordinate of the touch switch that is pressed.				
902	Touch switch Y coordinate output Stores the Y coordinate of the touch switch that is pressed.				
⋮	(Blank)				
956	Stores the current brightness adjustment value (0 to 127).			← TS	-
⋮	(Blank)				
965	File transfer communication timeout setting 　Set the monitoring timeout time when storage device of MONITOUCH is accessed from a 　client, such as V-Server, storage access DLL etc., in RUN mode. 　Set value is 0:　　　　　60 sec (default) 　Set value is other than 0:　Set value × 10 sec			→ TS	-
⋮	(Blank)				
990	Recipe　　GET_RECIPE_FILEINFO macro execution result			← TS	Macro Reference Manual
⋮	(Blank)				
1005	E-mail send　　　Number of e-mails waiting to be sent			← TS	TS Reference Manual 2 "4 Ethernet Comunication Function"
1006	E-mail send　　　Error information				
1007	EPSON STYLUS PHOTO series　　Hard copy 　0: Color 　1: Monochrome			→ TS	"16.2 Hard Copy"
1008	JPEG　　　Used to set accuracy of reduced JPEG images.				TS Reference Manual 2 "1 Image Display"
1009	Data sheet　　Consecutive printing (STA_LIST macro command) 　0: Prohibited 　1: Permitted			→ TS	-
1010	Data sheet　　Number of data sheets in print queue (STA_LIST macro command)_ 　Stores the number of data sheets in printing queue.(eight maximum) 　*　Enabled when $s1009 = 1. If the "STA_LIST" macro command is executed while eight data 　　sheets are already in the queue, a macro execution error occurs.			← TS	-
1011	Data sheet　　Cancel (STA_LIST macro command) 　Specifying "1" cancels the printing of data sheets in the queue. The value is automatically 　reset to "0" after cancellation. 　*　Enabled when $s1009 = 1.			→ TS ← TS	-
⋮	(Blank)				
1024	External storage device access result 　Stores the result of when a file on a storage device of MONITOUCH is accessed from a 　client, such as V-Server, storage access DLL etc., in RUN mode. 　0:　 Normal 　−1:　Error			← TS	-
1025	USB-FDD (drive: A) FDD error status			← TS	-
1026	USB FDD (drive: A) FDD free space (low-order) Unit: KB				
1027	USB-FDD (drive: A) FDD free space (high-order)				
1028	USB-FDD (drive: A) [Storage Removal] switch status				
⋮	(Blank)				

$s	Description	Device Type	Refer to
1030	Built-in socket (drive: C)　　　　Storage device error state	← TS	page 1-53
1031	Built-in socket (drive: C)　　　　Remaining space on storage device 　　Stores the amount of free space on the storage device. (Unit: kbyte)		-
1032			
1033	Built-in socket (drive: C)　　　　[Storage Removal] switch status 　　0:　　　　Switch OFF (removal prohibited) 　　Other than 0:　Switch ON (removal permitted)		-
1034			
1035	USB-A (drive: D)　　　　Storage device error state	← TS	page 1-53
1036	USB-A (drive: D)　　　　Remaining space on storage device 　　Stores the amount of free space on the storage device. (Unit: kbyte)		-
1037			
1038	USB-A (drive: D)　　　　[Storage Removal] switch status 　　0:　　　　Switch OFF (removal prohibited) 　　Other than 0:　Switch ON (removal permitted)		-
⋮	(Blank)		
1050	Background　　　Storage device access　Background processing flag	← TS	page 1-53
1051	Background　　　Storage device access　Background processing completion flag		page 1-53
1052	Background　　　Storage device access　Background processing error flag		page 1-53
1053			
1054			
1055			
1056	Macro execution result　　Arithmetic operation	← TS	Macro Reference Manual
1057	Macro execution result　　Conversion, transfer		
1058	Macro execution result　　Comparison		
1059	Macro execution result　　Macro operation control		
1060	Macro execution result　　Printer		
1061			
1062	Macro execution result　　Storage device		
1063	Macro execution result　　Others		
1064			
1065			
1066	PictBridge　　Status output	← TS	page 1-54
⋮	(Blank)		
1070	Stores FTP information.	← TS	TS Reference Manual 2 "4 Ethernet Comunication Function"
1071	FTP client　　Stores the number of FTP clients logged into the server (maximum of 3 clients).	← TS	
1072	FTP connection　　Forcibly disconnect the connection.	→ TS	
⋮	(Blank)		
1085	SRAM forced formatting	← TS	page 1-54
⋮	(Blank)		
1098	Sampling macro　　Background processing selection	→ TS	page 1-54
1099			
1100	Buffer No. 0　　Stores the number of sampling times set for the primary storage destination.	← TS	-
1101	Buffer No. 0　　Stores the current number of sampling times of the primary storage destination. (Set number of sampling times ($s1100) ≥ current number of sampling times ($s1101))		-
1102	Buffer No. 0　　Stores the number of sampling times set for the secondary storage target.		-
1103			
1104	Buffer No. 0　　Stores the current number of sampling times of the secondary storage destination. (Set number of sampling times ($s1102 and1103) ≥ current number of sampling times ($s1104 and 1105))		-
1105			
1106	Buffer No. 0　　Stores the number of sampling times executed.		-
1107			
1108	Buffer No. 0　　Secondary storage destination access status		page 1-54
1109	Buffer No. 0　　Background processing flag		page 1-54
1110	Buffer No. 0　　Sampling macro executing flag		page 1-54
1111	Buffer No. 0　　Sampling macro execution completion flag		page 1-54
1112	Buffer No. 0　　Sampling macro error flag		page 1-54

$s	Description	Device Type	Refer to
1113	Buffer No. 0 　　　Sampling error flag	← TS	page 1-54
1114	Buffer No. 0 　　　Sampling error forced storage flag	→ TS	page 1-54
⋮	(Blank)		
1120 - 1134	Buffer No. 1　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1140 - 1154	Buffer No. 2　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1160 - 1174	Buffer No. 3　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1180 - 1194	Buffer No. 4　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1200 - 1214	Buffer No. 5　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1220 - 1234	Buffer No. 6　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1240 - 1254	Buffer No. 7　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1260 - 1274	Buffer No. 8　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1280 - 1294	Buffer No. 9　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1300 - 1314	Buffer No. 10　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1320 - 1334	Buffer No. 11　(Equivalent to buffer No. 0 $s1100 to 1114)	→ TS ← TS	Refer to $s1100 - 1114
⋮	(Blank)		
1360	Security function　　　Stores the security level (0 to 15) of the currently logged-in user.	← TS	TS Reference Manual 2 "3 Security"
1361	Security function　　　Stores the user ID of the currently logged-in user.		
1362			
1363			
1364			
1365	Operation log viewer　 Stores the number of the log file being displayed.	← TS	TS Reference Manual 2 "2 Operation Log"
1366	Operation log viewer　 Stores the number of the log folder being displayed.		
⋮	(Blank)		
1380	Remote desktop　　　　Stores the start-up status. 　0: Hidden (disconnected) 　1: Shown (connected)	← TS	TS Reference Manual 2 "4 Ethernet Comunication Function"
1381	Remote desktop　　　　Stores the connection status._ 　0 or greater: Remote desktop table No. 　−1: Disconnected 　−2: Connection failure		
⋮	(Blank)		

$s	Description		Device Type	Refer to
1400	Network table 100 status		← TS	TS2060 Connection Manual TS1000 Smart Connection Manual
1401	Network table 101 status			
1402	Network table 102 status			
⋮	⋮			
1553	Network table 253 status			
1554	Network table 254 status			
1555	Network table 255 status			
⋮	(Blank)			
1560	Global overlap	Registration/display status_	← TS	page 1-55
1561	Global overlap Dot: 0 to 1023 Column: 0 to 127	Stores the X coordinate of the global overlap display position.		-
1562	Global overlap Dot: 0 to 768 Column: 0 to 37	Stores the Y coordinate of the global overlap display position.		-
1563	Global overlap Show: 0 to 9999 Hide: −1	Stores the global overlap library number.		-
⋮	(Blank)			
1674	VNC client status 0: Disconnected 1: Connected		← TSi	TS Reference Manual 2 "4 Ethernet Communication Function"
⋮	(Blank)			
1681	VNC access 0: Permitted Other than 0: Prohibited (forcible disconnection if client is connected)		→ TSi	TS Reference Manual 2 "4 Ethernet Communication Function"
2047				

Details

- $s2 - 13, $s1617 - 1640
  Stores the current overlap display status.

n + 0 (Display status)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Overlap registration *
0: None   1: Registered

Display status
0: Hidden   1: Shown
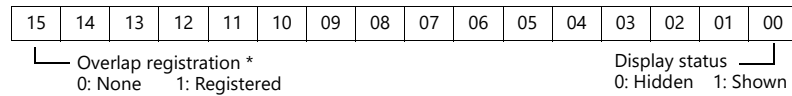
  * For multi-overlap display, this bit is set to "1" only during display.
    However, the bit remains set to "1" even during display hidden status when [Read PLC Device when OFF] is checked in the [Detail] settings of overlap library settings.

n + 1 (X coordinate)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

X coordinate display dot: 0 to 1023
Column/line: 0 to 127

n + 2 (Y coordinate)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Y coordinate display dot: 0 to 767
Column/line: 0 to 37

n + 3 (Multi-overlap number)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Multi-overlap number: 0 to 9999
For hiding multi-overlap display: −1
For normal overlap or call-overlap: −1
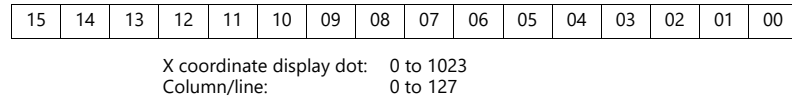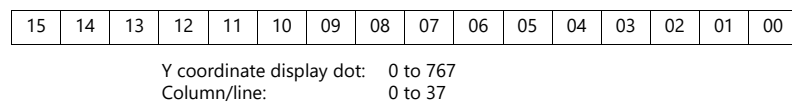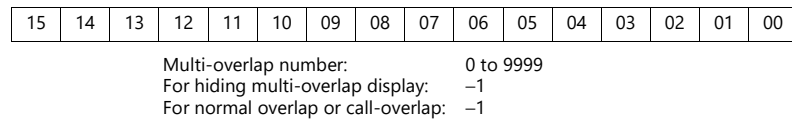
- $s16
  Stores the current printer status.

n + 0 (Printer status)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Printer status
0: READY   1: BUSY

0: Print standby
1: Printing
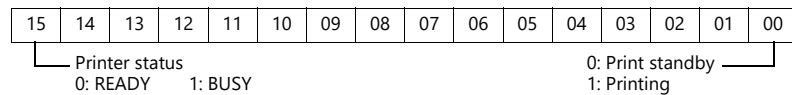
- $s17
  Stores the current backlight status. Whether the backlight is burnt out is stored.

n + 0 (Backlight status)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

0: Backlight burnt out   1: Backlight normal

0: OFF   1: ON
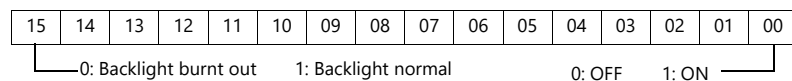
- $s20 to 55 (V7 compatible)
  Stores sampling buffer conditions.

Buffer No. 0 to 11	n + 0	[No. of Samples] specified in the [Buffering Area Setting] window
	n + 1	Number of sampling times in buffer (n + 0 ≥ n + 1)
	n + 2	Number of sampling times executed

- $s66
  Repeat the switch ON macro. Set a number other than "0" to $s66 using the ON macro.
  Example: Set the switch ON macro as shown below.
      $u100 = $u100 + 1
      $s66 = 1
      RET
  While the switch is held down, $u100 is continuously incremented.

  *1 Before executing the switch ON macro, the system clears addresses $s64 to 66 to "0".
      Set "1" to these addresses as necessary.
      When a macro is repeatedly commanded to repeatedly execute the function of switch, the macro will be prohibited if the function cannot be executed. (For example, when the switch function is [+ Block] and the block number has reached the maximum value.)

- $s75

This address is used to activate or deactivate the buzzer which sounds when the top overlap display among multiple overlap displays is switched over.

[0]: Buzzer ON
[1]: Buzzer OFF

- $s78

Stores the display format of data in the entry target.

Output Code	Entry Target	Display Format
−2	No entry mode	-
−1	No entry target	-
0		Decimal without sign
1		Decimal with sign (−)
2		Decimal with sign (+)
3	Numerical data display	Hexadecimal
4		Octal
5		Binary
6	Character display	-
7	Message display other than entry target	-
8	Numerical data display	Real number (floating decimal point)

- $s79

This setting is available when the entry mode is switched through the overlap activation (ON/OFF) or by multi-overlap number change on one screen.

*1 Do not set any value other than "0" or "1".

[0]: Selects the last entry target selected in the entry mode.
[1]: The entry target currently selected remains selected even after the mode is switched.

- $s99

Specify the rounding operation to use with the CVFD macro command.

Setting Value	Description	Operations
Other than 1 or 2	Rounding	When the fraction remainder is 0.5 or greater, it is rounded up; when it is less than 0.5, it is rounded down.
1	Rounding down	The fraction remainder is rounded down.
2	Rounding up	The fraction remainder is rounded up unless it is "0".

- $s104 and $s105

Specify the error handling performed when an error occurs during the reading/writing of data to the PLC using a macro command via communications.

Example:

When an indirect PLC device memory is set as the writing destination using the MOV command, a communication error will occur if the value in the indirect PLC device memory exceeds the range of the PLC device memory.

Use these addresses to avoid such a communication error.

- $s104:   [0]

When the write macro command is executed, the next command is started without waiting for the result of the macro write command.

If an error occurs during writing, error handling is performed.

The error handling to be performed depends on the setting for [Comm. Error Handling] ("Stop" or "Continue") under [Communication Setting] in the [Hardware Setting] window.

- $s104:   Other than [0]

When the write macro command is executed, the next command is started only after receipt of the result of the write operation. If an error occurs during writing, error handling is not performed and the result is stored in $s105. It will take a longer time compared to when "0" is set.

$s105: When $s104 ≠ 0, the result of the macro write error is stored.

[0]:   Normal
Other than [0]:   Error

- $s107

The information of whether or not data is registered in each page of the memo pad (maximum 8 pages) is stored.

$s107

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Page 0 — bit 00
Page 1 — bit 01
Page 2 — bit 02
Page 3 — bit 03
Page 4 — bit 04
Page 5 — bit 05
Page 6 — bit 06
Page 7 — bit 07

0: Data not registered
1: Data registered
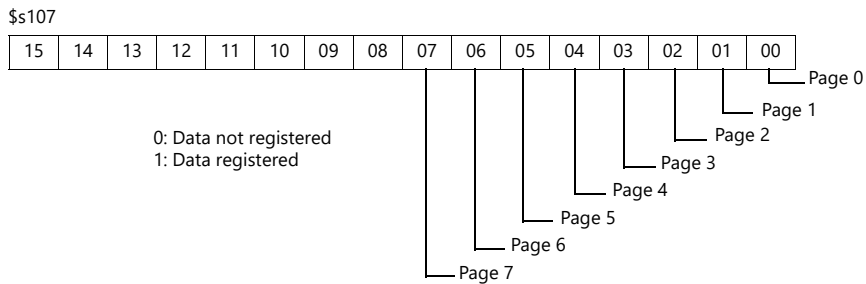
- $s128, 129, 114 to 127 (V7 compatible)

When the connection mode is [1 : n] and a timeout is detected in communication with PLC1, "1" is set at the related bit. After that, it is not possible to communicate with the PLC on the same screen.

When the screen display changes, all bits in these device memory are cleared to "0" to enable communication with the PLC set to the screen program.

$s128

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Port No. 15 — bit 15   Port No. 00 — bit 00

$s129

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Port No. 31 — bit 15   Port No. 16 — bit 00

$s114

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Port No. 47 — bit 15   Port No. 32 — bit 00

↓

$s127

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Port No. 255 — bit 15   Port No. 240 — bit 00
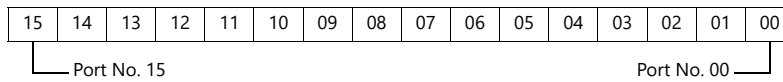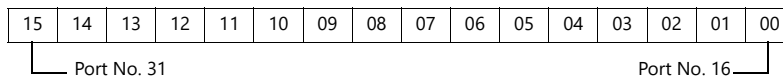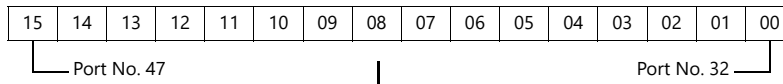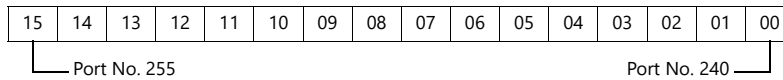
- $s160 - 166

Stores the calendar data that is read from the PLC or is currently displayed on MONITOUCH at the start of communication.

- $s177

Stores the buffer number for which the SET_BUFNO macro command was executed. When the power is turned on, the lowest buffer number in the [Buffering Area Setting] window is stored.

- $s178, 179

When the total value overflows after the execution of the SET_BUFNO macro command, the bits corresponding to sample word numbers 0 to 31 are set to "1".

Sample buffer word numbers 32 to 128 are not available.

$s178

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Word 15 — bit 15   Word 00 — bit 00

$s179

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Word 31 — bit 15   Word 16 — bit 00
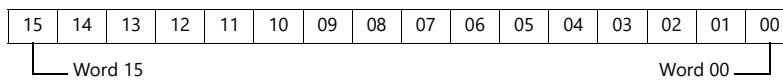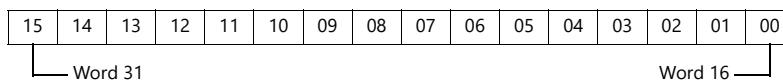
- $s180 - 435

  Stores the result of the SET_BUFNO macro command execution.

- $s468 - 485

  Reads or writes memory card information (card number, card name, filename) to device memory "n". Use the MOV macro command.

  Read: [n = $s468 (to 485)] is executed and device memory "n" is monitored.

  Write: [$s468 (to 485) = n] is executed and data in device memory "n" (to "n + 16") is written into the memory card.

  *   Data of $s468 to 485 is always "0".

  Example:

  1) $u100 = $s468

     The memory card number (1 word) is written into $u100.

  2) $u101 = $s469

     The memory card name (32 characters) is written into $u101 to $u116.

     (Even if the memory card name is less than 32 characters, 32 characters worth will be written.)

  3) $u117 = $s470

     The memory card filename (32 characters) is written into $u117 to $u132.

     (Even if the filename is less than 32 characters, 32 characters worth will be written.)

- $s497

  Outputs the result of accessing the storage device.

4	Card not mounted
6	Card size too small
7	Different card type
9	JPEG/BMP file read error
12	Card write error
15	Disk error (open failure)
16	Card read error

- $s514, 515

  These devices are relevant to the EREAD, EWRITE, SEND, and MES macro commands.

  - $s514: Macro wait request

    In the case of successive accesses to the same port on a single macro sheet, always specify a value other than "0" (with wait). If "0" (no wait) is specified, macro commands issued afterward will not be accepted.

    [0]: No wait
    During the execution of a macro command, the execution of the next macro command takes place before the completion of the current command.
    [Other than 0]: With wait_
    During the execution of a macro command, the next macro command is put on hold and is executed after the completion of the current command.

  - $s515: Storage of the macro execution result

    When $s514 is "0", the macro command request is stored (response not included). When a value other than "0" is set, the response returned to the command request is stored.

Code	Description	Solution
0	Normal	-
200 to 2000	Communication error	For details, refer to $s518 in the TS2060 Connection Manual 1 or the TS1000 Smart Connection Manual 1.
−30	Timeout	Check whether an error has occurred on the destination TS unit.
−31	Number of words for sending exceeded	Use the macro editor to check the number of words for sending.
−32	The specified table is not used.	Check the network table settings.
−33	The send command cannot be used.	Use the macro editor to check the macro command.
−34	The specified table is in use.	Check whether system device memory address $s514 is set. If not setting $s514, reduce the number of communications.
−35	Processing impossible due to insufficient memory	Check the memory availability of the counterpart device.
−36	Incorrect number of receive packet bytes	Check the number of request words.
−37	Local station memory access error	Check the request memory settings.
−38	Macro setting error	Check the macro settings.
−39	Cannot process command on the destination TS unit (local mode, communication error)	Restore the destination TS unit to RUN mode and execute the macro command again.

- $s814 - 818
  Stores the IP address of the network table number corresponding to the value* set for $s818. If no network table exists, "0.0.0.0" is stored.
  *1   Use the MOV (W) macro command to set the network table number.

- $s1030
  Outputs the result of access to the storage device at the built-in socket (drive: C).

4	Card not mounted
6	Card size too small
7	Different card type
9	JPEG/BMP file read error
12	Card write error
15	Disk error (open failure)
16	Card read error

- $s1035
  Outputs the result of access to the storage device at USB-A (drive: D). Same details as $s1030.

- $s1050
  Outputs the status of the operation related to the storage device.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Operation log
  0: Not processed
  1: In processing

Sampling data
backup/CSV output
  0: Not processed
  1: In processing

Hard copy macro
  0: Not processed
  1: In processing
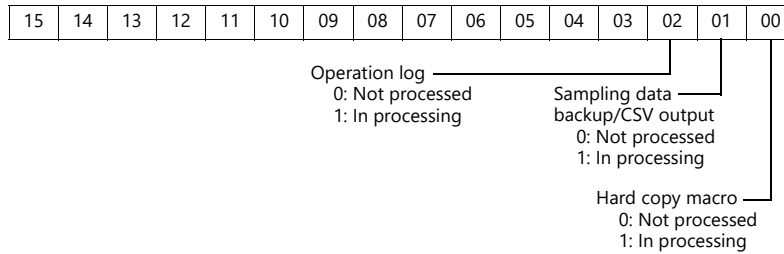
- $s1051
  Outputs the status of the completed operation related to the storage device.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Operation log
  0: Not completed
  1: Completed

Sampling data
backup/CSV output
  0: Not completed
  1: Completed

Hard copy macro
  0: Not completed
  1: Completed
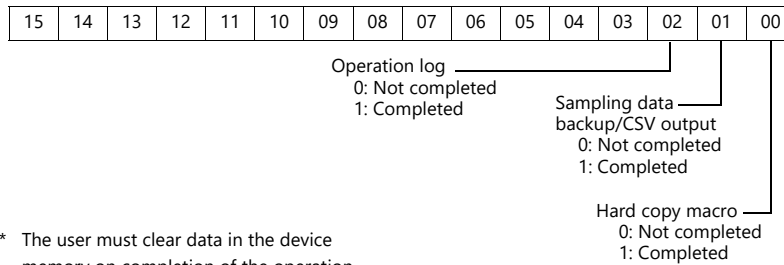
  *   The user must clear data in the device
      memory on completion of the operation.

- $s1052
  If an error occurs on completion of processing related to the storage device, the result is output.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Operation log
  0: Normal
  1: Error

Sampling data
backup/CSV output
  0: Normal
  1: Error

Hard copy macro
  0: Normal
  1: Error
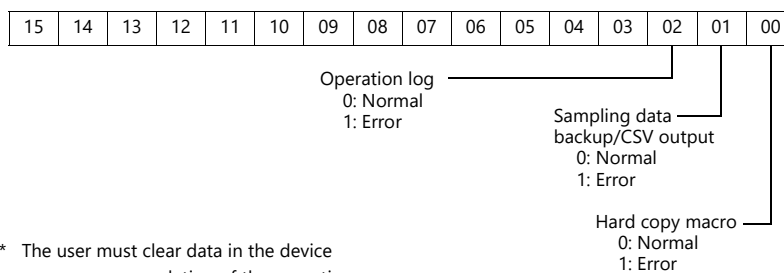
  *   The user must clear data in the device
      memory on completion of the operation.

- $s1066
  Outputs the status of printing performed on the PictBridge printer.

Value	Description	Cause and Remedy
0	The PictBridge printer is not connected or it is in the normal state.	-
1	Printing in progress using the PictBridge printer.	-
−1	Printer error (hardware related)	The cable is not connected. Check the USB cable connection.
		Check if the printer is out of order.
−2	Printer error (paper related)	The printer ran out of paper. Add paper.
		The type of paper is not correct. Set the correct type of paper.
−3	Printer error (related to ink) *	The ink is not installed. Install an ink cartridge.
		The ink level is low. Install a new ink cartridge.

- $s1085
  Stores information regarding forced formatting of the SRAM area.
  This is available when the [Format the SRAM forcefully] checkbox is selected in the [General Settings] window.
      [0]: Forced formatting not executed.
      [1]: Forced formatting executed (cleared to "0" when the mode changes from RUN to STOP).

- $s1098
  Other than [0]:
  Executes background processing of the "SMPL_BAK", "SMPL_CSV", and "SMPL_CSV_BAK" macro commands. However, if background processing is being executed to the buffer that has been specified, the next processing is started on completion of the current macro processing.

- $s1108
  The media status at the secondary storage destination, sampling formatting condition, etc. are comprehensively judged and the valid/invalid state of the secondary storage destination is output.
      [0]: Writing or browsing the secondary storage destination is not possible.
      [1]: Writing or browsing the secondary storage destination is possible.

- $s1109
  Outputs the status of creating a backup file or CSV output.
      Other than [0]: Backup file being created or CSV file outputted

- $s1110
  Outputs the status of sampling macro commands when $s1098 is set to other than "0".
      Other than [0]: Execution of the "SMPL_BAK", "SMPL_CSV", or "SMPL_CSV_BAK" macro command is in progress.

- $s1111
  Outputs the status of sampling macro commands.
      Other than [0]: Execution of the "SMPL_BAK", "SMPL_CSV", or "SMPL_CSV_BAK" macro command is complete.
    *1   This is cleared when $s1110 (executing flag) is set to ON.

- $s1112
  Outputs the status of sampling macro commands.
      Other than [0]: Execution error of the "SMPL_BAK", "SMPL_CSV", or "SMPL_CSV_BAK" macro command
    *1   This is cleared when $s1110 (executing flag) is set to ON.

- $s1113
  Outputs the sampling status.
      Other than [0]: A communication error occurred during sampling.
    *1   This is cleared when sampling is performed normally. Sampling information of device memory map (V8 specifications) is not output.

- $s1114
  Outputs the sampling status.
      Other than [0]: If a communication error occurs during sampling, sampling will continue by resetting the data to "0" in the device memory where the error occurred.
    *1 Sampling of device memory map (V8 specifications) is performed regardless of the setting of this flag, with the data regarded as "0" in the device memory where an error occurred.

- $s1560
  Stores the global overlap display status.

n + 0 (Display status)

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Overlap registration *
0: None   1: Registered

Display status
0: Hidden   1: Shown
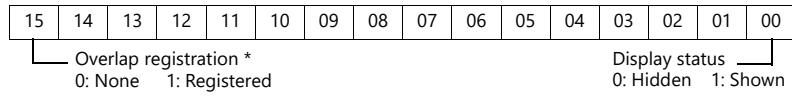
* This bit is set to "1" only during display.
However, the bit remains set to "1" even the display hidden status when [Read PLC Device when OFF]
is checked in the [Detail] settings of overlap library settings.

2 Overlap

2.1   Overview

2.1.1   Overlap Displays

Windows can be displayed on the screen. These overlaying windows are called "overlap" displays.
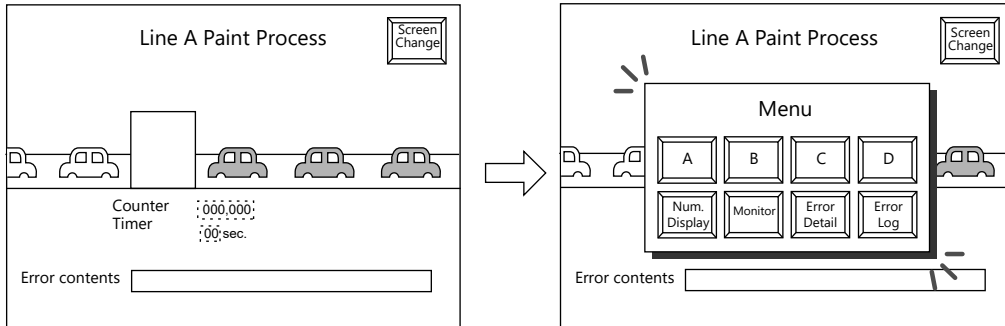
Each screen has an overlap display area ID from 0 to 2, and 3 overlaps can be displayed at once.

   *   Overlap ID: An ID that identifies an overlap display on the screen.
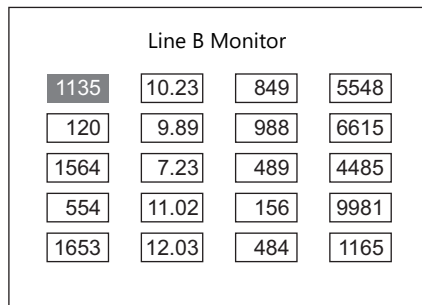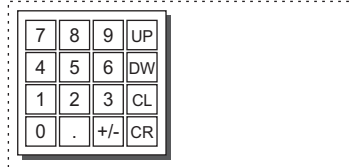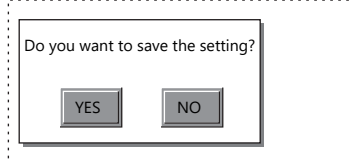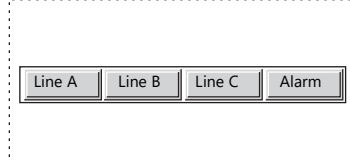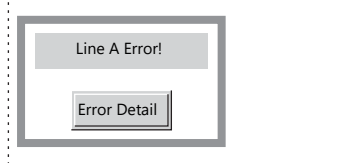
By using a global overlap, a maximum of four overlap displays can be shown on the base screen at one time. For details on global overlap display, refer to page 2-26.

When several overlap displays are shown at the same time, it is possible to move an overlap display that is partly behind another to the foreground by touching the screen.
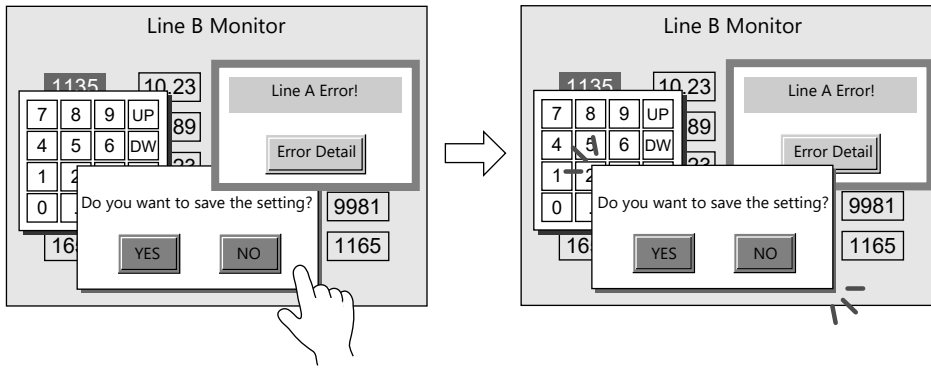
* However, when a value other than "0" is entered for system device memory $s77, only the switches (including system buttons) on the overlap display in the foreground are available (exclusive function).

Only the switches on this overlap display are available.
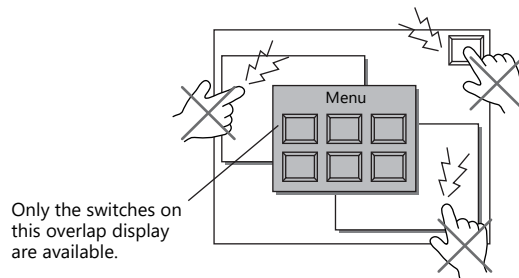
☞   "1.3 List of Internal Device Memory"

2.1.2 Overlap Display Formats

Overlap displays comprise the following four formats.

Overlap	Refer to
Normal overlap	page 2-3, page 2-8
Call-overlap	page 2-4, page 2-15
Multi-overlap	page 2-5, page 2-18
Global overlap	page 2-6, page 2-26

Normal Overlap

This overlap display format is unique to each screen.
An overlap display created for screen 1 cannot be displayed on other screens.
A normal overlap display can be shown or hidden using a switch or command from the PLC.

Directly place a "normal overlap" display on overlap ID 0 of screen 1.
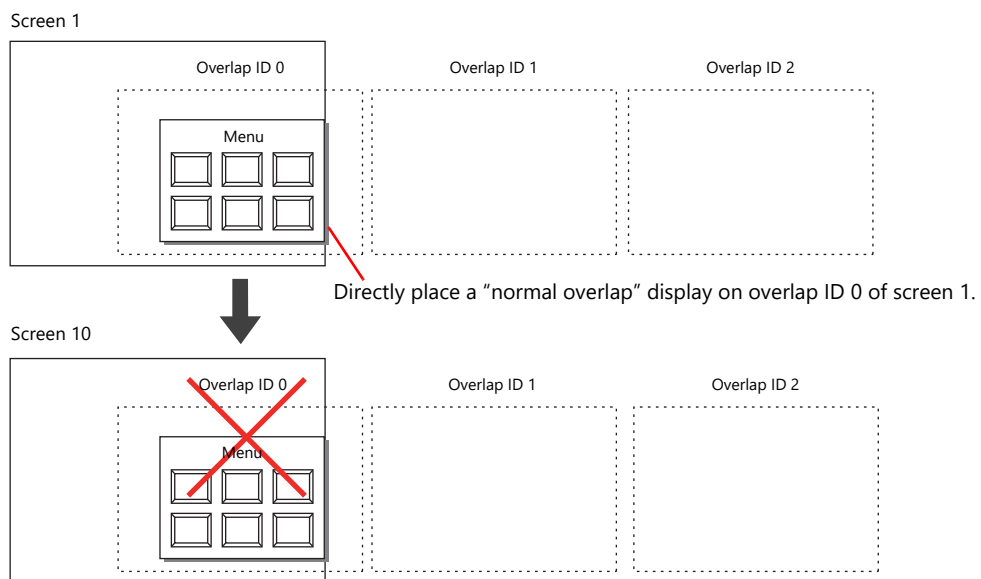
Call-overlap

This overlap display format calls and displays overlaps registered to the overlap library.
Because overlap displays are called from the library, they can be shared between multiple screens.
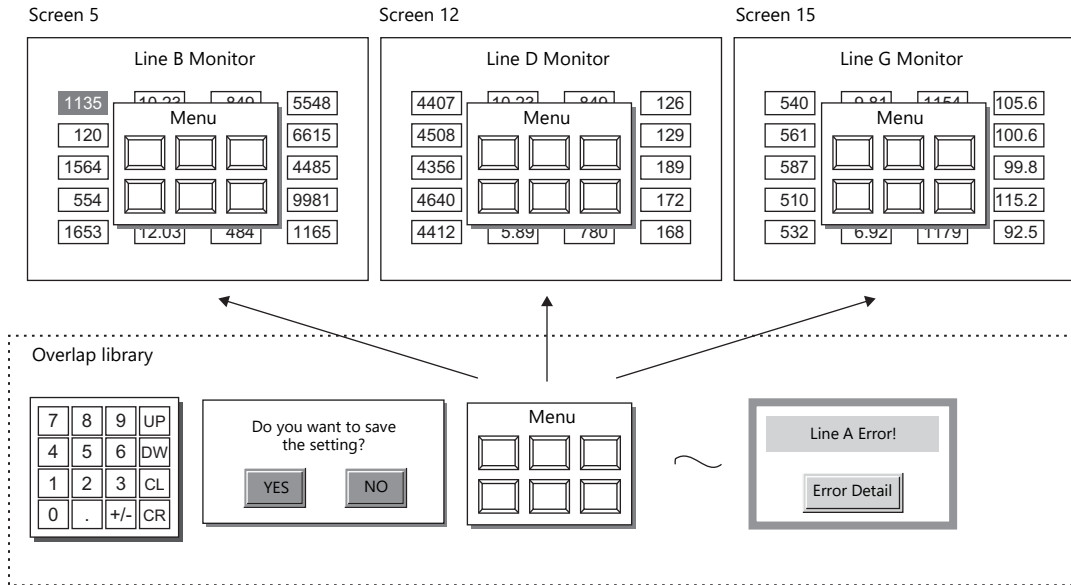
An overlap library number is set with respect to the overlap IDs from 0 to 2 on each screen.
A maximum of three overlaps can be displayed at once. A call-overlap display can be shown or hidden using a switch or command from the PLC.
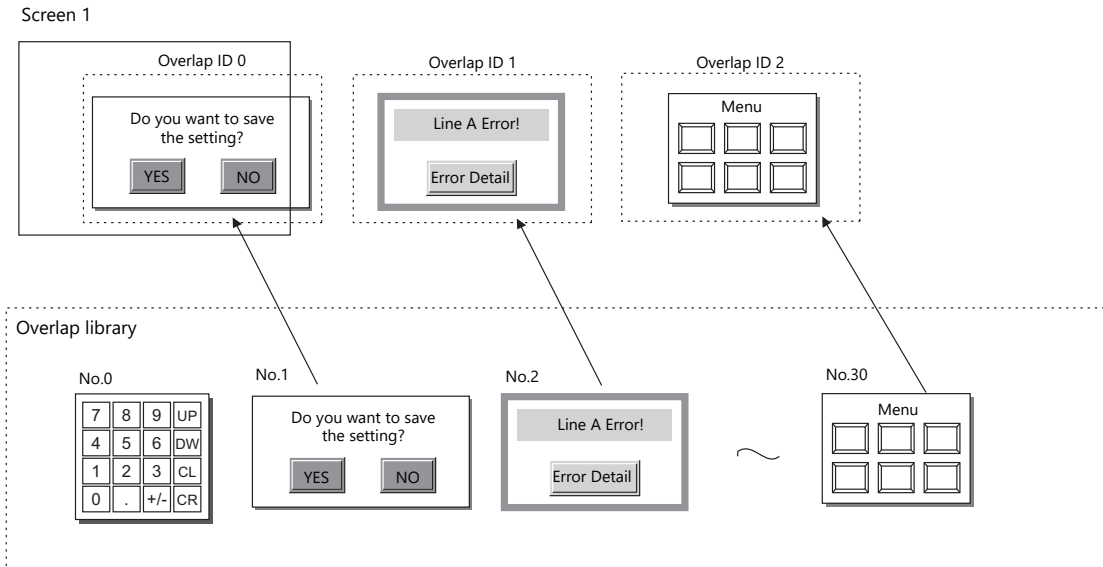
Multi-overlap

This overlap display format calls and displays overlaps registered to the overlap library.
Because overlap displays are called from the library, they can be shared between multiple screens.
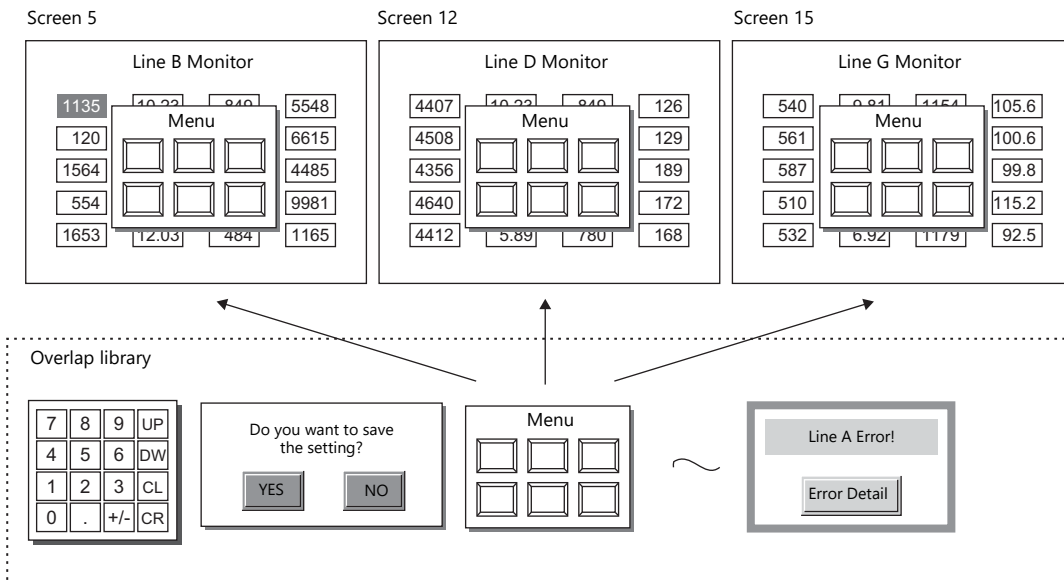
An overlap library number that can be switched between 0 and 9999 can be set with respect to a single overlap ID.

A maximum of 3 overlaps can be displayed at once and 4000 types of overlaps can be selected by switching the overlap library number. A multi-overlap display can be shown or hidden using a switch or command from the PLC.
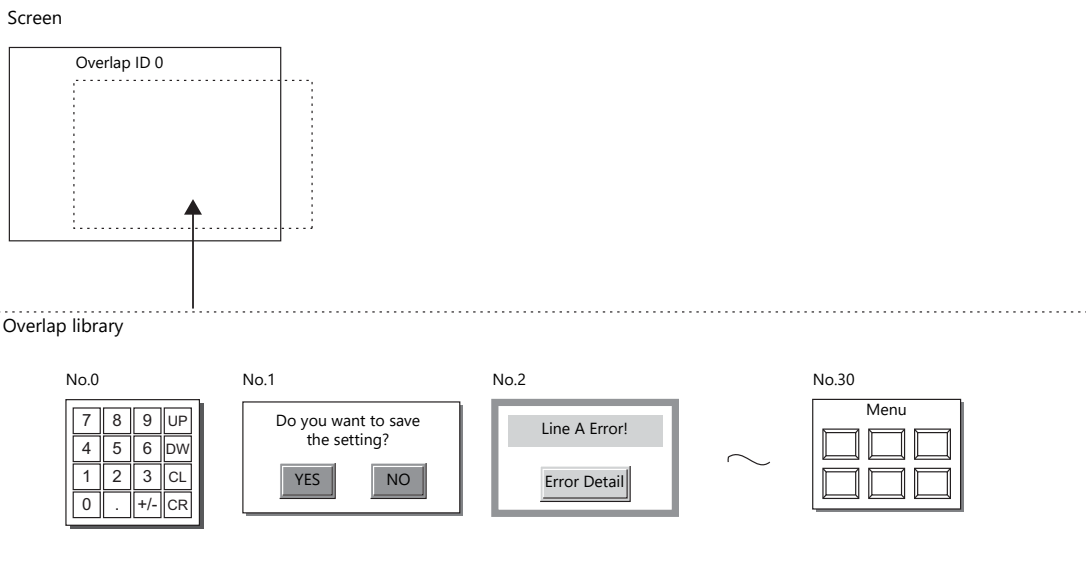
Global Overlap

This overlap display format calls and displays overlaps registered to the overlap library.

Because overlap displays are called from the library, they can be shared between multiple screens.

Any overlap library number from 0 to 9999 can be set with respect to overlap ID 3. A maximum of 4000 types of overlaps can be selected and displayed. A global overlap display can be shown or hidden using a switch or command from the PLC.
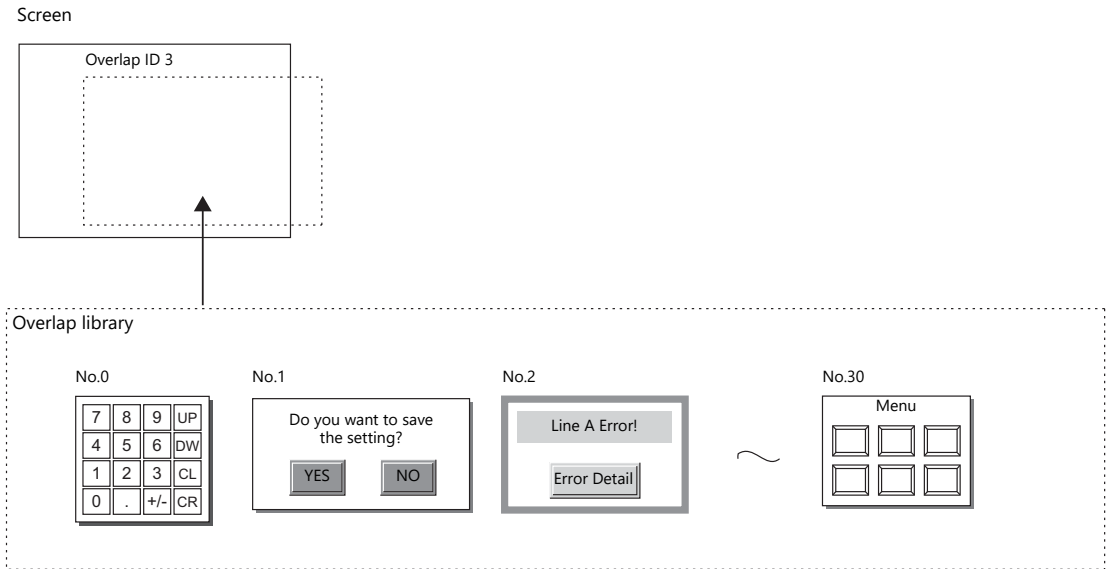
The same overlap display is shown even if the screen changes to another screen.

Because this overlap format is not affected by screen changes, it is well suited to high-urgency alarm displays.
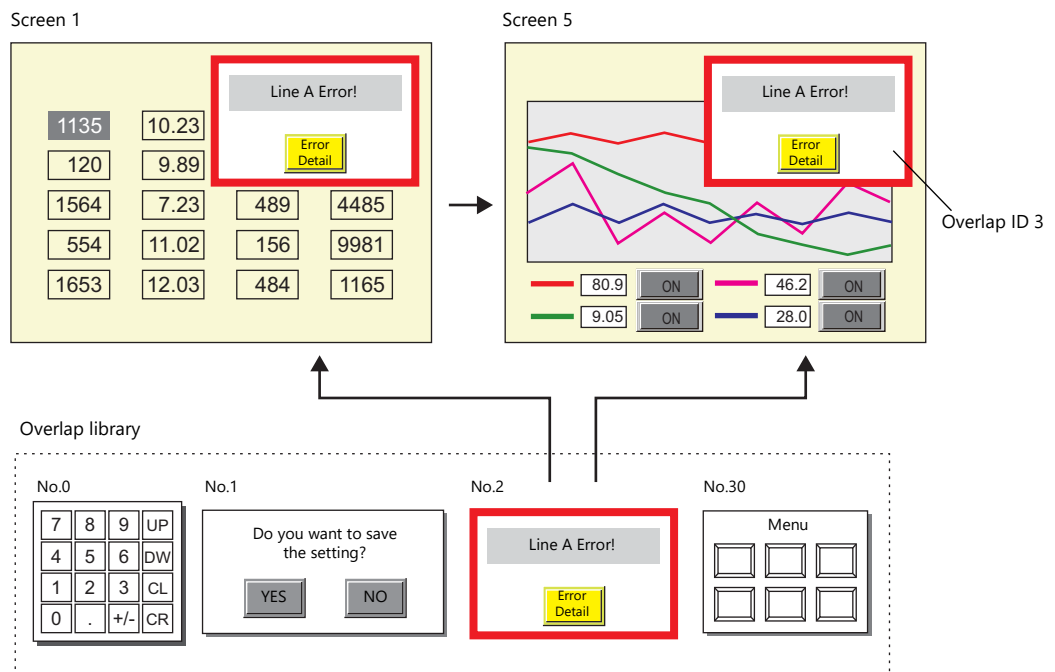
2.1.3 Overlap Auxiliary Functions

System Buttons

The system button overlap auxiliary function operates in the following two ways.

Overlap Movement

Touch the top left corner (2 x 2 switch grid) of the overlap display to make the overlap frame blink.
With the overlap frame blinking, touch a position on the screen once to move the overlap display to that position. (The frame stops blinking after the overlap display is moved.)

Touch somewhere outside the overlap display on the screen while the frame is blinking.

The overlap display is moved with its top left corner aligned to the touched position and the frame stops blinking.
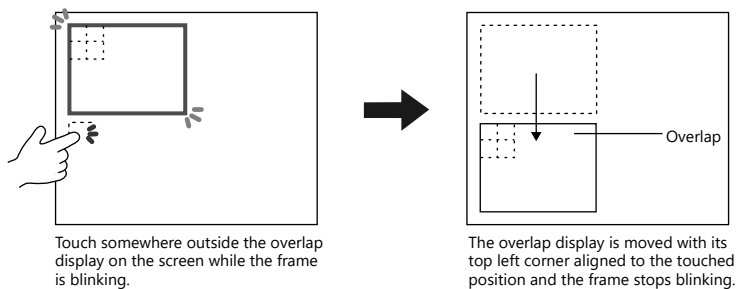
If the overlap display will protrude off-screen at the new position, the protrusion is automatically adjusted so that the entire overlap display is shown on-screen.
To stop the overlap frame blinking (and cancel the movable state), touch the top left corner of the overlap display again.

Hiding the Overlap Display

Double-touch (touch the screen twice within one second) the top left corner (2 x 2 switch grid) to hide the overlap display.

Touch within the 2 x 2 switch grid twice.

The overlap display disappears from the screen.

Blip! Blip!
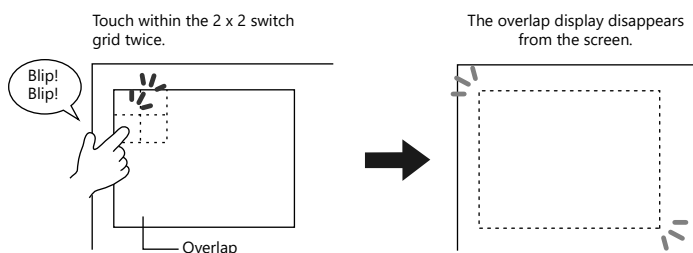
Overlap

Setting system buttons

The system button can be set in the [Detail] setting of the setting window for each overlap.

☞ "Detail" page 2-10

2.2   Normal Overlap

### 2.2.1 Creation Procedure

Use the following procedure to create a normal overlap.

1. Click [Parts] → [Overlap] → [Normal Overlap] and place an overlap.
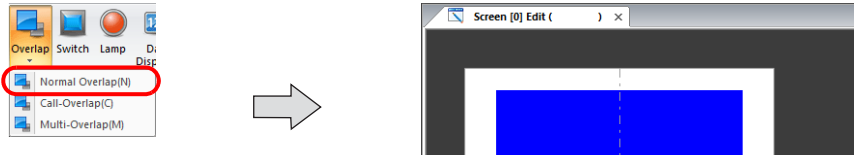
2. Adjust the size of the overlap.
3. Select [Overlap Editing] → [ID 0] on the right-click menu. The overlap editing window is displayed.
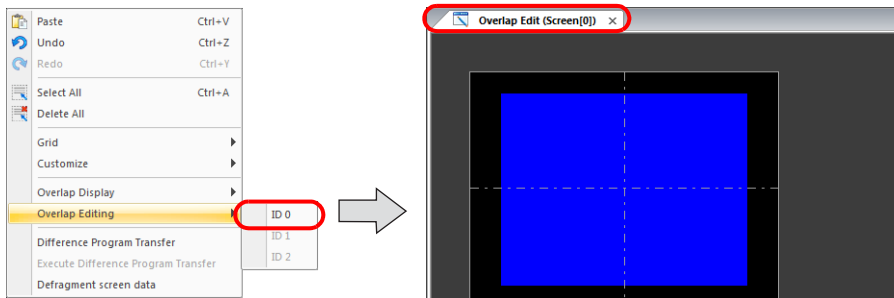
4. Place switches, lamps, and other items on the overlap.
5. Select [Overlap Editing] → [ID 0] on the right-click menu. The user is returned to the screen editing window.
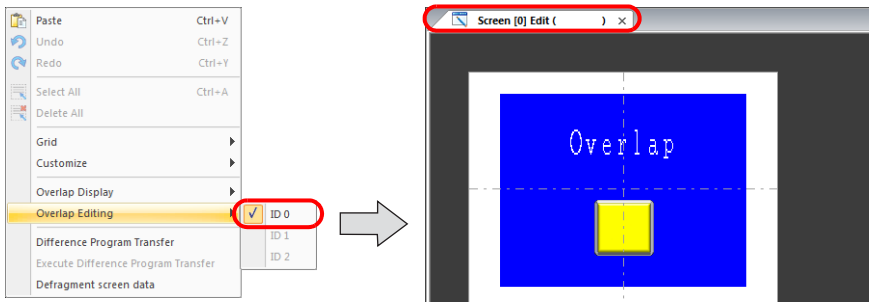
6. If performing showing/hiding with a switch, place a switch. page 2-11
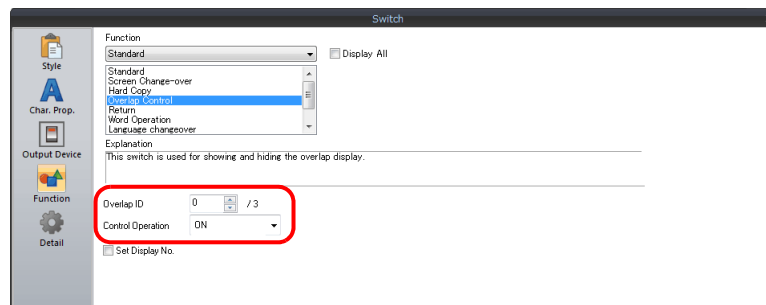
7. If performing showing/hiding with commands from a PLC, configure the [Control Device] settings. page 2-13
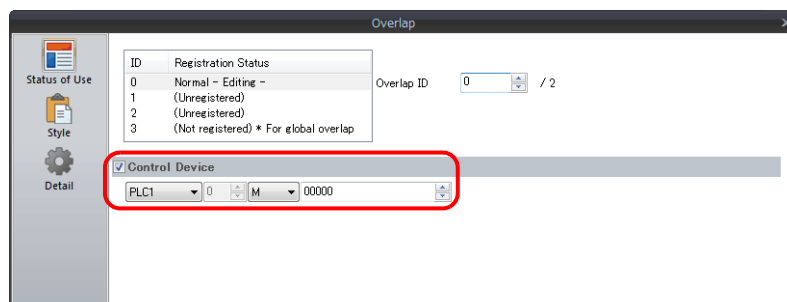
2.2.2 Detailed Settings

Status of Use

Item	Description
Registration Status	Check the registration status of overlap IDs 0 to 3. "- Editing -" is shown for the ID that is currently being edited. The overlap ID can also be changed to an unregistered ID.

Control Device	Selected
	   Specify a device using one bit. Showing and hiding is performed according to the value of the bit.
	   0 → 1 (edge): Show
	   1 → 0 (edge): Hide
	
	Unselected
	   Bits 0 to 2 of read area "n + 1" are used.
	
	   * Select the [Display Overlap during bit ON] checkbox at [System Setting] → [Unit Setting] → [General
	       Setting] to allow level operation. Refer to page 2-13.

Style
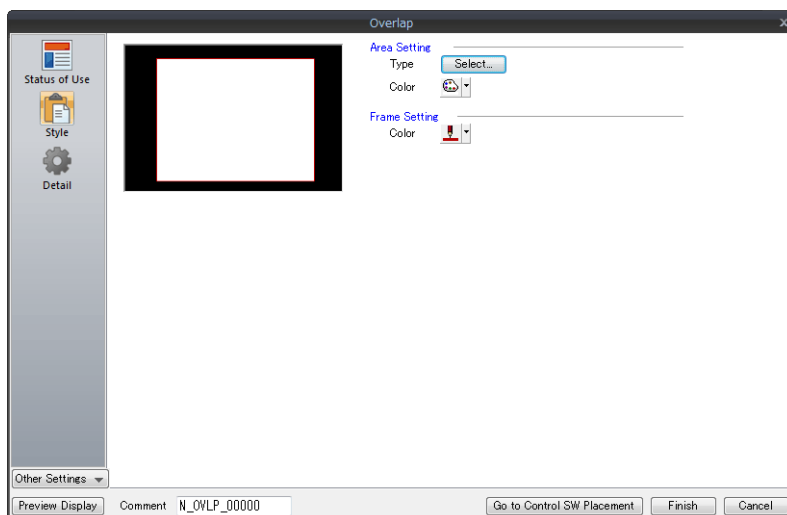
Item	Description
Area Setting Frame	Set the design and color of the area.

Detail
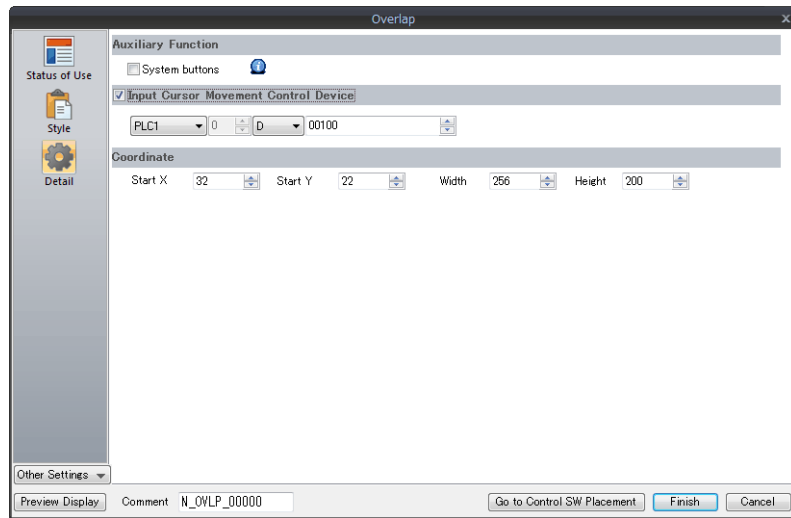
Item		Description
Auxiliary Function	System buttons	Select this checkbox to use system buttons. Refer to page 2-7.
Input Cursor Movement Control Device		This setting is required to use the "entry function" on an overlap display. For details, refer to page 6-34.
Coordinate	Start X/Start Y	Set the display position of the overlap using X and Y coordinates.
	Width/Height	Set the size of the overlap.

2.2.3 Show/Hide Settings

There are four methods for showing and hiding normal overlap displays.

Method		Error Detail	Refer to
Internal command	Switch	Function: Overlap Control Set Display No.: Unselected	page 2-11
	Macro	OVLP_SHOW OVLP_POS	page 2-12
External Command	Control device memory	0 → 1: Show 1 → 0: Hide	page 2-13

	Read area "n + 1"	Bits 0 to 2
		  0 → 1 (edge): Show
		  1 → 0 (edge): Hide
			page 2-14

Switch

Setting

1. Display the settings menu of the normal overlap display.
2. Click [Go to Control SW Placement] and place a switch.
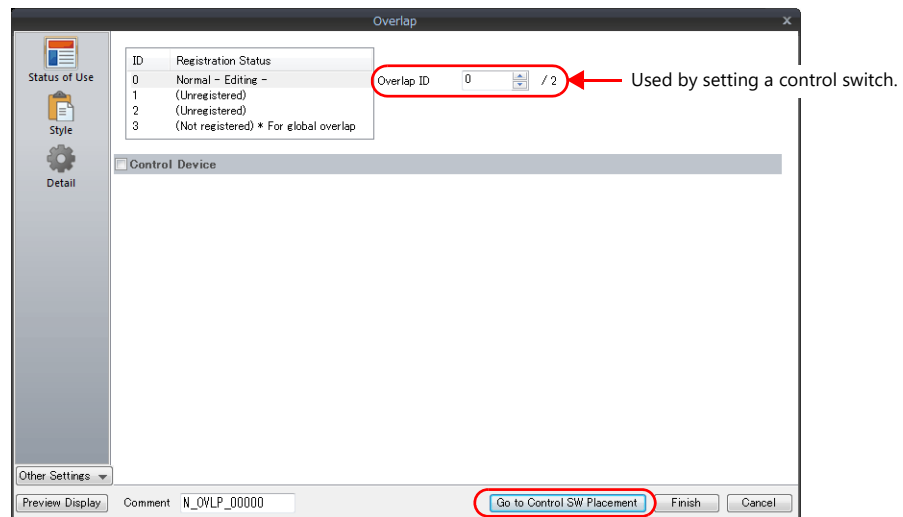
3. Set the function of the switch.
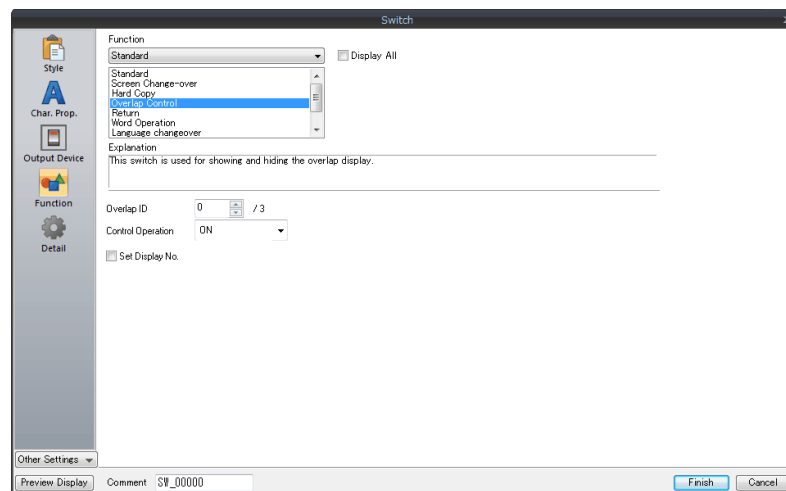
Function	Overlap Control
Overlap ID	Specify the same ID as the [Overlap ID] of the normal overlap.
Control Operation	ON: Show OFF: Hide ALT: Alternate between show and hide ICON: Show
Set Display No.	Unselected

Macro

A macro can be used to show and hide normal overlap displays. In this case, use the "OVLP_SHOW" command.
The "OVLP_POS" command is used to specify the display position. For details, refer to the Macro Reference Manual.

Setting

1. Creating a macro for showing an overlap display

    1) Display the [Macro Block No. Editor] window.
    2) Register the following macro.

$u100 = 2 (W)	Set an overlap ID from 0 to 2 (ID2 in this example).
$u101 = 1 (W)	Overlap display
SYS (OVLP_SHOW) $u100	Execute the command.

    3) Execute the macro block in a switch ON macro or global macro.

2. Creating a macro for hiding an overlap display

    1) Display the [Macro Block No. Editor] window.
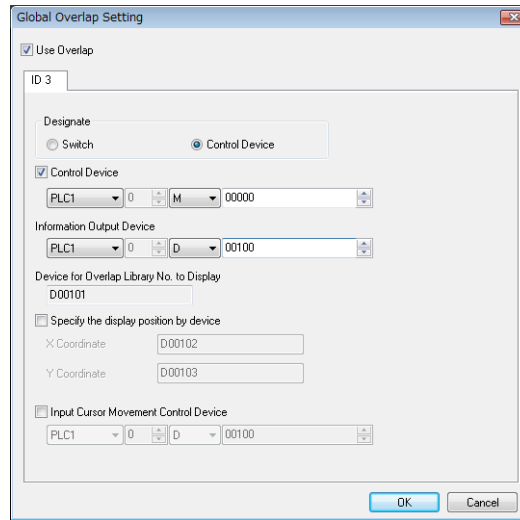   2) Register the following macro.

$u100 = 2 (W)	Set an overlap ID from 0 to 2 (ID2 in this example).
$u101 = 0 (W)	Hide the overlap display
SYS (OVLP_SHOW) $u100	Execute the command.

    3) Execute the macro block in a switch ON macro or global macro.

Control Device Memory

Setting

1. In the normal overlap settings menu, click [Status of Use] and configure the [Control Device] settings.
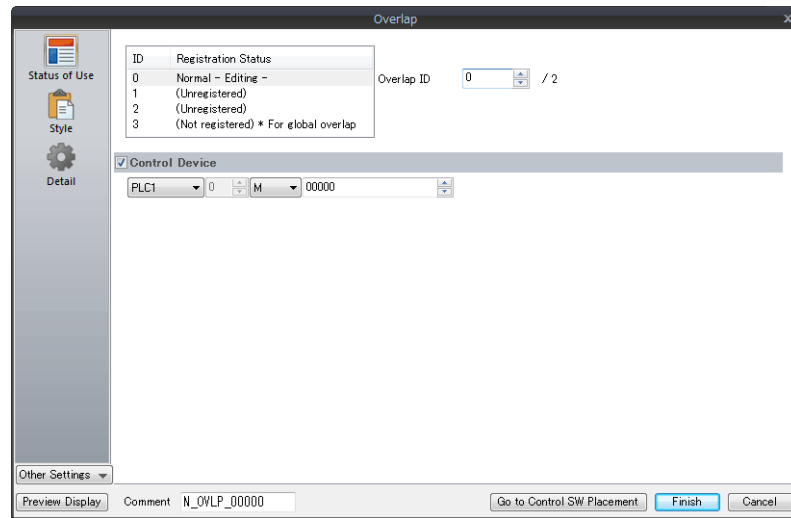
2. The overlap is shown when the [Control Device] bit is ON and hidden when the bit is OFF.
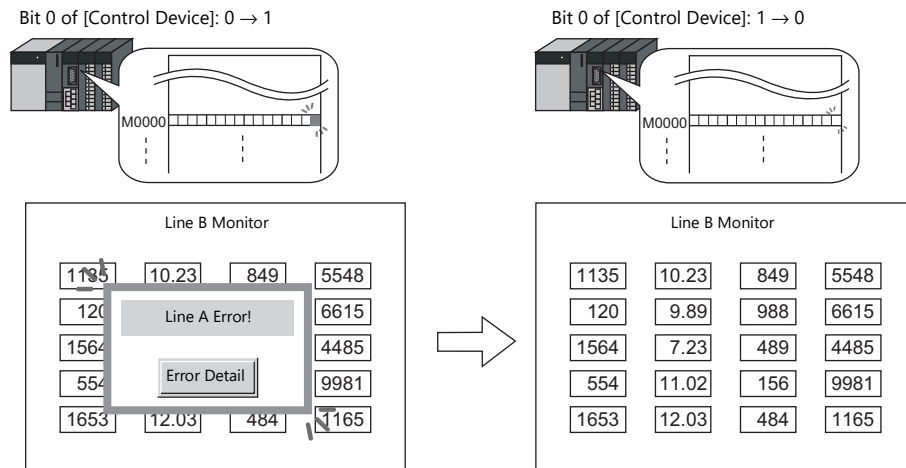
*   * Recognition of bit status
    The method used for bit recognition differs depending on the setting of [Display Overlap during bit ON] on the [General Settings] tab accessible by clicking [System Setting] → [Unit Setting] → [General Setting].
    *   Unselected:
        The change (edge) from 0 to 1 or 1 to 0 is used to recognize bit status.
    *   Selected:
        Level recognition is used to determine the bit status.
        Suppose that an overlap display was shown on the screen using an external command, the screen was switched to another screen, and then the first screen is displayed again. In this case, the overlap display that corresponds to the bit being turned ON appears on the screen.
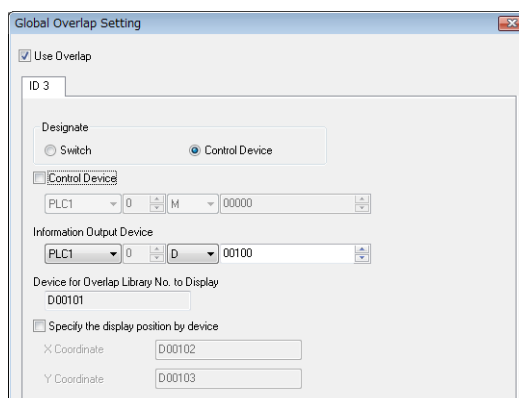*   * Notes on showing an overlap display using an external command
    A switch for which [Function] is set to [Overlap Control] with [Control Operation: OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

Read area "n + 1"

The read area "n + 1" (screen status command) of [System Setting] → [Hardware Setting] → [Read/Write Area] is used.
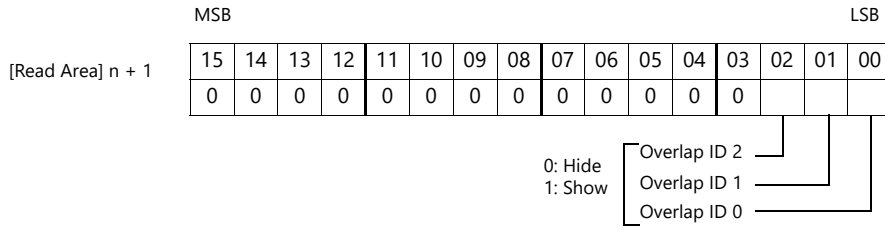
Overlaps are shown when the respective bit of read area "n + 1" is ON and hidden when the bit is OFF.

E.g.: Read area "D0"
       Overlap ID 0
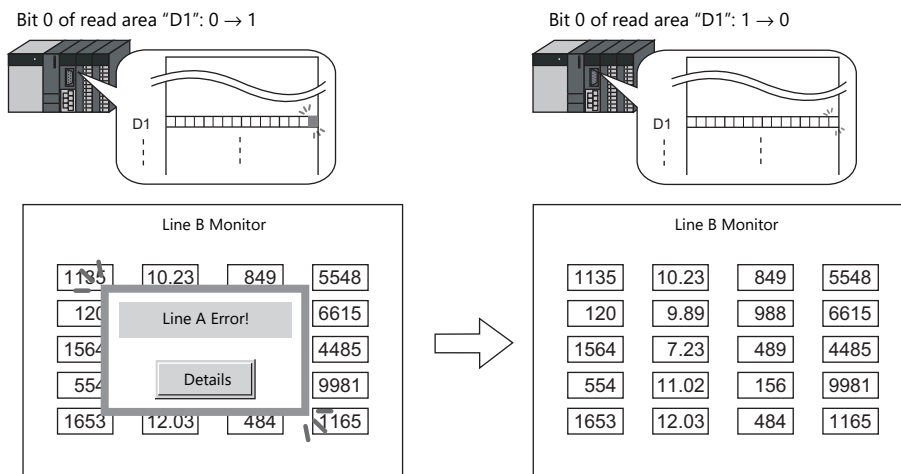
*   Recognition of bit status
    The method used for bit recognition differs depending on the setting of [Display Overlap during bit ON] on the [General Settings] tab accessible by clicking [System Setting] → [Unit Setting] → [General Setting].

    • Unselected
      The change (edge) from 0 to 1 or 1 to 0 is used to recognize the bit status.

    • Selected
      Level recognition is used to determine the bit status.
      Suppose that an overlap display was shown on the screen using an external command, the screen was switched to another screen, and then the first screen is displayed again. In this case, the overlap display that corresponds to the bit that is ON appears on the screen.

*   Notes on showing an overlap display using an external command
    A switch for which [Function] is set to [Overlap Control] with [Control Operation: OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

2.3 Call-overlap

2.3.1 Creation Procedure

1. Creating from an Overlap Library

    1) Display an [Overlap Library Edit] tab window by clicking [Home] → [Registration Item] → [Overlap Library].
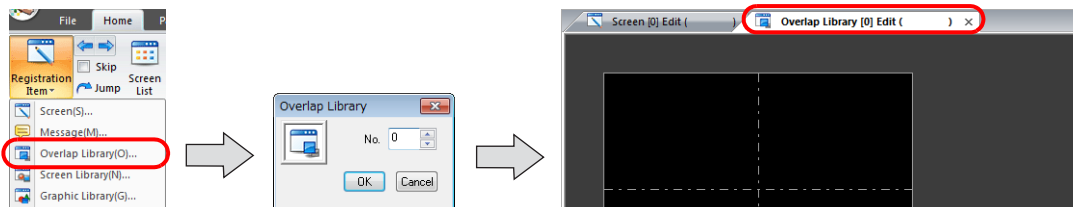
    2) Click [Parts] or [Home] → [Overlap] → [Normal Overlap] and place an overlap.
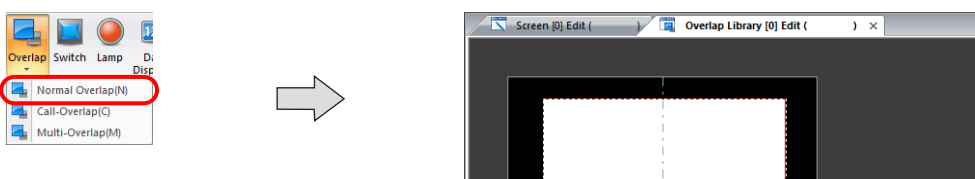
    3) Adjust the size of the overlap.

    4) Select [Overlap Editing] → [ID 0] on the right-click menu. The overlap editing window is displayed.
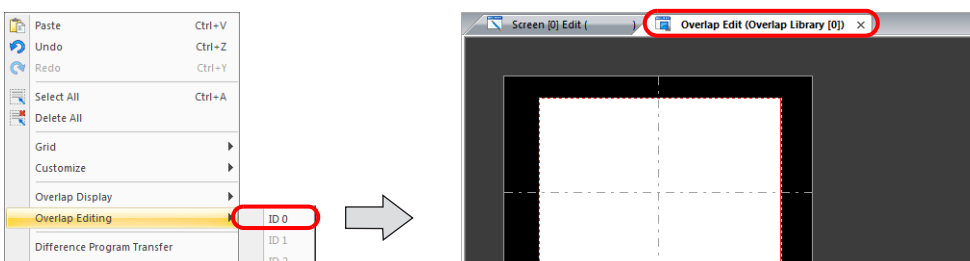
    5) Place switches, lamps, and other items on the overlap.

    6) Select [Overlap Editing] → [ID 0] on the right-click menu. The user is returned to the screen editing window.

2. Placing Call-Overlaps

    1) In the screen editing window, click [Parts] → [Overlap] → [Call-Overlap] and place an overlap.

    2) Click the icon and display the settings menu.

    3) Configure the [Operation Select] settings.

Overlap Setting	Call
Overlap Screen Setting	Set the overlap library number.
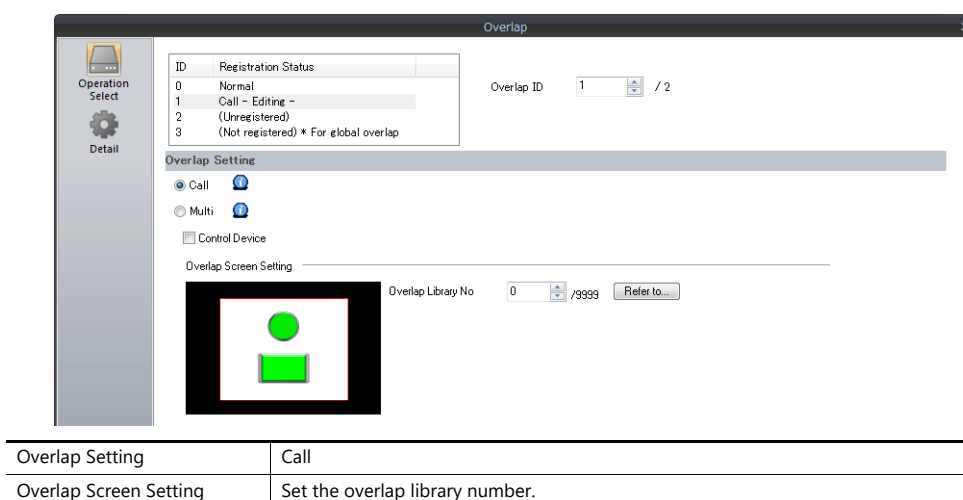
3. If performing showing/hiding with a switch, place a switch. page 2-17
4. If performing showing/hiding with commands from a PLC, configure the [Control Device] settings. page 2-16

2.3.2 Detailed Settings
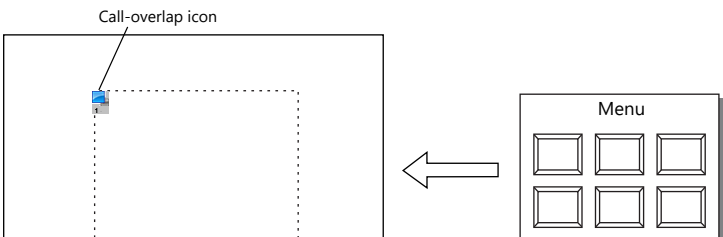
Operation Select

Item	Description
Registration Status	Check the registration status of overlap IDs 0 to 3. "- Editing -" is shown for the ID that is currently being edited. The overlap ID can also be changed to an unregistered ID.
Overlap Setting	Call Overlap library number Set the library number of the overlap for display from those registered in the overlap library. Click [Refer to] to select using a list display or thumbnails.

Control Device	Selected
	  Specify a device using one bit. Showing and hiding is performed according to the value of the bit.
	  0 → 1 (edge): Show
	  1 → 0 (edge): Hide
	
	Unselected
	  Bits 0 to 2 of read area "n + 1" are used.
	
	* Select the [Display Overlap during bit ON] checkbox at [System Setting] → [Unit Setting] → [General
	    Setting] to allow level operation. Refer to page 2-13.

Information Output Device	Specify a device using one bit. Stores the overlap display status.
	  0: Hide
	  1: Shown

Detail

Item		Description
Input Cursor Movement Control Device		This setting is required to use the "entry function" on an overlap display. For details, refer to page 6-34.
Coordinate	Start X/Start Y	Set the display position of the overlap using X and Y coordinates.

2.3.3 Show/Hide Settings

There are four methods for showing and hiding call-overlap displays.

Method		Error Detail	Refer to
Internal command	Switch	Function: Overlap Control Set Display No.: Unselected	
	Macro	OVLP_SHOW OVLP_POS	
External Command	Control device memory	0 → 1: Show 1 → 0: Hide	

	Read area "n + 1"	Bits 0 to 2
		   0 → 1 (edge): Show
		   1 → 0 (edge): Hide	

Switch

Setting

1. Display the settings menu of the call-overlap display.
2. Click [Go to Control SW Placement] and place a switch.

3. Set the function of the switch.

Function	Overlap Control
Overlap ID	Specify the same ID as the [Overlap ID] of the call-overlap.
Control Operation	ON: Show OFF: Hide ALT: Alternate between show and hide ICON: Show
Set Display No.	Unselected

2.4 Multi-overlap

2.4.1 Creation Procedure

1. Creating from an Overlap Library

   1) Display an [Overlap Library Edit] tab by clicking [Home] → [Registration Item] → [Overlap Library].
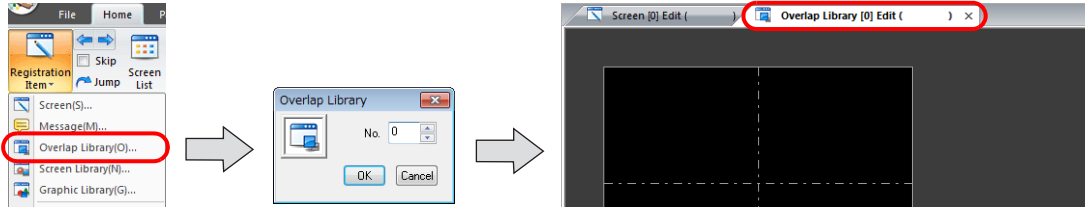
   2) Click [Parts] or [Home] → [Overlap] → [Normal Overlap] and place an overlap display.
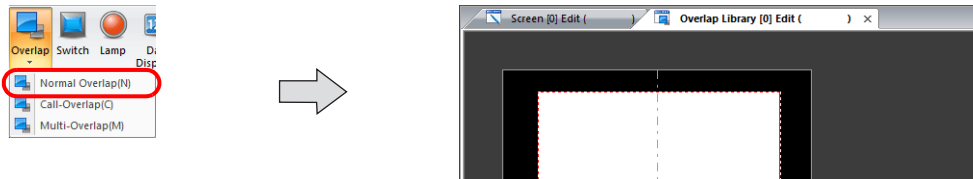
   3) Adjust the size of the overlap.

   4) Select [Overlap Editing] → [ID 0] on the right-click menu. The overlap editing window is displayed.
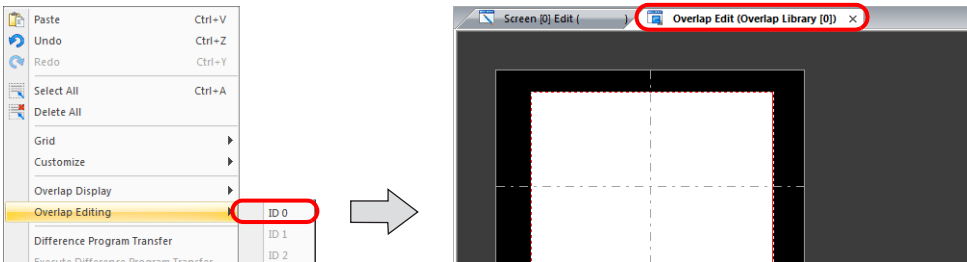
   5) Place switches, lamps, and other items on the overlap.

   6) Select [Overlap Editing] → [ID 0] on the right-click menu. The user is returned to the screen editing window.

2. Placing a Multi-Overlap

   1) In the screen editing window, click [Parts] → [Overlap] → [Multi-Overlap] and place an overlap.

   2) Click the icon and display the settings menu.

   3) Configure the [Operation Select] settings.
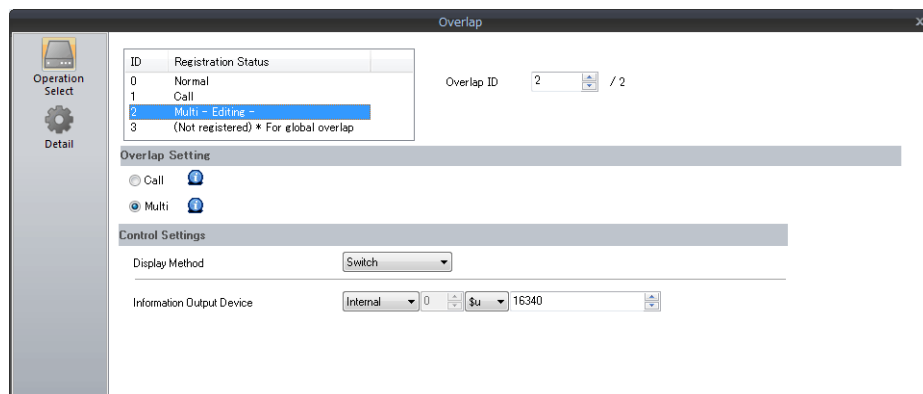
Overlap Setting			Multi
Control Settings	Display Method	Switch	Use switches for showing and hiding. Refer to page 2-21.
		Control Device	Use commands from a PLC for showing and hiding. Refer to page 2-23.

2.4.2 Detailed Settings

Operation Select

Item	Description
Registration Status	Check the registration status of overlap IDs 0 to 3. "- Editing -" is shown for the ID that is currently being edited. The overlap ID can also be changed to an unregistered ID.
Overlap Setting	Multi
Control Settings	Select the overlap display method (Switch/Control Device).

Display method

- Switch

Item	Description
Switch	Control showing and hiding of the overlap using the switch function.
Information Output Device	Store the overlap library number. Show: 0 to 9999 Hide: −1 (FFFFHex)

• Control Device

Item	Description

Control Device	Selected
	  Specify a device using one bit. Showing and hiding is performed according to the value of the bit.
	  1 (level): Show
	  0 (level): Hide
	
	Unselected
	  Bits 0 to 2 of read area "n + 1" are used.

Information Output Device Device for Overlap Library No. to Display Specify the display position by device	Store and set the following information using a maximum of 4 words. *(see table below)*

Information Output Device		n	Stores the overlap library number.
			  Show: 0 to 9999
			  Hide: −1 (FFFFHex)
				TS →

Device for Overlap Library No. to Display		n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device	Selected	n+2	Set the X coordinate. [*1]	TS ←
		n+3	Set the Y coordinate. [*1]	TS ←
	Unselected		The overlap display is shown in the same position as it is placed in the overlap library.	

*1 Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
    Line/Column: X coordinate in 8 pixels, Y coordinate in 20 pixels
    Dot: X coordinate in 4 pixels, Y coordinate in 1 pixel
    When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

Detail

Item	Description
Input Cursor Movement Control Device	This is required for using "entry mode" on an overlap display. For details, refer to page 6-34.
Coordinate	The coordinates of the multi-overlap icon. This setting is unrelated to the operation of MONITOUCH.

2.4.3 Show/Hide Settings

There are four methods for showing and hiding multi-overlap displays.

Method			Error Detail		Refer to
Internal command	Switch	Show	Function: Set Display No.:	Overlap Control Selected	page 2-21
		Hide	Function: Control Operation: Set Display No.:	Overlap Control OFF Unselected	
	Macro		SET_MOVLP OVLP_POS		page 2-22
External Command	Control device memory		0: Hide 1: Show		page 2-23

	Read area "n + 1"		Bits 0 to 2
			  0: Hide
			  1: Show
					page 2-24

Switch

A switch can be used to show and hide multi-overlap displays.

Setting

1. Display the settings menu of the multi-overlap display.
2. Click [Go to Control SW Placement] and place a switch.
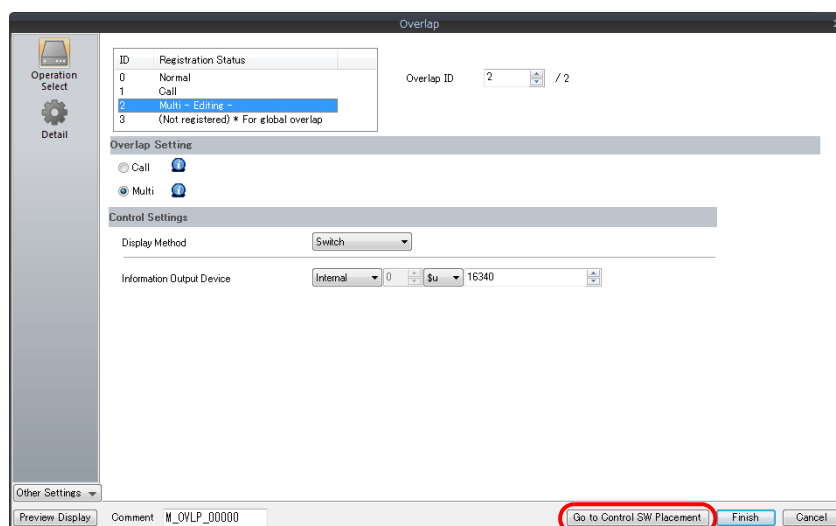
3. Set the function to use.
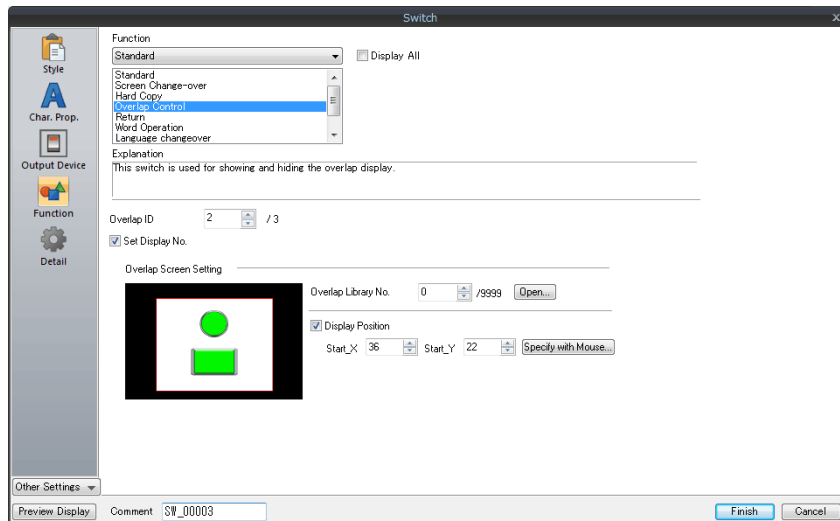
Function	Overlap Control
Overlap ID	Specify the same ID as the [Overlap ID] of the multi-overlap.
Show	Set Display No.	Selected
	Overlap Library No.	Set the overlap library number of the overlap for display.
	Display Position	Set the X and Y coordinates.
Hide	Control Operation	OFF: Hide
	Set Display No.	Unselected

Macro

A macro can be used to show and hide multi-overlap displays. Use the "SET_MOVLP" and "OVLP_SHOW" commands. The "OVLP_POS" command is used to specify the display position. For details, refer to the Macro Reference Manual.

Setting

1. Creating a macro for showing an overlap display

    1) Display the [Macro Block No. Editor] window.
    2) Register the following macro.

$u100 = 2 (W)	Set an overlap ID from 0 to 2 (ID2 in this example).
$u101 = 12 (W)	Set an overlap library number from 0 to 9999 (No. 12 in this example).
$u102 = 150 (W)	X coordinate [*1]
$u103 = 50 (W)	Y coordinate [*1]
SYS (SET_MOVLP) $u100	Execute the command.

    *1 Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
        Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
        Dot: X coordinate in 4 dots, Y coordinate in 1 dot

    3) Execute the macro block in a switch ON macro or global macro.

2. Creating a macro for hiding an overlap display

    1) Display the [Macro Block No. Editor] window.
    2) Register the following macro.

$u100 = 2 (W)	Set an overlap ID from 0 to 2 (ID2 in this example).
$u101 = 0 (W)	Hide the overlap display
SYS (OVLP_SHOW) $u100	Execute the command.

    3) Execute the macro block in a switch ON macro or global macro.

Control Device Memory

Setting

1. In the multi-overlap settings menu, click [Operation Select] and configure the [Control Device] and [Information Output Device] settings under [Control Settings].

2. Set the library number of the overlap for display to the [Device for Overlap Library No. to Display].

   When specifying the display position, also set the X and Y coordinates.

Information Output Device	n	Store the overlap library number. Show: 0 to 9999 Hide: −1 (FFFFHex)	TS →
Device for Overlap Library No. to Display	n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device	n+2	Set the X coordinate. *1	TS ←
	n+3	Set the Y coordinate. *1	TS ←

*1 Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
   Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
   Dot: X coordinate in 4 dots, Y coordinate in 1 dot
   When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

3. The overlap is shown when the [Control Device] bit is ON and hidden when the bit is OFF.

* **Notes on showing an overlap display using an external command**
  * Suppose that an overlap display was shown on the screen using an external command, the screen was switched to another screen, and then the first screen is displayed again. In this case, the overlap display that corresponds to the bit being turned ON appears on the screen.
  * A switch for [Function: Overlap Display = OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

Read Area "n + 1"

Setting

1. In the multi-overlap settings window, click [Operation Select]. Under [Control Settings], specify [Display Method: Control Device] and then configure the [Information Output Device] settings.
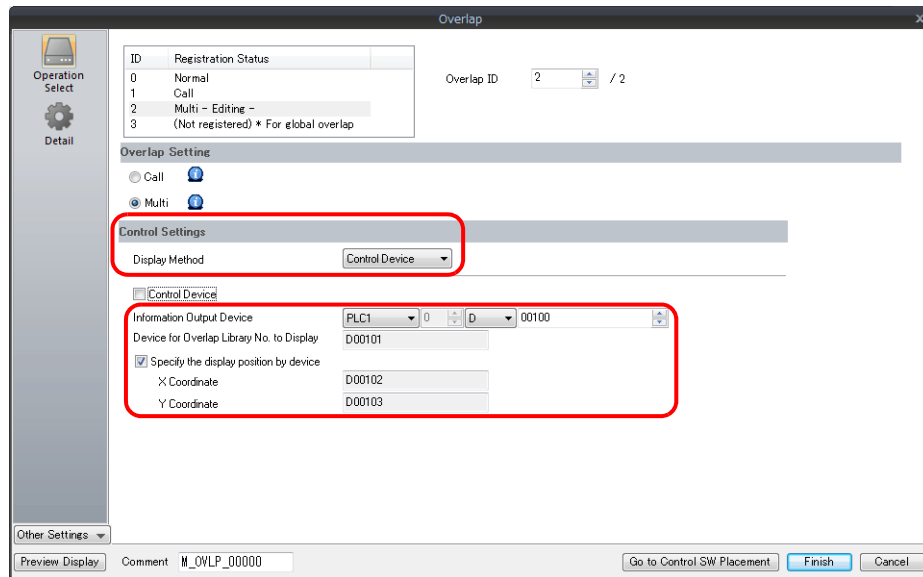
2. Set the library number of the overlap for display to [Device for Overlap Library No. to Display].

   When specifying the display position, also set the X and Y coordinates.

Information Output Device	n	Store the overlap library number. Show: 0 to 9999 Hide: −1 (FFFFHex)	TS →
Device for Overlap Library No. to Display	n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device	n+2	Set the X coordinate. *1	TS ←
	n+3	Set the Y coordinate. *1	TS ←

    *1   Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
            Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
            Dot: X coordinate in 4 dots, Y coordinate in 1 dot
            When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

3. The read area "n + 1" (screen status command) of [System Setting] → [Hardware Setting] → [Read/Write Area] is used. Overlaps are shown when the respective bit of read area "n + 1" is ON and hidden when the bit is OFF.
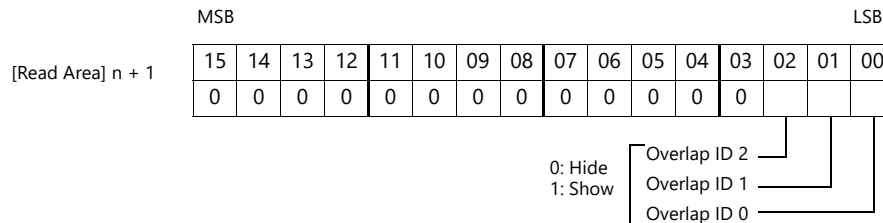
E.g.: Read area "D0"

Specify the overlap to display with [Device for Overlap Library No. to Display].   Bit 2 of read area "D1": 0 → 1
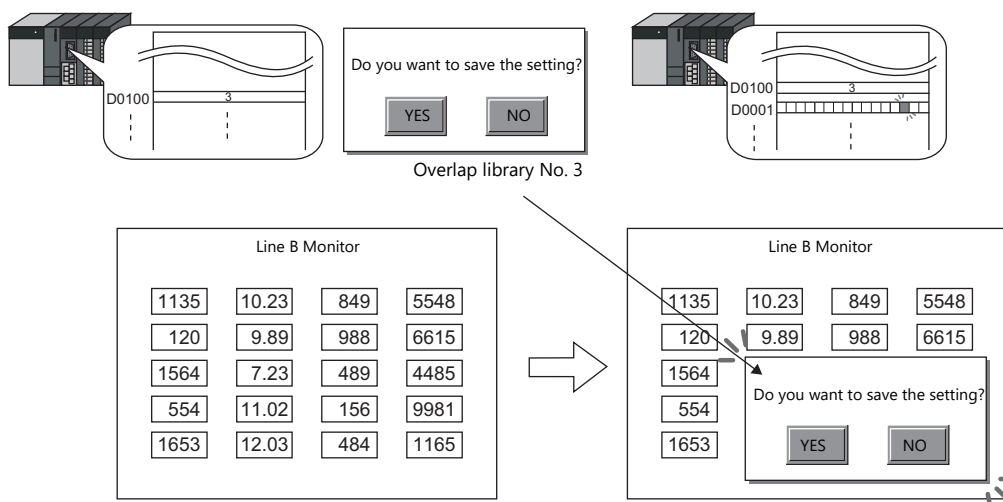
Overlap library No. 3

* **Notes on showing an overlap display using an external command**
  * Suppose that an overlap display was shown on the screen using an external command, the screen was switched to another screen, and then the first screen is displayed again. In this case, the overlap display that corresponds to the bit that is ON appears on the screen.
  * A switch for which [Function] is set to [Overlap Control] with [Control Operation: OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

2.5 Global Overlap

2.5.1 Creation Procedure

1. Creating from an Overlap Library

   1) Display an [Overlap Library Edit] tab window by clicking [Home] → [Registration Item] → [Overlap Library].
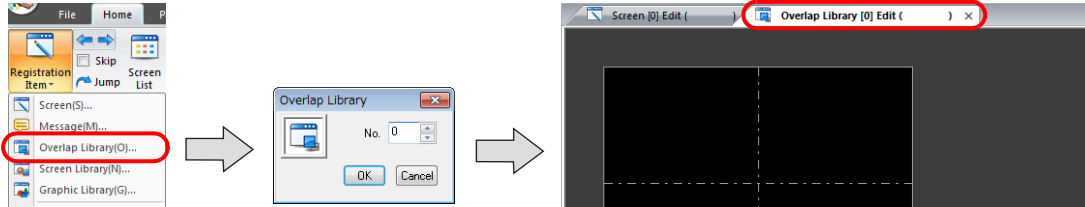
   2) Click [Parts] or [Home] → [Overlap] → [Normal Overlap] and place an overlap display.
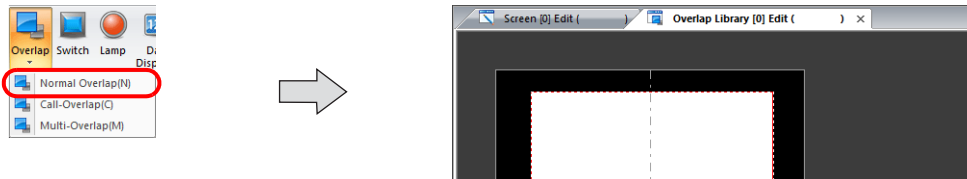
   3) Adjust the size of the overlap.

   4) Select [Overlap Editing] → [ID 0] on the right-click menu. The overlap editing window is displayed.
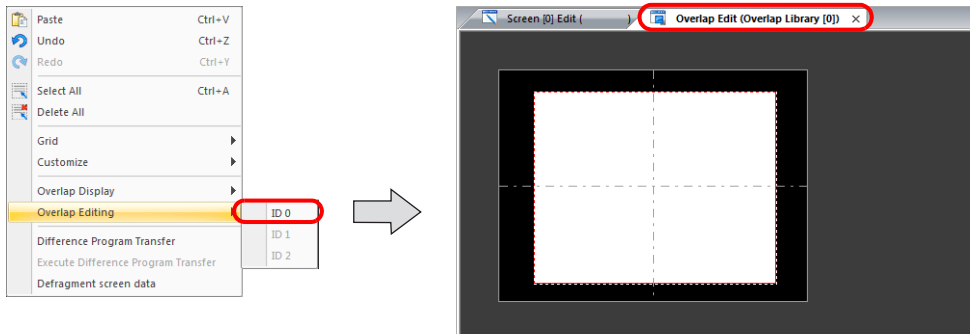
   5) Place switches, lamps, and other items on the overlap.

   6) Select [Overlap Editing] → [ID 0] on the right-click menu. The user is returned to the screen editing window.
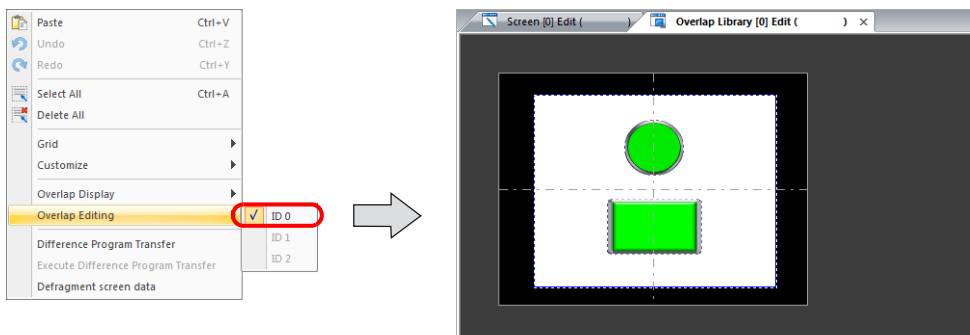
2.   Global Overlaps

1)   Click [System Setting] → [Global Setting] → [Global Overlap Setting].

2)   Select the [Use Overlap] checkbox. (Fixed to ID 3)
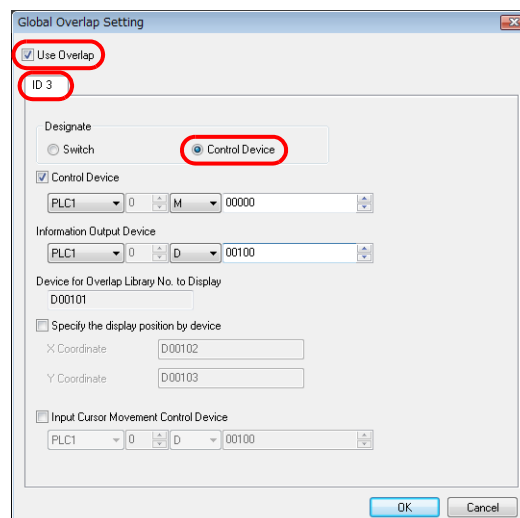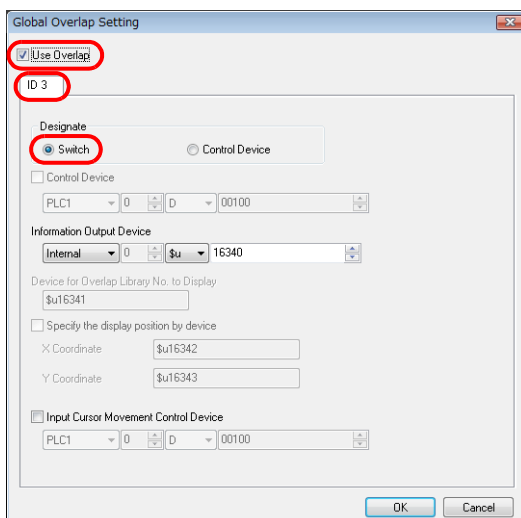
3)   Select a display method under [Designate].

Item		Description
Designate	Switch	Use switches for showing and hiding. Refer to page 2-30.
	Control Device	Use commands from a PLC for showing and hiding. Refer to page 2-32.

2

2.5.2   Detailed Settings

Display Method Selection

- Switch
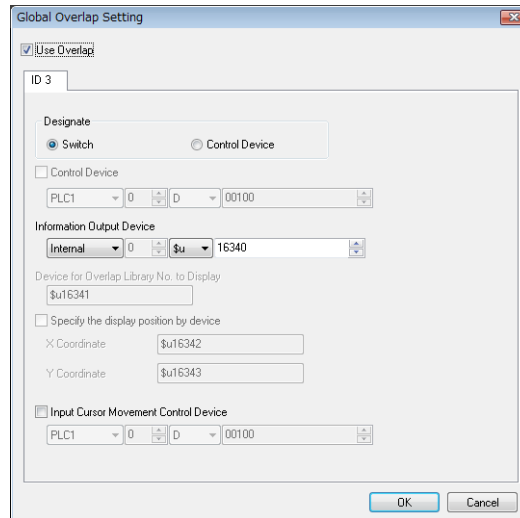
Item	Description
Switch	Control showing and hiding of the overlap using the switch function.
Information Output Device	Store the overlap library number. 　　Show:　0 to 9999 　　Hide:　−1 (FFFFHex)
Input Cursor Movement Control Device	This setting is required to use the "entry function" on an overlap display. For details, refer to page 6-34.

- Control Device
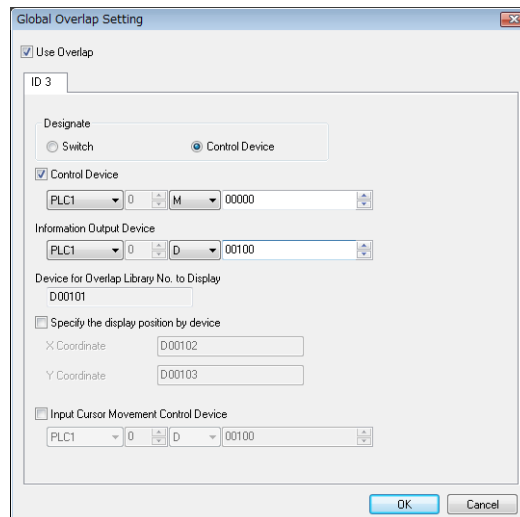
Item	Description
Control Device	Specify a device using one bit. Showing and hiding is performed according to the value of the least significant bit. Selected 　　1 (level): Show 　　0 (level): Hide Unselected 　　Bit 3 of read area "n + 1" is used. 　　1 (level): Show 　　0 (level): Hide

Item	Description
Information Output Device Device for Overlap Library No. to Display Display Position	Store and set the following information using a maximum of 4 words.

Information Output Device	n	Stores the overlap library number. Show: 0 to 9999 Hide: −1 (FFFFHex)	TS →
Device for Overlap Library No. to Display	n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device — Selected	n+2	Set the X coordinate. *1	TS ←
	n+3	Set the Y coordinate. *1	TS ←
Specify the display position by device — Unselected		The overlap display is shown in the same position as it is placed in the overlap library.	

Item	Description
Input Cursor Movement Control Device	This setting is required to use the "entry function" on an overlap display. For details, refer to page 6-34.

*1 Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
Dot: X coordinate in 4 dots, Y coordinate in 1 dot
When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

2.5.3 Show/Hide Settings

There are four methods for showing and hiding global overlap displays.

Method		Error Detail	Refer to
Internal command	Switch	Function: Overlap Control Set Display No.: Selected	page 2-30
	Macro	SET_MOVLP OVLP_SHOW OVLP_POS	page 2-31
External Command	Control device memory	0: Hide 1: Show	page 2-32

	Read area "n + 1"	Bit 3
		   0: Hide
		   1: Show
			page 2-33

Switch

A switch can be used to show and hide global overlap displays.

Setting

1. Click [Parts] → [Switch] and place a switch.
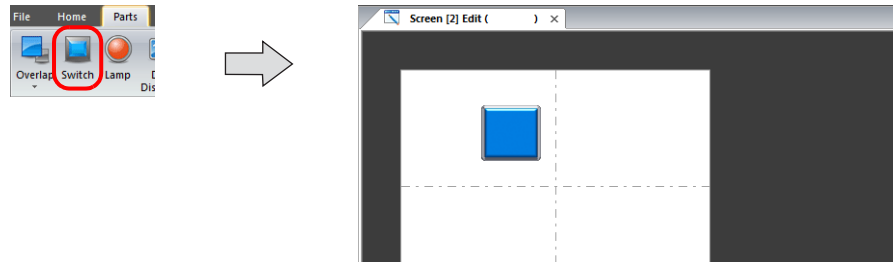
2. Set the function to use.
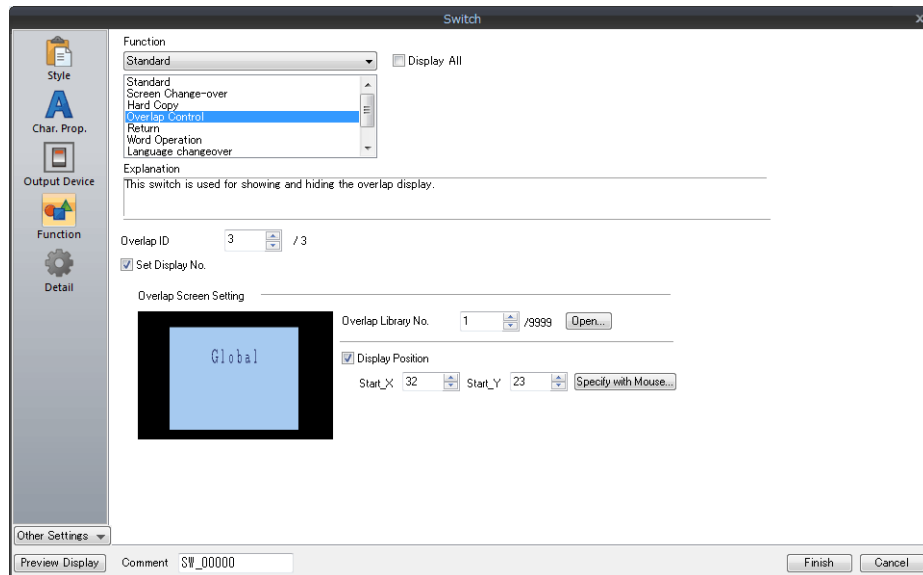
Function	Overlap Control
Overlap ID	Fixed to ID 3
Control Operation	ON: Show OFF: Hide ALT: Alternate between show and hide ICON: Show
Set Display No.	Selected:
Overlap Library No.	Set the overlap library number of the overlap for display.
Display Position	Set the X and Y coordinates.

Macro

A macro can be used to show and hide global overlap displays. Use the "SET_MOVLP" and "OVLP_SHOW" commands. The "OVLP_POS" command is used to specify the display position. For details, refer to the Macro Reference Manual.

Setting

1. Creating a macro for showing an overlap display

    1) Display the [Macro Block No. Editor] window.
    2) Register the following macro.

$u100 = 3 (W)	The overlap ID number is fixed to "3".
$u101 = 12 (W)	Set an overlap library number from 0 to 9999 (No. 12 in this example).
$u102 = 150 (W)	X coordinate [*1]
$u103 = 50 (W)	Y coordinate [*1]
SYS (SET_MOVLP) $u100	Execute the command.

        *1 Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
        Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
        Dot: X coordinate in 4 dots, Y coordinate in 1 dot

    3) Execute the macro block in a switch ON macro or global macro.

2. Creating a macro for hiding an overlap display

    1) Display the [Macro Block No. Editor] window.
    2) Register the following macro.

$u100 = 3 (W)	The overlap ID number is fixed to "3".
$u101 = 0 (W)	Hide the overlap display
SYS (OVLP_SHOW) $u100	Execute the command.

    3) Execute the macro block in a switch ON macro or global macro.

Control Device Memory

Setting

1. In the global overlap settings menu, configure the [Control Device] settings. One word is occupied.

2. Set the library number of the overlap for display to the [Device for Overlap Library No. to Display].

   When specifying the display position, also set the X and Y coordinates.

Information Output Device	n	Store the overlap library number. Show:　0 to 9999 Hide:　−1 (FFFFHex)	TS →
Device for Overlap Library No. to Display	n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device	n+2	Set the X coordinate. *1	TS ←
	n+3	Set the Y coordinate. *1	TS ←

   *1　Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
   　　Line/Column:　　X coordinate in 8 dots, Y coordinate in 20 dots
   　　Dot:　　　　　　X coordinate in 4 dots, Y coordinate in 1 dot
   　　When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

3. The overlap is shown when 0 bit of [Control Device] is ON and hidden when the bit is OFF.
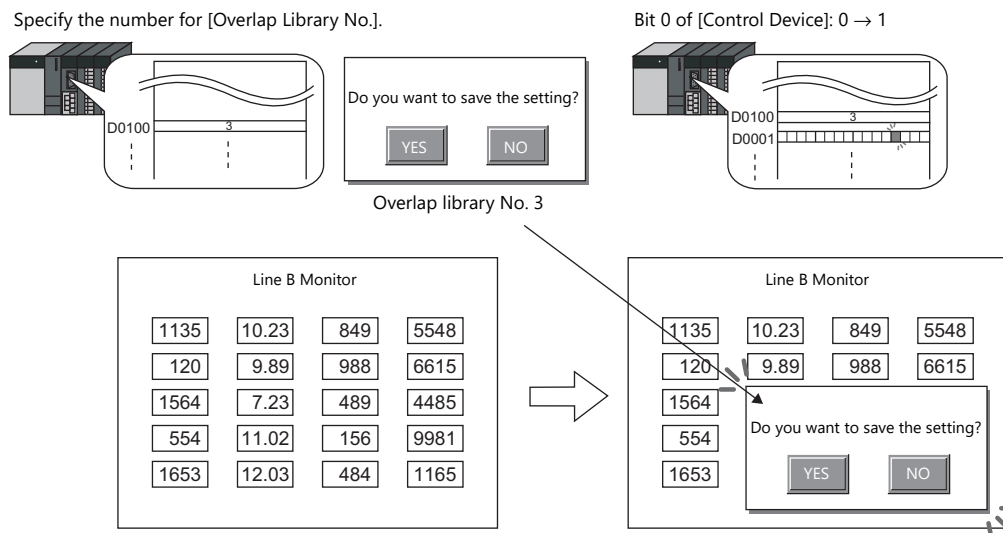
   *　Notes on showing an overlap display using an external command
   　A switch for which [Function] is set to [Overlap Control] with [Control Operation: OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

Read Area "n + 1"

1. Set the library number of the overlap for display to the [Device for Overlap Library No. to Display] in the [Global Overlap Setting] window.
   When specifying the display position, also set the X and Y coordinates.

Information Output Device	n	Store the overlap library number. Show: 0 to 9999 Hide: −1 (FFFFHex)	TS →
Device for Overlap Library No. to Display	n+1	Set the overlap library number of the overlap for display.	TS ←
Specify the display position by device	n+2	Set the X coordinate. *1	TS ←
	n+3	Set the Y coordinate. *1	TS ←

   *1   Set the unit of the placement coordinates. [System Setting] → [Unit Setting] → [Overlap] → [Overlap Coordinates]
   Line/Column: X coordinate in 8 dots, Y coordinate in 20 dots
   Dot: X coordinate in 4 dots, Y coordinate in 1 dot
   When no coordinate is specified, the overlap display is shown in the position as registered in the overlap library.

2. Show or hide the overlap by turning ON or OFF respectively the 3rd bit of read area "n + 1" (screen status command) of [System Setting] → [Hardware Setting] → [Read/Write Area].
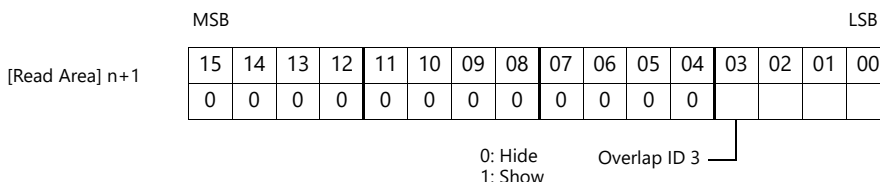
E.g.: Read area "D0"
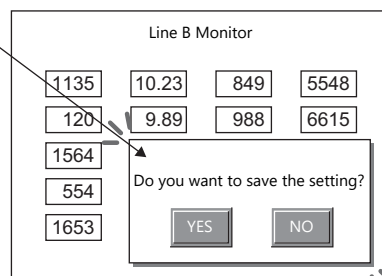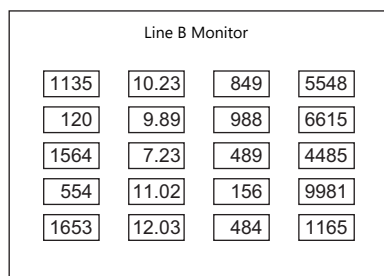
   * Notes on showing an overlap display using an external command
   A switch for which [Function] is set to [Overlap Control] with [Control Operation: OFF] can be used to hide the overlap display. Using this type of switch hides the overlap display with the bit of the control device memory still turned ON. To show the overlap display again, the bit needs to be turned OFF and ON again.

2.5.4 Notes

- Global overlaps are redisplayed when the display language is changed.
- Global overlap displays cannot be set for component parts nor called upon from component parts.

3 Switch

3.1   Switch

3.1.1 Overview

Basic Function of Switches

- Switches can send ON/OFF information to specific bits in PLC or internal device memory.
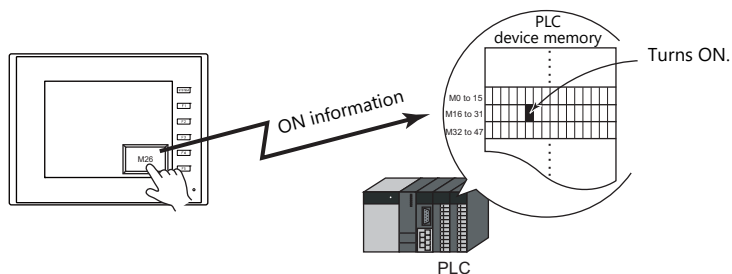
☞   For example settings, refer to "Setting the PLC bit to ON." page 3-4.

- When a switch is pressed, the following processes can be executed:
  - Changing the screen for display
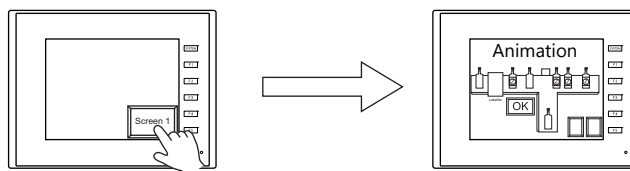
☞   For example settings, refer to "Changing Screens" page 3-5.

  - Showing an overlap display
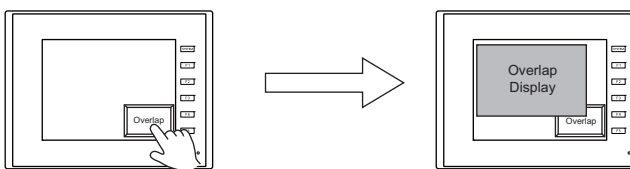
  - Performing the configured calculations and writing the results to the device memory
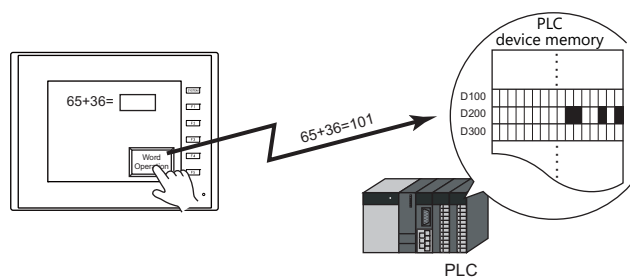
  - Printing the displayed screen
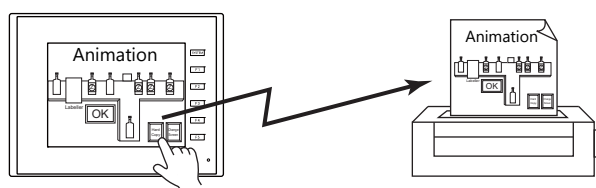
- Turning a device memory bit ON and showing an overlap display at the same time
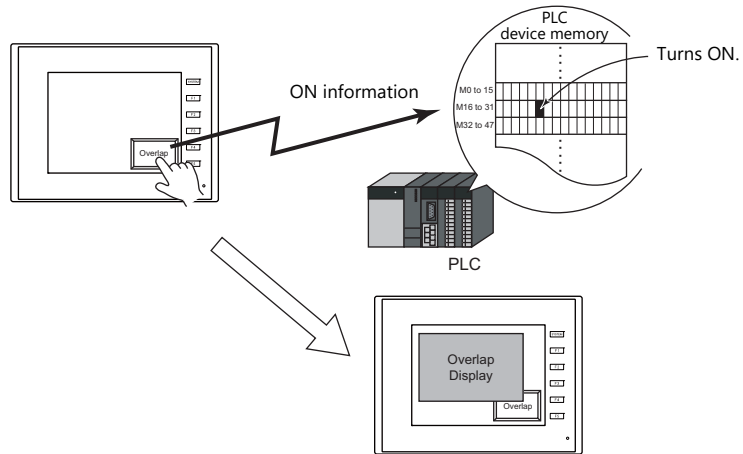
- When a switch is pressed, ON/OFF information or a value can be sent for multiple bits or words at the same time to a PLC device memory or internal device memory.

Pressing the [High speed] switch can serve not just to turn M30 ON, but to turn M10 and M20 OFF at the same time. This makes it simple to create radio buttons.
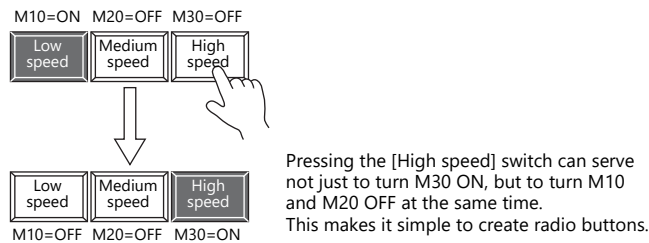
- A delay function can be added to switches.
  "ON delay" functions can be set, where device memory output cannot occur unless the switch is pressed continuously for a fixed time, and "OFF delay" functions can be set, where the device memory cannot go OFF until a fixed time has elapsed after the switch is released.

For example, on pressing a switch for which [Output Device: M10] and [ON delay: 3 sec] have been set, M10 will be turned ON after the switch has been pressed continuously for 3 seconds.
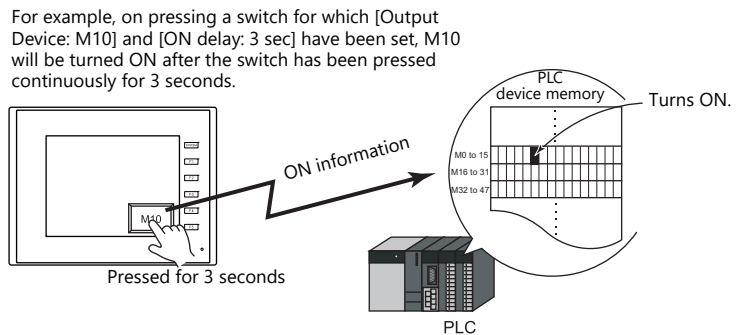
- A confirmation pop-up window, which asks whether to proceed with the operation or cancel the operation ([OK] or [Cancel]), can be configured to be displayed automatically when a switch is pressed.
  These settings for confirmation and operation execution can be configured entirely on the MONITOUCH, without any troublesome programming.
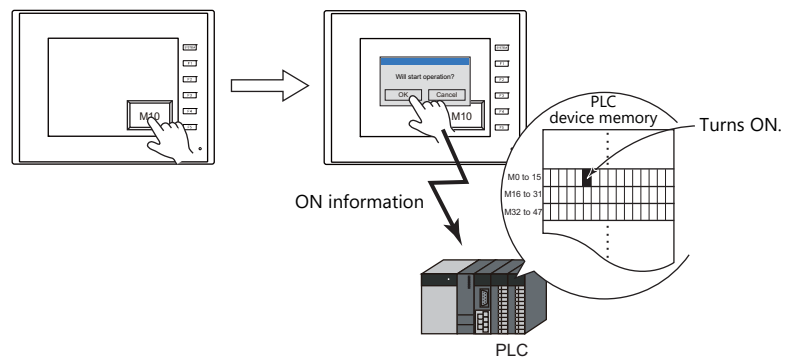
- A macro can be executed when a switch is pressed or released.

Lamps in Switches

- There are switches available with lamps that light up (ON color) when the switch is pressed and turn off (OFF color) when released.
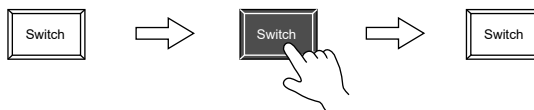
- Lamp activation can be instructed from an external device memory.
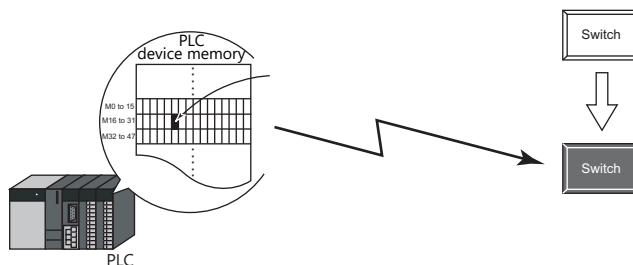
- When instructing lamp activation from an external device memory, a maximum of 128 patterns can be registered for a single lamp part.
  This can be done using consecutive device memory addresses or by using desired addresses (N-state lamp).
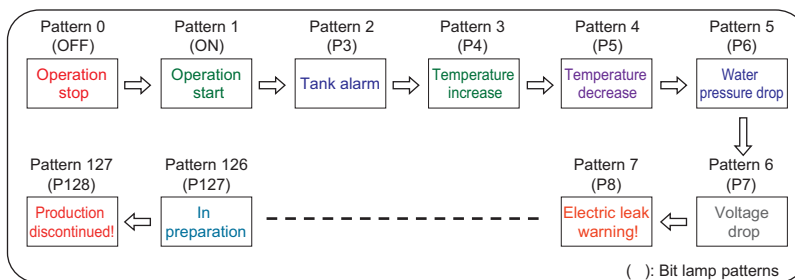
- Lamps can be set to light up when multiple conditions are satisfied. (N-state lamp)
  Up to four conditions can be defined using AND and OR operators.
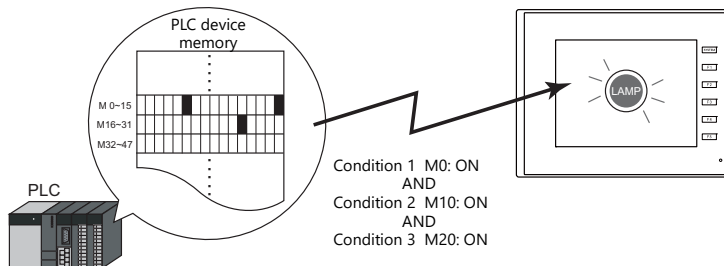
☞ For a detailed setting example, refer to "4 Lamp".

3.1.2 Setting Examples

Setting the PLC bit to ON.

Set PLC device memory M26 to ON while the switch is pressed and OFF after the switch is released.
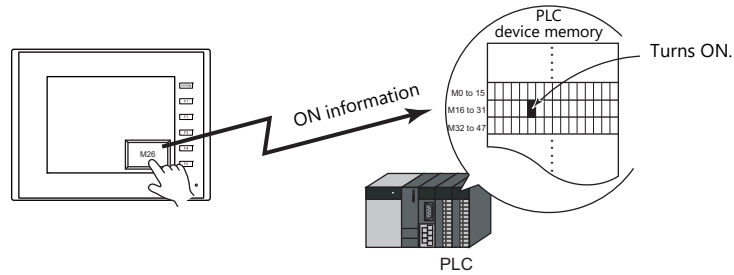
1. Click [Parts] → [Switch] and place a switch on the screen.
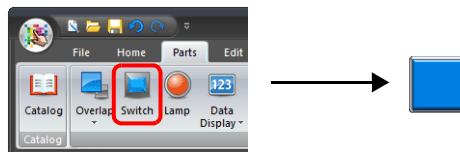
2. Double-click on the switch to display the settings window.
   Configure the following settings for [Output Device] and then click [Finish].
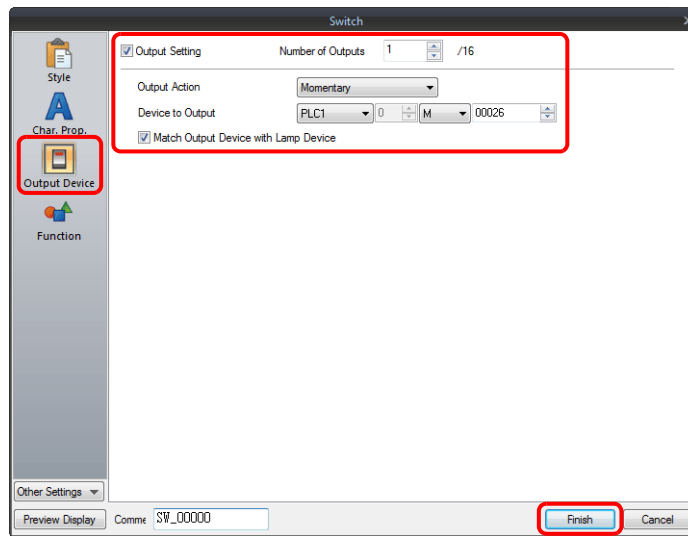
This completes the necessary settings.

Changing Screens

Change to screen No. 1 when the switch is pressed.
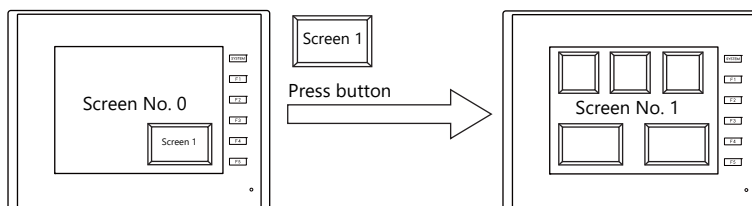
1. Click [Parts] → [Switch] and place a switch on the screen.
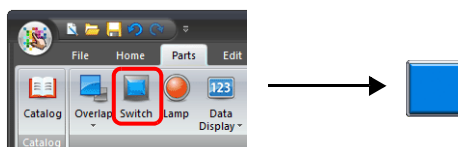
2. Double-click on the switch to display the settings window.
   Configure the following settings for [Function] and then click [Finish].
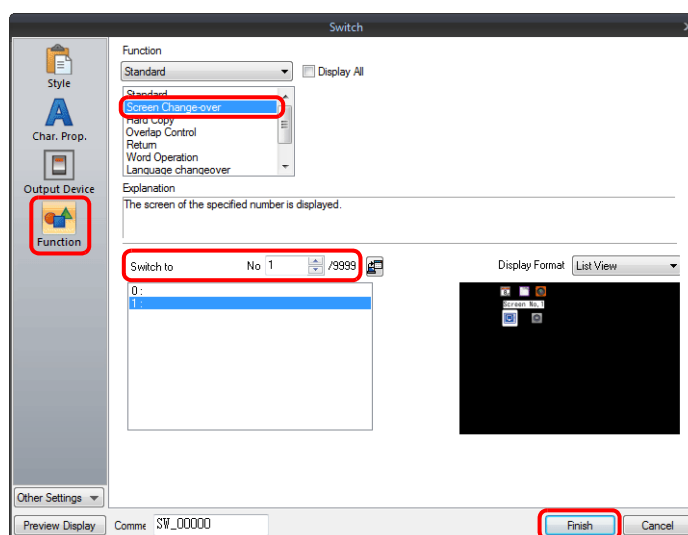
This completes the necessary settings.

3.1.3   Detailed Settings

Style

Item		Description
No. of Patterns (2 to 128)		Set the number of times the display of the switch lamp can be changed.
Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color. A transparent switch can also be selected.
	Select from image files	Select a bitmap file. The bitmap file can be set to all patterns by clicking [Apply to All Patterns].
Frame	Type	Select the frame type of the switch. * Only available with 2D (Square2) parts.
	Color	Select the frame color of the switch. * Only available with 2D (Square2) parts.
Enable flash display function (flashing with OFF pattern)		This item is available when a 3D pattern type[1] other than an OFF pattern (excluding "Sign" and "3D_128" parts) is selected. Select this checkbox to flash the display between the selected pattern and the OFF pattern.
Other Settings	Draw Mode REP/XOR	REP: Display using the color set in [Area Setting]. XOR: When the lamp device memory is ON, the frame and text are displayed in the color resulting from an XOR operation. For the difference between REP and XOR, refer to "4.4 Draw Mode" page 4-15.
	Clear graphic displayed before switching (transparency function)	The previous graphic is not retained when the checkbox is selected. For details, refer to "Notes on the transparency function" page 4-10.
Use lamp function[2]		Select this checkbox to change the display in the switch area. Unselected: When the switch is pressed, the lamp lights up automatically. The switch changes to the ON color when pressed and the OFF color when released. Selected: Setting for the lamp device memory become available. Specify a device memory address for the lamp display. * **When placing multiple switches, set up consecutive addresses for the lamp device memory to ensure high-speed processing.** For details, refer to "4 Lamp".
	Device Designation	Bit: The lamp display is changed by setting (ON) and resetting (OFF) bits. The required number of bits depends on the number of display patterns. (127 bits maximum) * **When multiple bits are set (ON), the most significant bit has priority.** Word: The lamp display is changed according to the value specified for the device memory. The range of setting values varies with the number of patterns. (Range: 0 to 127) If a value outside the specified range is set, the lamp display is not changed.
	Input Type (DEC/BCD)	Specify the input format of the device memory.

*1   Notes on 3D and 2D pattern types
      Part shapes differ depending on the selection made in the catalog.
      • 3D type: Real, Sign, 3D, 3D_128, HA
      • 2D type: 2D
      Selection of an image file corresponds to the 3D type.
*2   This setting is linked to [Use lamp function] in the [Output Device] settings. When the [Use N-state lamp] checkbox is selected, the setting is hidden

Char. Prop.

Item	Description
[OFF] [ON] - [P128]	When [Style] → [Other Settings] → [Draw Mode] is [XOR]: Only [OFF] can be selected. Specify the text to be displayed.
Pattern No. (0 to 127)	When [Style] → [Other Settings] → [Draw Mode] is [REP]: Specify the text to be displayed on each pattern.
Text	Enter the text to be displayed on the switch. Up to 4 lines can be registered. Text properties can be set for each line. Text can be justified within the switch part.
Color (text color, background color)	Set the color for text. The background color can also be set if set as "no transparency" in the following [Style] setting.
Style	Set the text style.
Character Size (1 to 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 to 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Rotation + Direction	Set the combination of text rotation and direction. Four combinations are displayed in the drop-down menu. When selecting an option other than the above, click the icon at the bottom. The window that allows selection from all options is displayed.
Use Windows fonts	Select this checkbox to use a Windows font.
Alignment	Set the text alignment. Center Flush Left ⌐ ⌐ Flush Right
Text copy Copy only characters	The text and its attributes for the current pattern (OFF, ON, P3) are copied to the other patterns. Select the [Copy only characters] checkbox to copy text and coordinate information to all other patterns. Note that the text properties will not be copied. If the destination for copy has no text, text properties will also be copied.
Set line spacing	Set the pitch between lines.
Use the same style for all patterns	Select this checkbox to configure the same settings as the opened pattern attributes with respect to all switch patterns (for each respective line if multiple lines are included).
Auto-adjust the size according to the style	Select this checkbox to automatically adjust the switch size to the entered text.
Retain the coordinates when changing character string	Newly registered text is placed by centering. When any registered text is changed while this checkbox is selected, the coordinates remain the same. When a line is added to the existing text while this checkbox is selected, the added line is aligned with the upper line.
4-Line Display	When using Windows fonts, selecting this checkbox divides the text entry area into four lines. This allows different properties to be specified for each line when using Windows fonts.

Output Device

Item		Description
Output Setting		Select this checkbox to execute the specified output operation for the set output device when the switch is pressed.
	Number of Outputs (1 to 16)	A maximum of 16 types of output operations can be executed at once when the switch is pressed. This value sets the number of operations to execute. When the number of outputs is set to "2" or more, output operations are processed in sequence from No. 0. The output operations performed when the switch is released are also processed in sequence from No. 0.
	Output Action [*1]	Momentary: Set the output device memory to ON. When the switch is released, set the output device memory to OFF. Set: Set the output device memory to ON. Reset: Set the output device memory to OFF. Alternate: Inverse the state of the output device memory (set to OFF if ON, set to ON if OFF). Momentary W: Set the output device memory to ON. When the switch is released, set the output device memory to OFF. Word Operation: Execute the set arithmetic expression. For details, refer to "Word operation" page 3-10.
	Device to Output	Specify a PLC device memory, internal device memory, or tag. Processing speed will be faster when an internal device memory is selected than when a PLC device memory is selected. (Specify a bit for [Device to Output] when [Output Action] is set to a value other than [Word Operation].)
	Match Output Device with Lamp Device	Select this checkbox to set the lamp device memory address to the same address set for [Device to Output]. When [Alternate] is set for [Output Action], the display reflects the status of the output device memory.
Use lamp function [*2]		Select this checkbox to change the display in the switch area.
		Unselected When the switch is pressed, the lamp lights up automatically. The switch changes to the ON color when pressed and the OFF color when released.
		Selected Settings for the lamp device memory become available. Specify a device memory address for the lamp display. * **When placing multiple switches, set up consecutive addresses for the lamp device memory to ensure high-speed processing.** For details, refer to "4 Lamp".
	Device Designation	Bit: The lamp display is changed by setting (ON) and resetting (OFF) bits. The required number of bits depends on the number of display patterns. (127 bits maximum) * **When multiple bits are set (ON), the most significant bit takes precedence.** Word: The lamp display is changed according to the value specified for the device memory. The range of setting values varies with the number of patterns. (Range: 0 to 127) If a value outside the specified range is set, the lamp display is not changed.
	Input Type (DEC/BCD)	Specify the input format of the device memory.

*1 Notes on [Momentary] and [Momentary W] operation
Processing differs depending on the type of PLC device memory specified for output (whether bits are writable or not).
For information on PLC device memory types, refer to the relevant PLC manual.

- When a bit-writable device memory is specified:
  Processing for [Momentary] and [Momentary W] is the same.
- When a non-bit-writable device memory is specified:
  Because processing for switch operations is performed in units of bits on the TS, processing differs as described below

- Processing when [Momentary] is selected:
  (1) One word of [Device to Output] is read.
  (2) The result of [Output Action] is written to one word of [Device to Output].
  (Other bits are kept intact.)
  Example: When [D100 - 10] is specified for [Device to Output]:

(1) Data in D100 is read.

(2) The bit of D100 - 10 is set (ON) and written to D100.

- Processing when [Momentary W] is selected:
  The result is directly written to one word of [Device to Output].
  (Other bits are cleared.)
  Therefore, always secure one-word for [Device to Output].

Example: When [D100 - 10] is specified for [Device to Output]:

The bit of D100 - 10 is set (ON) and one entire word is written.
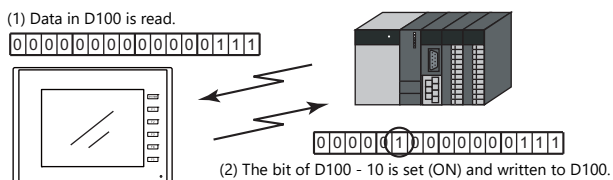
For a bit-writable device memory, select either [Momentary] or [Momentary W]. For a non-bit-writable device memory, it is recommended to select [Momentary W] for high-speed processing.
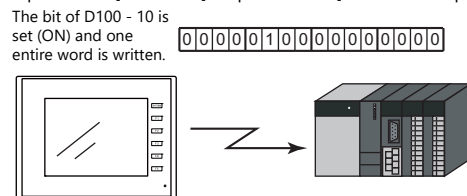
*2 This setting is linked to [Use lamp function] in the [Style] settings.
When the [Use N-state lamp] checkbox is selected, the setting is hidden.

3

Word operation

Item			Description
Operation Setting	Operation Device		Specify the device memory address for operation.
	Operation Mode	Transfer	Perform the specified arithmetic operation with [Operation Device] and [Operand Device] and write the result to the device memory set for [Address to Output Operation Result]. When performing division, the quotient is output to the device memory set for [Address to Output Operation Result] and the remainder is output to the device memory set for [Address to Output Operation Result] + 1.
		Add	
		Subtract	
		Multiply	
		Divide	
		OR	Perform the specified logical operation with [Operation Device] and [Operand Device] and write the result to the device memory set for [Address to Output Operation Result].
		AND	
		XOR	
	Operand Device		Specify the device memory address for the operand. It is possible to use a constant.
	Address to Output Operation Result		Specify the device address where the operation result is output.
Condition Setting	Comparison Condition	None	Operation is executed when the switch is pressed.
		=, ≠ <, > ≤, ≥	Set the condition for executing the word operation. Condition satisfied: Word operation is executed. Condition not satisfied: Word operation is not executed.
	Comparison Device		Specify the device memory address where the comparison value is stored.
	Constant		Specify a constant.
Operation Type (DEC/BCD)			Specify the operation format (format of writing to the specified device memory address).

- Usage Example
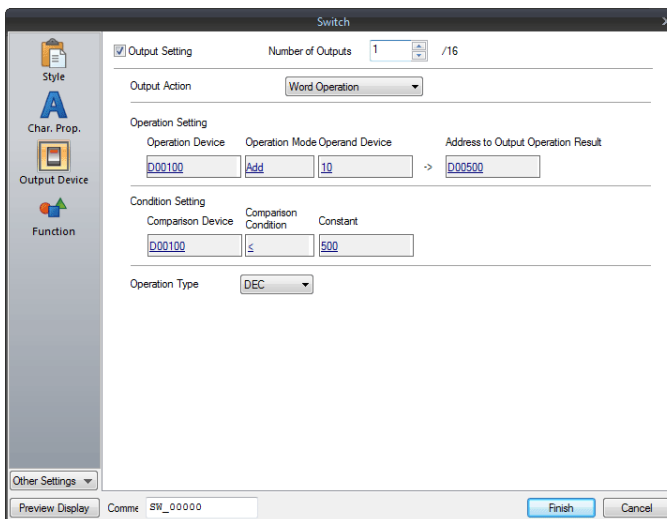
Operation Setting

Operation Device	Operation Mode	Operand Device		Address to Output Operation Result
D500	Add	10	→	D500

Condition Setting

Comparison Device	Comparison Condition	Constant
D100	<	500

Operation Type: DEC

When the data in D100 is less than "500", the operation (D500 + 10 → D500) is executed.

- Notes
  - If the value of the [Address to Output Operation Result] device memory is changed by an external command, the latter value has priority.
  - MONITOUCH processes operations in the following order:
    1) Reads the [Operation Device] and [Operand Device].
    2) Operation processing
    3) Writes the operation result to the [Address to Output Operation Result] device memory.

Function
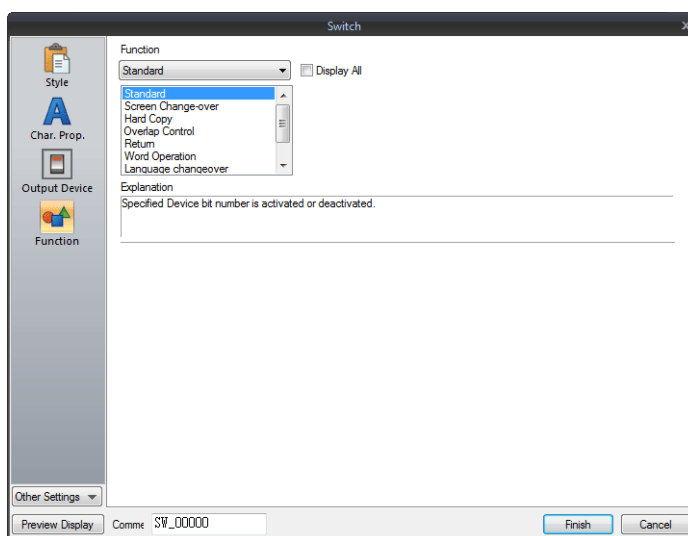
Item			Description
Function			Select the function to assign to the switch, that is, how the switch should work when pressed.
	Standard	Standard	Set the bit of the specified device memory ON/OFF.
		Screen Change-over *1 *2	Change to the specified screen number (0 to 9999).
		Hard Copy *3	Print the currently displayed screen image. Operations can be performed normally on the screen during printing.
		Overlap Control	Show or hide an overlap. For details, refer to "2 Overlap".
		Return *4 *5	Return to the previously displayed screen. Up to 8 previous screens can be displayed.
		Word Operation	Execute the set arithmetic expression. Select the [Changeover the screen] checkbox to change to the specified screen number after executing an operation. For details on word operations, refer to "Word operation" page 3-10.
		Language changeover	Change the display language. For details, refer to the TS Reference Manual 2.
		Storage Removal	Stop access to a storage device. For details, refer to "Storage Removal (Stopping Access to a Storage Device)" page 3-26.
	Security	Log In	Used in conjunction with the security function. For details, refer to the TS Reference Manual 2.
		Log Out	
Display All			Display all switch functions. For details, refer to "3.1.4 Basic Function of Switches" page 3-20.

*1 When the screen display is changed, all the switches and switch outputs should be turned OFF.
This is to prevent accidental activation of any switch that may be caused by inadvertent contact with the screen.

*2 It is possible to change the screen display without using the switch function by instead using an external command from the PLC.
For information on changing the screen from a PLC, refer to "1.1.3 Communication Setting".

*3 When the screen is printed with a [Function: Hard Copy] switch, the switch is also printed out.
To prevent the switch from appearing on the printout, use a function switch ([F1] to [F5]) or an external command to print instead.
For details on printing using an external command, refer to "16 Print".

*4 When the screen display reverts using the [Function: Return] switch, the initial screen state is displayed, that is, the state in which no scrolling or block changes have been specified.

*5 It is possible to disable returning for screens that are displayed by an external command.
Navigate to [System Setting] → [Unit Setting] → [General Setting] and select the [Return switch prohibited when switching the screen by an external command] checkbox on the [General Settings] tab. For details, refer to "1.1 System Settings".

Macro
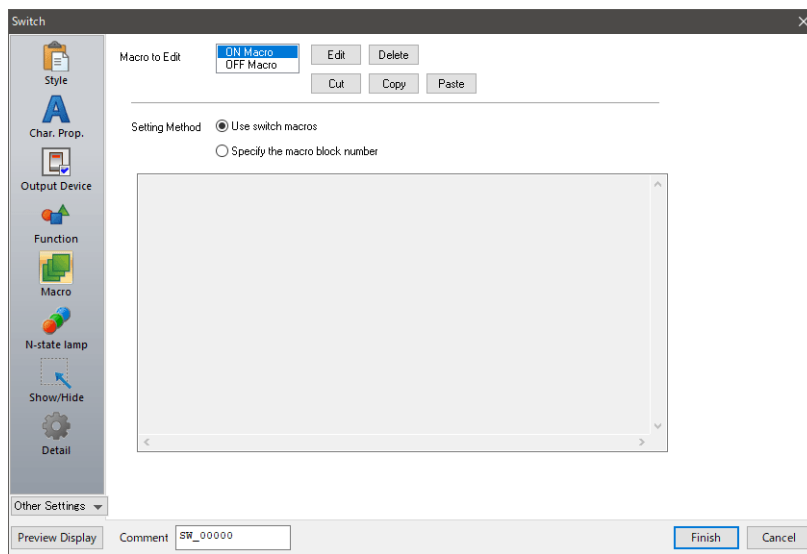
	Item	Description
Macro to Edit	ON Macro	Register a macro command to be executed once when the switch is pressed.
	OFF Macro	Register a macro command to be executed once when the switch is released.
	Edit	Start the macro editor. Register a macro command to be executed.
	Delete	Delete the macro command.
	Cut	Cut the macro command. This is convenient when copying a macro command to a different switch.
	Copy	Copy the macro command. This is convenient when copying a macro command to a different switch.
	Paste	Paste a copied macro command. This is used when copying a macro command from a different switch.
Setting Method	Use switch macros	Use a macro for the switch itself. Click the [Edit] button to register a macro.
	Specify the macro block number	Specify the macro registered to a macro block. If nothing is registered, click the [Edit] button to register a macro.

Delay

Item		Description
ON delay		Select this checkbox to specify a delay for when the switch is turned ON.
	ON after a lapse of preset time (Setting Time: 1 to 300 × 100 ms)	The switch is activated for the function as specified for [Output Device], [Function], and [Macro] when the switch is held down for the specified time.
	Pressed twice within the setting time (Setting Time: 10 to 300 × 100 ms)	The switch is activated for the function as specified for [Output Device], [Function], and [Macro] when the switch is pressed within the specified time interval. When the switch is pressed once, the frame of the switch starts blinking. The switch is activated when pressed again while blinking. If another switch is pressed or another screen is displayed while the switch frame is blinking, the switch operation is canceled. * If an overlap display is shown while the switch frame is blinking, the switch operation continues.
	Sound a buzzer when the switch is pressed for the first time	Selected: Always sound a buzzer when the switch is pressed. Unselected: When this checkbox is unselected, a buzzer only sounds when the switch is activated after the ON delay time.
ON repeat [*1]	Repeat ON function (Repeat interval: 15 to 150 × 10 ms)	When this checkbox is selected, the repeat function is added to the switch function.
	Repeat ON macro (Repeat interval: 15 to 150 × 10 ms)	When this checkbox is selected, the repeat function is added to the switch ON macro.
	Sound a buzzer during repeat	Select this checkbox to sound a buzzer when a repeat operation is executed.
OFF delay [*2] (Setting Time: 1 to 300 × 100 ms)		Select this checkbox to specify a delay for when the switch is turned OFF. A switch OFF operation (momentary output device memory, OFF macro, etc.) will be processed at the conclusion of the specified time after the switch has been released. * The OFF delay setting can be configured for a maximum of eight switches on a single screen.

*1   If the [Repeat ON function] checkbox is selected and the ON macro repeat function is also set (at $s64 to 66), the repeat operation of the ON macro will be executed first when the switch is pressed.

*2   When the screen has a switch currently performing an OFF delay operation, the screen cannot be switched (no switch operation acceptable) until the OFF delay operation is completed.
Likewise, when an overlap display has a switch currently performing an OFF delay operation, the overlap display cannot be switched or cleared until the OFF delay operation is completed.

Interlock

Item			Description
Use interlock			Select this checkbox to enable the interlock function for the switch.
	Condition Setting		Click a condition number to configure a condition that must be satisfied for the interlock to activate.

		Bit device	Set the interlock bit address.
			
			 Bit device "ON": switch operation is allowed
			     When [Bit device] is OFF, switch operation is prohibited.
			     When [Bit device] is ON, switch operation is allowed.
			
			 Bit device "OFF": switch operation is allowed
			     When [Bit device] is OFF, switch operation is allowed.
			     When [Bit device] is ON, switch operation is prohibited.

		Word Device	Set the comparison condition expression of the interlock device memory. Data Length: Set the data length of the condition value. 1-Word/2-Word Constant Display Type: Set the format of the comparison condition expression. [DEC +-]/[DEC]/[BCD]/[HEX] Comparison condition expression: Set a comparison sign, value, and device memory as the conditions for comparison.
		Security Level	Used in conjunction with the security function. Allow users of levels higher than the set level to operate the switch. For details on security functions, refer to the TS Reference Manual 2.
	Detailed Settings	Judge the condition when the switch is OFF [1]	This setting is available when [Momentary/Momentary W] is selected for [Output Action]. Set whether the system judges the conditions for interlock activation when the switch is released (i.e. when your finger is released from the switch). Unselected: The system does not judge the conditions when the switch is OFF. Selected: The system judges the conditions even when the switch is OFF. If the conditions are not satisfied, the switch will not be turned OFF even when your finger is released.
		Sound an error buzzer when the condition is not met	Set whether an error buzzer sounds when the switch is pressed and the conditions are not satisfied. Unselected: A buzzer does not sound. Selected: A buzzer will sound.
	Display ladder diagram		Select this checkbox to display the configured conditions for interlock activation as a ladder diagram.
	Display setting details		Select this checkbox to configure condition settings on the ladder diagram.

*1 Example of operation when the switch is OFF

Switch settings window
Device to Output: M0
Output Action: Momentary
Use interlock
    Condition 1
    Bit device: M1
    Bit device "ON": switch operation
    is allowed

When the switch is ON:

When the switch is OFF:

TS
Control panel
← Press

TS
Control panel
Release →

Judge conditions when the switch is OFF.

M1

Condition satisfied

Condition not satisfied

ON
Lamp ON graphic

ON
Lamp ON graphic

Output Device Memory M0 remains ON.

M1

Condition satisfied

Condition satisfied

ON
Lamp ON graphic

OFF
Lamp OFF graphic

Output Device Memory M0 is OFF.

Do not judge conditions when the switch is OFF.

M1

Condition satisfied

Ineffective

ON
Lamp ON graphic

OFF
Lamp OFF graphic

Output Device Memory M0 is OFF.

M1

Condition satisfied

Ineffective

ON
Lamp ON graphic

OFF
Lamp OFF graphic

Output Device Memory M0 is OFF.
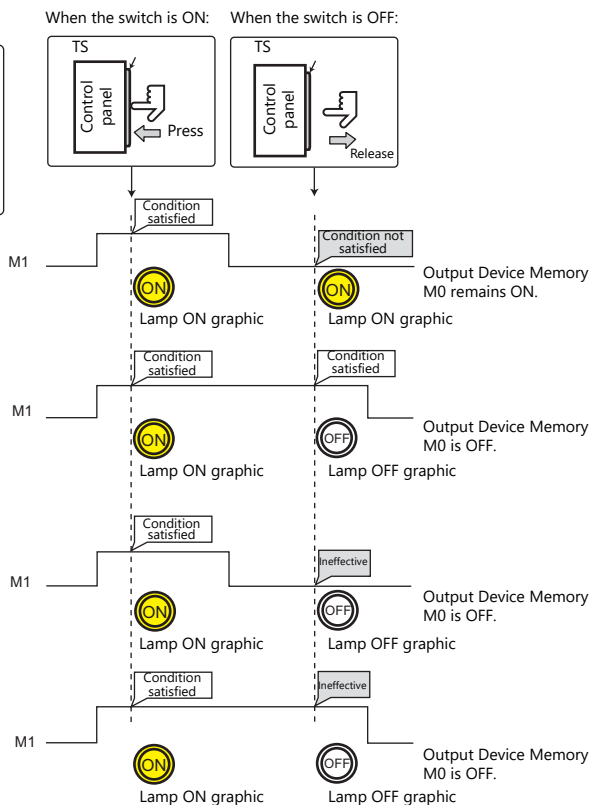
Message Box

Item		Description
Use message call function		Select this checkbox to automatically display a message dialog box when the switch is pressed. When [OK] is pressed, the switch is activated for the function as specified for [Device to Output], [Function], and [Macro]. When [Cancel] is pressed, no operations are performed and the message dialog box closes.
	Message Box Type	OK/Cancel Switch Use a message dialog box that displays an [OK] and [Cancel] switch.
		OK Switch Use a message dialog box that only displays an [OK] switch.
	Messages to Display	Reference one line of the message registered in the [Message] window. A maximum of 96 one-byte characters (48 two-byte characters) can be displayed. Click [Open] to display the [Message Edit] window.

- While a message dialog box is displayed, no switch operations other than those in the message dialog box are accepted (except for the function switches).
- If the screen is changed while a message dialog box is displayed, this has the same effect as pressing [Cancel].

N-State Lamp

The number of patterns specified in the [Style] settings is displayed.

Item				Description
Use N-state lamp				Select this checkbox to use the N-state lamp function. Specify bit device memory or word device memory for each pattern.
	Condition Setting			Set the conditions for operating a lamp. Click [Add] and set up a maximum of four conditions for lighting up the selected pattern.
		Bit Device		Light the lamp by setting the specified bit device memory to ON or OFF.
		Word Device		Light the lamp by setting a conditional expression for the specified word device memory.
			Constant Display Type	Select the data type of the conditional expression. [DEC+−] / [DEC] / [BCD] / [HEX]
			Condition expression	Set an equal sign, value, and device memory address as the conditions for comparison.
		Security Level		This setting is available when using the security function. Light the lamp according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.
	AND/OR Setting			When setting two or more conditions, set whether to perform AND or OR operations on the conditions.

Precedence

The TS series unit checks conditions in order starting from ON, P3, P4, and through to P128. The pattern for which conditions are determined to be satisfied the earliest is displayed.

Pattern No.	Precedence
ON	High
P3	
:	
P128	Low

If all conditions are not satisfied, the OFF pattern is displayed.

☞   For a detailed setting example, refer to "4 Lamp".

3

Show/Hide

Item		Description
Show		Display the numerical data display on the screen.
Hide		Do not display the numerical data display on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

	Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
	Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the switch using X and Y coordinates.
	Width/Height	Set the size of the switch by specifying width and height.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	A buzzer sounds individually	Unselected: This depends on the setting configured in [System Setting] → [Unit Setting] → [Buzzer]. Selected A buzzer sound is set for each switch. Standard/Short/Continuous/Error ^{*1}/OFF
	Save an operation log	Used in conjunction with the operation log. For details, refer to the TS Reference Manual 2.
	ID (0 - 255)	Set the ID.

*1　When the buzzer is set to OFF in [System Setting] → [Unit Setting] → [Buzzer], the setting here is disabled (i.e. buzzer OFF).

3.1.4 Basic Function of Switches

List of Functions

If the [Display All] checkbox is selected next to [Function] in the switch settings, all of the switch functions are displayed for selection.

When nothing is listed in the "Linked Part" column of the table, the switch activates alone with the set function. When one or more functions are listed in the "Linked Part" column, the switch will not perform its set function unless a link is established with a corresponding part (i.e. the IDs of the switch and corresponding part must match).

For details, refer to the relevant pages.

Standard

Name	Description	Linked Part	Refer to
Standard	Set the bit number of the specified device memory ON/OFF.	–	–
Screen Change-over	Change to the screen of the specified screen number.	–	–
Hard Copy	Print the currently displayed screen image.	–	page 16-17
Overlap Control	Control normal/call/multi-/global overlap display.	–	page 2-1
Return	Return to the previous screen	–	–
Reset	Clear logging and alarm data.	Alarm Trend	page 8-1 page 7-1
Word Operation	Perform operations on device memory data.	–	page 3-10
Item Select	Act as an entry selection switch if data is placed in the same switch.	Entry	page 6-33
Language changeover	Change the display language.	–	*1
Switching to Main Menu	Display the Main Menu screen.	-	-
+Block	Increment the display block by one.	Message mode Graphic Alarm Trend Memo Pad JPEG	page 12-1 page 11-1 page 8-1 page 7-1 page 13-21 *1
– Block	Decrement the display block by one.		
Roll Up	Scroll up.	Message mode Alarm Trend	page 12-1 page 8-1 page 7-1
Roll Down	Scroll down.		
Block Call	Change the display block.	Message mode Graphic Memo Pad	page 12-1 page 11-1 page 13-21
Mode	Display messages that correspond to functions on the switch.	Message mode Alarm	page 12-1 page 8-1
Occupy	Make a 1:1 connection with the PLC (multi-link connection only).	–	–
Storage Format (Buffer)	Format the sampling or logging file on the storage device.	–	–
Storage Removal	Stop access to the storage device.	–	page 3-26

*1   For details, refer to the TS Reference Manual 2.

Entry

Name	Description	Linked Part	Refer to
Character Input	Enter text onto switches.	Entry (DELETE key available for alarm usage)	page 6-1
Write	Write the entry data to the device memory.		
Clear	Clear the entry data.		
Toggle Sign	Invert the entered sign (for numerical input).		
Space	Enter a one-byte space (for character input).		
Back Space	Delete the character to the left of the cursor [*1].		
Delete	Delete the character at the cursor position [*1] [*2].		
+1	Increment the number at the cursor position by one (for numerical input).		
−1	Decrement the number at the cursor position by one (for numeric input).		
Add	Add a set number to the number display at the cursor position.		
Subtraction	Subtract a set number from the number display at the cursor position.		
Cancel	Restore the initial display state during entry operation.		
LFT	Move the cursor left [*2].		
RGT	Move the cursor right [*2].		
UP	Move the cursor to the previous option (−1).		
DW	Move the cursor to the next option (+1).	Entry	page 6-1
>>	Move to the next screen page (+1)		
<<	Move to the previous screen page (−1).		
Graphic Library	Change characters by reading a graphics library.		
Conversion of Kanji	Select the Kanji mode.		
80 Compatible HEX Key	Use when converting GD-80 series screen programs		
80 Compatible HEX Key Change			
Max. Value Entry	Display the maximum value at the entry display position.		
Min. Value Entry	Display the minimum value at the entry display position.		
Multi-char. Input	Change the text on the switch.		
Switching (Entry Mode Change)	Change the text entry mode (when the Japanese conversion function is used).		
Switching (1-byte/2-byte Char. Change)	Change between one-byte and two-byte characters (when the Japanese conversion function is used).		
Switching (Caps Lock)	Change between uppercase and lowercase characters (when the Japanese conversion function is used).		
Direct Input	Perform direct text input (when the Japanese conversion function is used).		
Word Edit	Edit registered words (when the Japanese conversion function is used).		
Word Registration	New word registration (when the Japanese conversion function is used)		
Char. Switching (+)	Increment the character entry switch by one.		
Char. Switching (−)	Decrement the character entry switch by one.		

*1 The decimal point and signs cannot be deleted from numerical data displays.
*2 For numerical displays, the [Allow to use Insert/DELETE keys when entering values] checkbox must be selected on the [General Settings] tab of the [Unit Setting] window, which is displayed by navigating to [System Setting] → [Unit Setting]. The above setting applies to the entry modes of all screens.

Sample

Name	Description	Linked Part	Refer to
Zooming in	Zoom in on a graph.	Trend Trend sampling	Trend page 7-1
Zooming out	Zoom out of a graph.		

Graph Return	Return to the latest sampling data.	Trend
		    Trend sampling
		    Data sampling
		Alarm
		    Alarm logging
		    Alarm tracking
			Alarm
			page 8-1

Display Change-over	Change the display between date display and time display.	Alarm
		    Alarm logging
		    Alarm tracking	

Print	Print sampling buffer data.	Trend
		    Data sampling
		Alarm
		    Alarm logging	

Change Display Order	Change the display order between chronological order and reverse chronological order.	Alarm
		    Alarm logging
		    Time order alarming
		    Alarm tracking	

Acknowledge	Display the acknowledgement time of the alarm.	Alarm Alarm tracking	

Memory Card

Name	Description	Linked Part	Refer to
File Select	File selection available from the list	Memory card mode	page 13-6
Record Select	Record selection available from the list		
Card Number Edit	Edit mode available with the specified multi-overlap display shown		
Card Name Edit	Edit mode available with the specified multi-overlap display shown		
File Name Edit	File edit mode available with the switch lit		
Record Name Edit	Record edit mode available with the switch lit		
Card Format	Formatting of memory cards		
Transfer Card -> PLC	Transfer of the selected record to PLC		
Transfer PLC -> Card	Transfer of the selected record from PLC		

Memo Pad

Name	Description	Linked Part	Refer to
Pen Color	Select the pen color.	Memo Pad	page 13-21
Pen Size	Select the pen thickness.		
Line	Draw a straight line.		
Delete Area	Delete the selected area of the memo pad.		
Delete All	Delete all memo pads on the screen.		

Table Data

Name	Description	Linked Part	Refer to
Cursor Movement to Right	Move the cursor right within the table.	Table Data Display	page 5-31
Cursor Movement to Left	Move the cursor left within the table.		
Table Move +	Move the table in the positive direction.		
Table Move –	Move the table in the negative direction.		

Digital Switch

Name	Description	Linked Part	Refer to
Digital Switch +	Increment the selected digit by one.	Numerical Display	page 3-25
Digital Switch −	Decrement the selected digit by one.		
Digital Switch Sign Inversion	Inverse the sign of the numerical data display.		

JPEG

Name	Description	Linked Part	Refer to
File Delete	Delete the JPEG file currently displayed or recipe file currently selected.	JPEG	*1
File Call	Load the JPEG file of the specified number.		
JPEG Search	Set an increment/decrement value for JPEG file selection.		

*1 For details, refer to "1 Image Display" in the TS Reference Manual 2.

Recipe

Name	Description	Linked Part	Refer to
Recipe Data Save	Save the specified recipe data.	−	page 15-1
Recipe Data Load	Load the specified recipe data.		
Recipe Data Delete	Delete the specified recipe data.		

Security

Name	Description	Linked Part	Refer to
Log In	Change the security level.	−	*1
Log Out	Change the security level to "0".		

*1 For details, refer to the TS Reference Manual 2.

Network Camera Display

Name	Description	Linked Part	Refer to
Step Up	Point the camera up.	Network camera display	*1
Step Down	Point the camera down.		
Step Left	Point the camera left.		
Step Right	Point the camera right.		
Zoom In	Zoom in on the camera image.		
Zoom Out	Zoom out of the camera image.		
Focus Far	Focus the camera on a distant point.		
Focus Near	Focus the camera on a nearby point.		

*1 For details, refer to the TS Reference Manual 2.

Remote Desktop

Name	Description	Linked Part	Refer to
Remote Desktop Show/Hide	Show or hide the remote desktop window of the connected server (computer) at the specified coordinates.	Remote Desktop	*2
Connect	Establish connection with a server (computer) to enable display of the remote desktop window.		
Disconnect	Disconnect from a server (computer) to disable the display of the remote desktop window.		
Connect/Disconnect	Connect to or disconnect from a server (computer) to respectively enable or disable the display of the remote desktop window each time the switch is pressed.		
Show/hide a scroll bar (S menu)	Show or hide the scroll bar (S menu) each time the switch is pressed. *1		
Reduce Display/100% Display	Change the display magnification of the computer screen image between the automatically reduced size and 100% magnification each time the switch is pressed.		

*1   While the auto-reduction function is in use, showing or hiding the scroll bar (S menu) is not selectable.

*2   For details, refer to TS Reference Manual 2.

Switch Function Examples

Digital Switch

Usage example

← Switch [Function: Digital Switch +]
← Numerical display [Function: Digital Switch]
← Switch [Function: Digital Switch –]
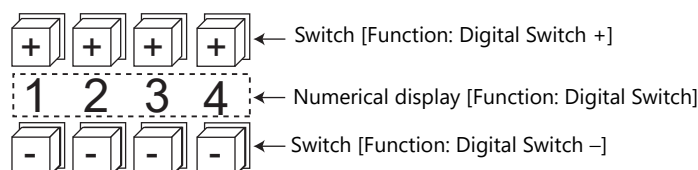
- Switch
  - Function

Item		Description
Digital Switch +	Target digits (1 to 17)	The selected digit is incremented by one.
Digital Switch –	Target digits (1 to 17)	The selected digit is decremented by one.
Digital Switch Sign Inversion	-	Inverse the sign of the numerical data display

  - [Detail] → [Detail settings]
    ID: Same as the numerical data display part.
- Numerical Display
  - [Function: Digital Switch]
    Carryover to higher/lower digits: When selected, carryover to higher/lower digits is performed.
    When not selected, only the specified digit changes.
  - [Detail] → [Detail settings]
    ID: Same as the switch.

Without carryover:
- Without sign or with "+" sign
  Pressing the [+] key on the first digit changes "129" → "120".
  Pressing the [–] key on the first digit changes "120" → "129".

Only the third digit changes in order of 0, 1, 2, 3, ... 9, 0, 1.

Only the first digit changes in order of 0, 9, 8, 7, ... 2, 1, 0.
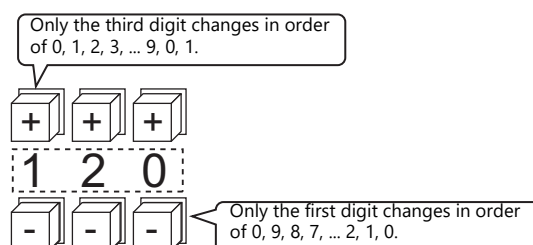
- With "–" sign
  Pressing the [+] key on the first digit changes the display as shown below.
  "-008" → "-009" → "000" → "001" → "002"
  Change the sign using a switch ([Function: Digital Switch Sign Inversion]).

With carryover:
- Without sign or with "+" sign
  Pressing the [+] key changes "129" to "130".
  Pressing the [–] key changes "120" to "119".

- With "–" sign
  Pressing the [+] key changes "-129" to "-128".
  Pressing the [–] key changes "-129" to "-130".

Carry up

Carry down
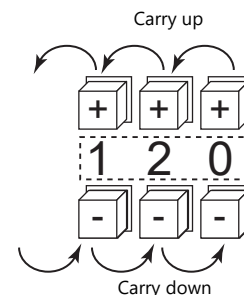
Notes

- Maximum and minimum values can be set when [Alarm] is selected for [Operation/Alarm].
- [Word Operation] and [Scaling] can be used.
- If multiple numerical data display parts ([Function: Digital Switch]) of the same ID exist, the part that is placed first is targeted for operation.

Storage Removal (Stopping Access to a Storage Device)

The switch lamp status changes as shown in the following table. Information on the switch status is stored at $s500 in the system device memory.

Lamp	Storage Removal	Storage Access Status
OFF	Prohibited	Normal access
Blinking ON/OFF	Prohibited	Data writing triggered by switch turning ON
ON	Permitted	Access stopped

* If the [Upon storage removal] checkbox is selected in the storage output settings of the alarm server or logging server, alarm/logging data is output in CSV format.

Notes

- The [Storage Removal] switch stops access to all connected storage devices (SD card and USB storage devices).
- When intending to cancel the switch ON status (with access stopped) and start accessing the storage device, press the switch again.
- If the screen is changed when the switch is ON, the state of the storage device does not automatically return to the accessing state.
- The lamp device memory address specified for the switch becomes unavailable.

3.1.5 Flowchart

When the Switch is ON (Pressed)
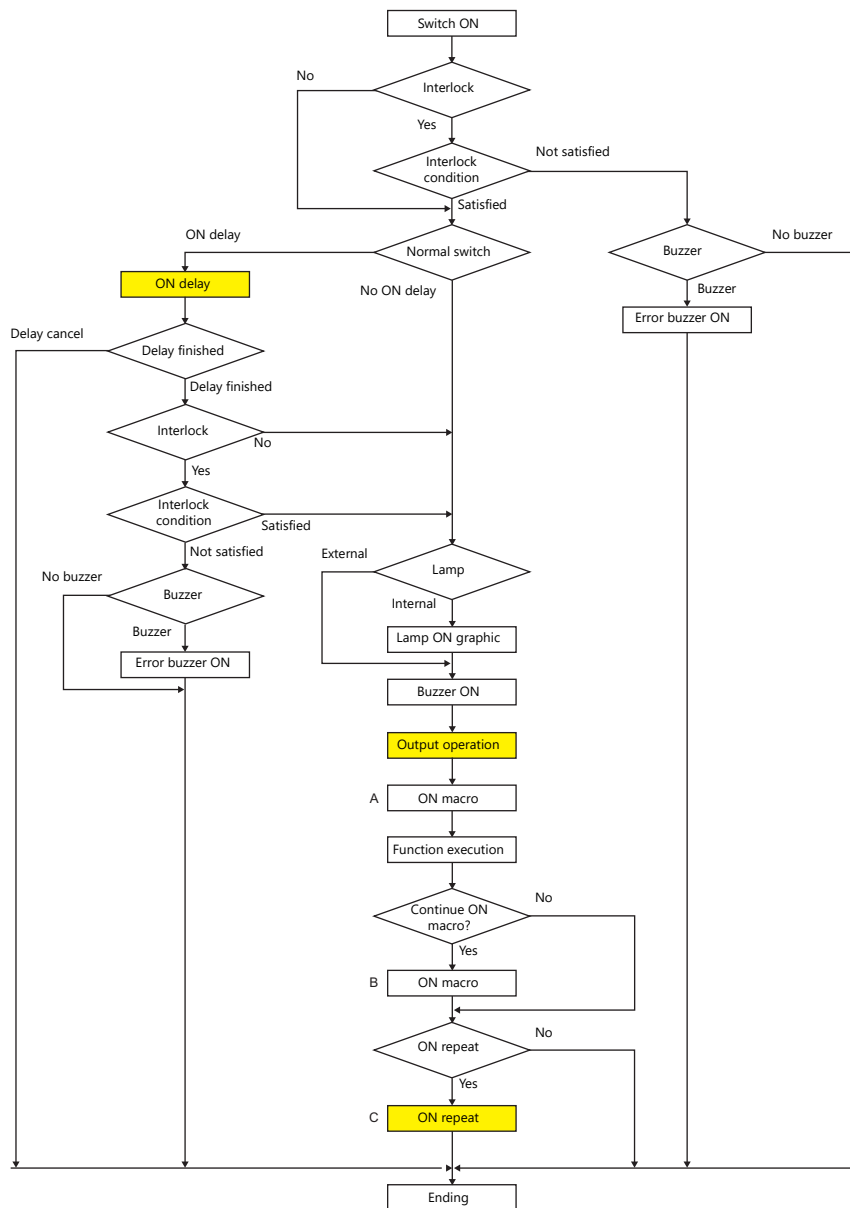
*1 [Output Action] or [Macro] should be selected for execution.
*2 Macro B starts after macro A is finished with the "SWRET" command.
   For details on macro commands, refer to the Macro Reference Manual.
*3 The switch function is executed after the ON macro is executed. However, the "SET_SCRN," "SET_MOVLP," "OVLP_SHOW," and "OVLP_POS" commands are executed after the switch function has been executed.
*4 Operation "C" is repeated until the switch is turned OFF (released).

ON delay

ON delay

```
[ON delay]
   |
   v
<First-touch buzzer> ── No ──┐
   |                         |
  Yes                        |
   v                         |
[Buzzer ON]                  |
   |                         |
   v <───────────────────────┘
<ON delay timer up> ── Switch OFF ──┐
   |                                |
  Yes                               |
   v                                v
[Delay finished]              [Delay cancel]
```

Double-touch

```
[ON delay]
   |
   v
[Switch frame blink]
   |
   v
<Second touch> ── timer up ──┐
   |                         |
  Yes                        |
   v                         v
[Delay finished]       [Delay cancel]
```

Message dialog box

```
[ON delay]
   |
   v
[Buzzer ON]
   |
   v
<Confirmation pop-up
 window displayed> ── [CANCEL] pressed ──┐
   |                                     |
 [OK] pressed                            v
   |                                [Buzzer ON]
   v                                     |
[Confirmation pop-up                     v
 window clear]                    [Confirmation pop-up
   |                               window clear]
   v                                     |
[ON processing finished]                 v
                                  [CANCEL processing
                                   finished]
```

ON delay + message dialog box

```
[ON delay]
   |
   v
<First-touch buzzer> ── No ──┐
   |                         |
  Yes                        |
   v                         |
[Buzzer ON]                  |
   |                         |
   v <───────────────────────┘
<ON delay timer up> ── Switch OFF ──┐
   |                                |
  Yes                               |
   v                                v
[Delay finished]              [Delay cancel]
   |
   v
[Buzzer ON]
   |
   v
<Confirmation pop-up
 window displayed> ── [CANCEL] pressed ──┐
   |                                     |
 [OK] pressed                            v
   |                                [Buzzer ON]
   v                                     |
[Confirmation pop-up                     v
 window clear]                    [Confirmation pop-up
   |                               window clear]
   v                                     |
[ON processing finished]                 v
                                  [CANCEL processing
                                   finished]
```
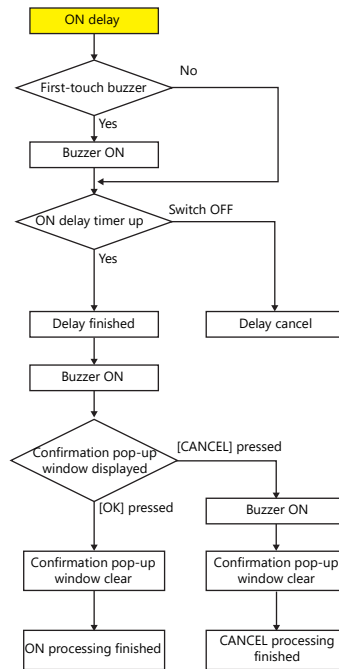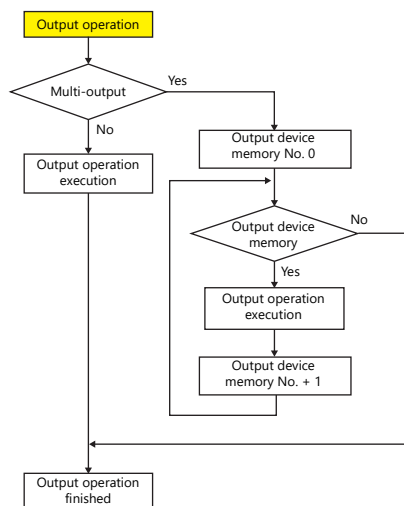
Output action

ON repeat
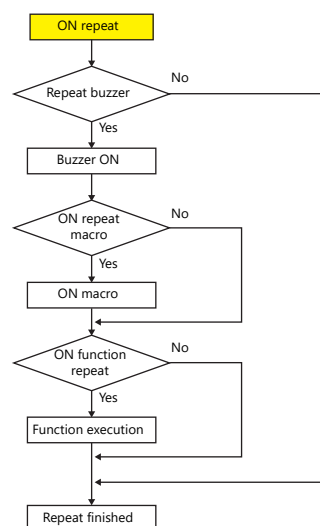
When the Switch is OFF (Released)

Set, reset, alternate

Release the switch.

OFF delay — No

OFF delay timer up — Switch ON → Delay cancel

Yes → Delay finished

Switch OFF

Lamp — External / Internal

Lamp OFF graphic

OFF macro

Ending

Momentary, momentary W

Release the switch.

OFF delay — No

OFF delay timer up — Switch ON → Delay cancel

Yes → Delay finished

Switch OFF

Interlock — No / Yes

When the switch is OFF — Ineffective / Effective

Interlock condition — Satisfied / Not satisfied

Lamp — External / Internal → Lamp OFF graphic

Output operation

OFF macro

Lamp — External / Internal → Lamp OFF graphic

Ending

* For details on [Output Action] settings, refer to "Notes on [Momentary] and [Momentary W] operation" page 3-9.

3.1.6 Coordinate Output

The current touch switch information is output to $s900 to 902 of the system device memory.
This information is useful when linking to an image processing device.
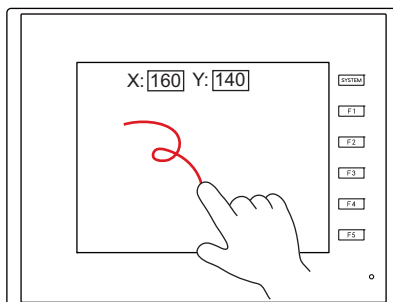
- $s900
  Touch switch status

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Not used

0: Switch OFF
1: Switch ON

- $s901
  X coordinate (absolute)
- $s902
  Y coordinate (absolute)

3.1.7   Notes

⚠️ Do not use switches where they could cause injury to people or damage machinery. Moreover, do not use switches as emergency switches.

Placement

Minimum Switch Size and Maximum Number of Switches

- Minimum size: 2 dots × 2 dots (For safety reasons, however, a size of at least 18 dots × 14 dots is recommended.)
- Maximum number of switches (including scroll bars and slide switches)
  - TS2060:   192
  - TS1000S: 1024

Placing Switches Overlaying Other Switches

⚠️ Do not overlay one switch on another switch.

- If switches are overlaid, the activation of switches is dependant on the selection of the [System Setting] → [Unit Setting] → [General Setting] → [If a switch is overlaid on another, enable the upper switch] checkbox. For details, refer to "1 System" "General Settings" page 1-12.

Switch Area

The operable area that is sensitive to screen presses is basically identical to the switch part area. However, the operable area may differ depending on the part type, placement method, and enlargement or reduction.
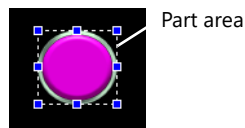
Part area

Check the action area as described below.

Location of settings

[View] → [Display Environment] → [Display] tab → [Display Area] checkbox
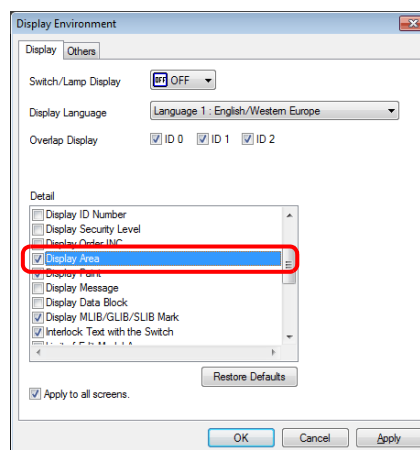
When the [Display Area] checkbox is selected, a dotted box is shown around each placed switch part as shown below. This dotted box indicates the switch's operable area. Pressing within the switch's operable area will activate the switch.

The outline of each switch part is called the "part area" of the switch. Pressing anywhere outside of this area does not activate the switch.

Part area
Operable area
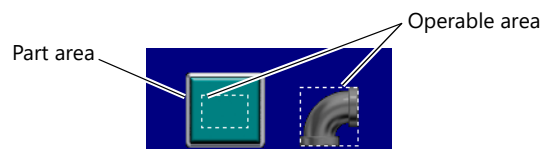
3.2   Scroll Bars

3.2.1 Overview

Scroll bars can be used to display portions of messages or JPEG images that lie off screen.
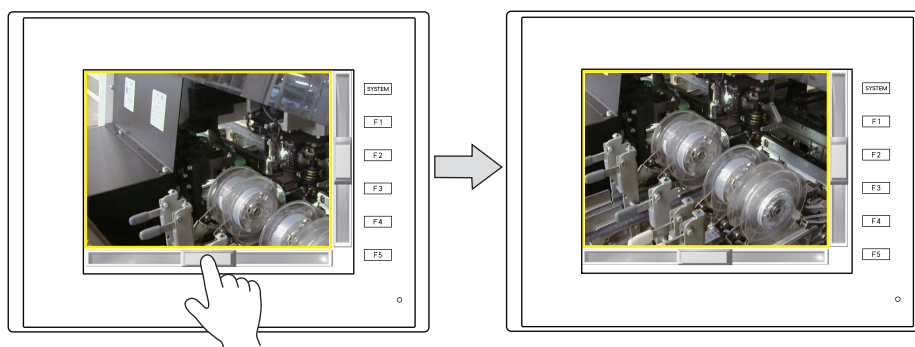
Scroll the screen by moving the slide switch
or pressing the desired position on the rail.

Position to press and data write timing
- The scroll bar operates when either the slide switch or rail is pressed.
- Writing of a value occurs when the slide or rail is released.

Conceptual diagram of slide switch movement
- The slide switch moves together with your finger during movement.

Slide switch   Moving   Line   Rail
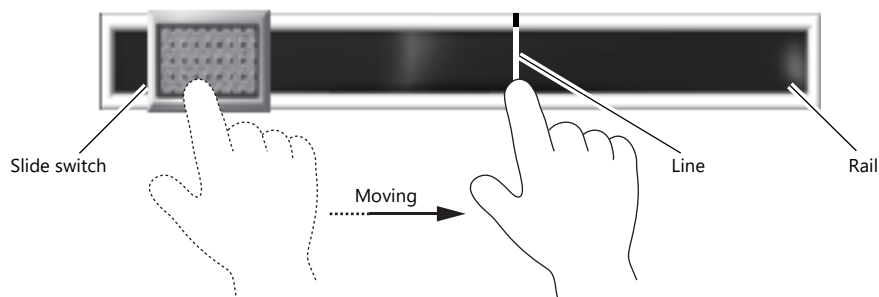
Applicable Items

Item	Scroll Direction
JPEG	Vertical and horizontal
Bit order alarming and alarm sub-display	Vertical and horizontal
Message mode	Vertical and horizontal
Trend sampling	Vertical or horizontal [*1]
Alarm logging	Horizontal
Time order alarming	Horizontal
Alarm tracking	Horizontal
Memory card mode	Vertical and horizontal
Recipes	Vertical and horizontal

*1   The scrolling direction depends on the [Direction] setting in the [Trend Graph] window.
[↑] [↓]: vertical scrolling, [→] [←]: horizontal scrolling

3.2.2 Setting Examples

Scroll bars can be added to screens that display JPEG images.

* **For details on JPEG display settings, refer to the TS Reference Manual 2.**
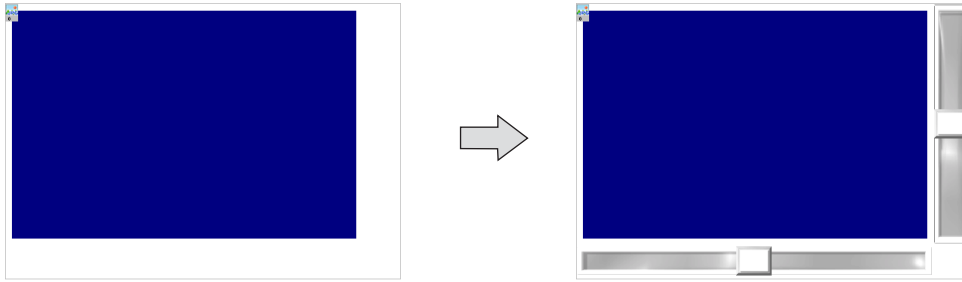
1. Click [Parts] → [Catalog] to display the catalog window.
   Configure the following settings and drag and drop a vertical scroll bar onto the screen.
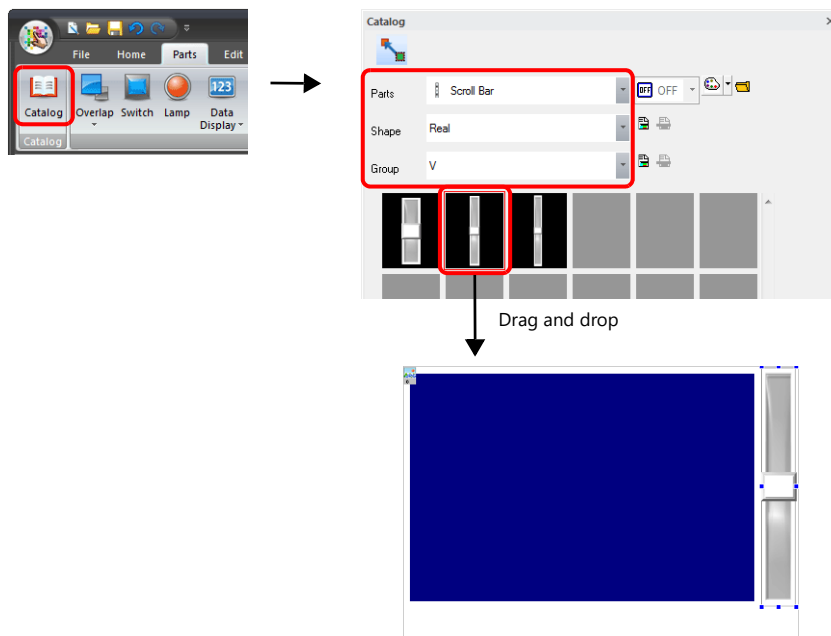
Drag and drop

2. Double-click on the scroll bar to display the settings window.
   Configure the [Output Setting] settings as shown below.
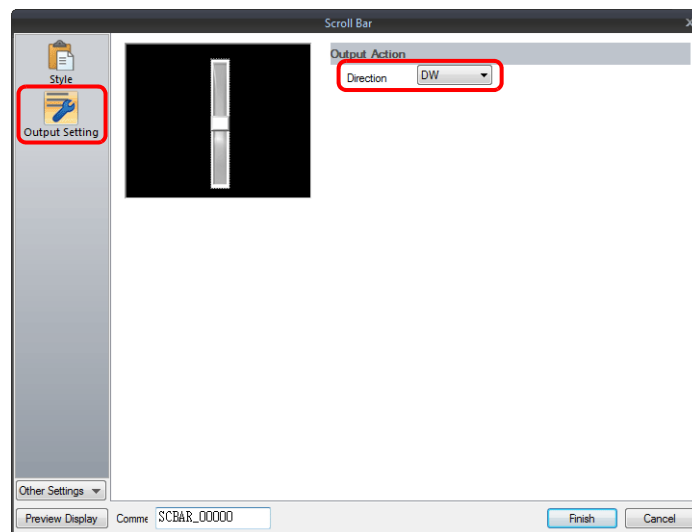
3. Click [Detail] → [Detail Settings], link [ID] to the ID of the JPEG display, and then click [Finish].
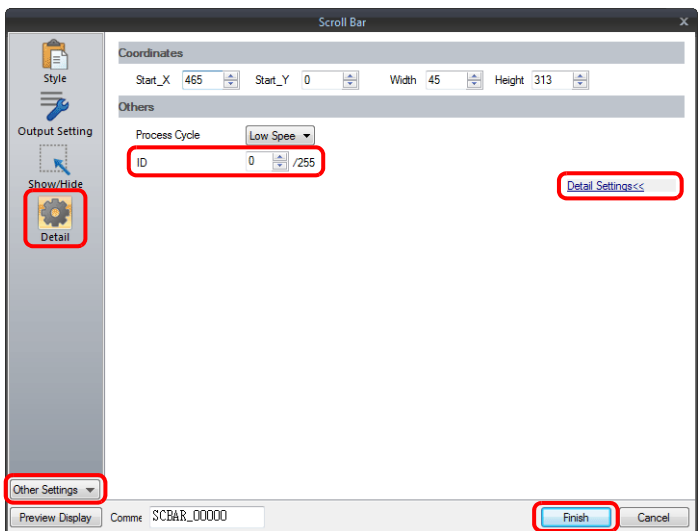
4. Drag and drop a horizontal scroll bar onto the screen from the catalog window in the same manner as step 1.

5. Double-click on the scroll bar to display the settings window.
   Configure the [Output Setting] settings as shown below.
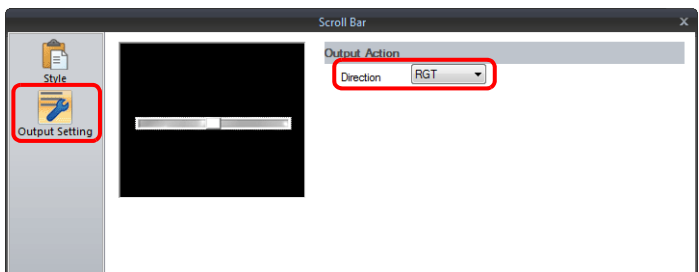
6. Click [Detail] → [Detail Settings], link [ID] to the ID of the JPEG display, and then click [Finish].
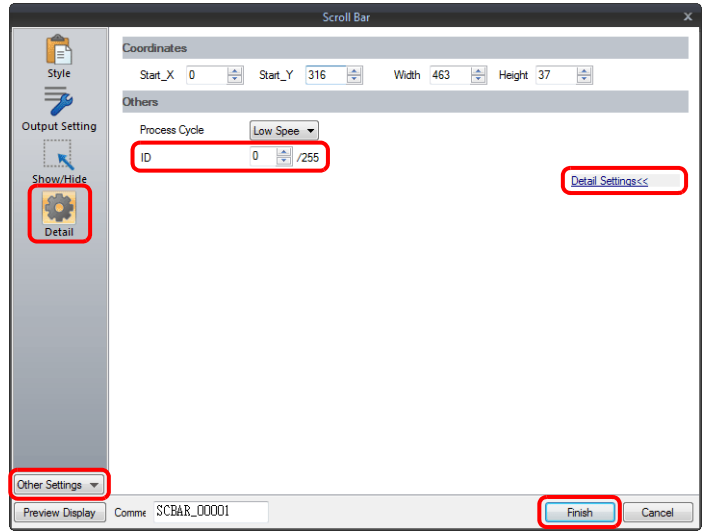
This completes the necessary settings.

3.2.3 Detailed Settings

Style
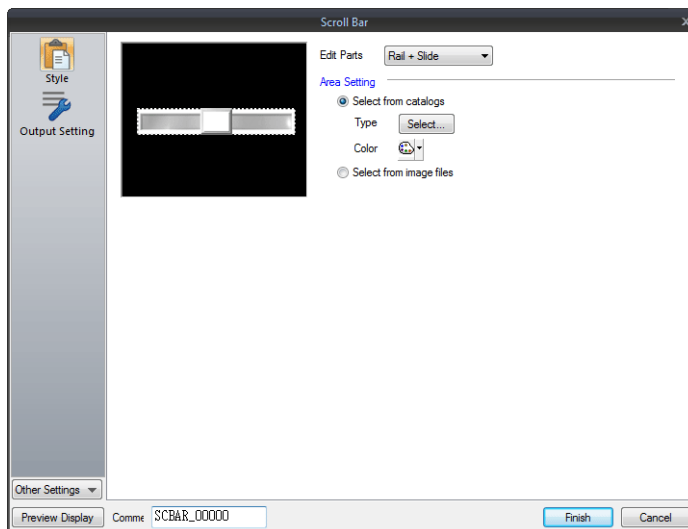
Item		Description
Edit Parts		Select the parts to edit (rail/slide).
Area Setting	Select from catalogs	Select the part design of each pattern. After selecting the part, select the part color.
	Select from image files	Select a bitmap file.

Output Setting
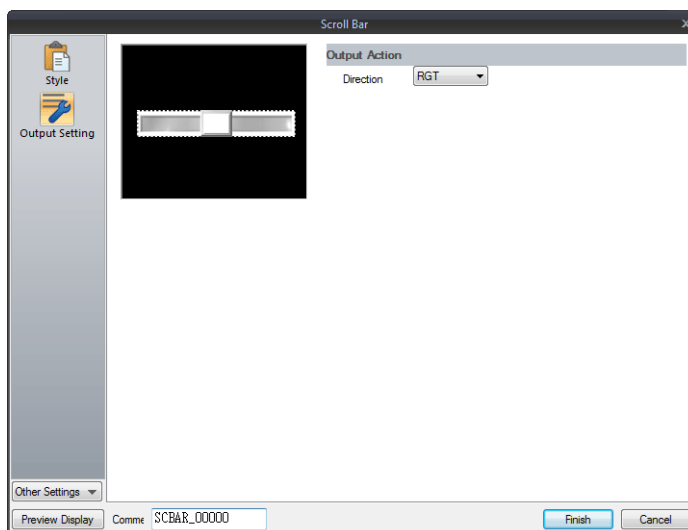
Item		Description
Output Action	Direction (RGT, LFT, UP, DW)	Select the scrolling direction.

Show/Hide

Item		Description
Show		Display the numerical data display on the screen.
Hide		Do not display the numerical data display on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.
	Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
	Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.
	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the scroll bar using X and Y coordinates.
	Width/Height	Set the size of the scroll bar by specifying width and height.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID (0 - 255)	Set the ID.

3.2.4 Notes

- Maximum number per screen (including switches and slide switches)
  - TS2060:   192
  - TS1000S: 1024
- Scrolling is performed in pixel units.
- If multiple scroll bars are placed that have the same ID and are not linked to other items, the scroll bar in the foreground takes effect.

3

3.3 Slider Switch

Slider switches are used in conjunction with numeric data entry.
For details on slider switches, refer to "6.1 Numerical Data Entry".

4 Lamp

4.1   Overview

- The displayed patterns of lamps are switched in response to data changes in the lamp device memory.
  There are lamps called "bit lamps" that are switched according to bit setting (ON) and resetting (OFF) and "word lamps" that are switched according to the values placed in device addresses.
  - Bit lamp
    Lamp device memory: M19
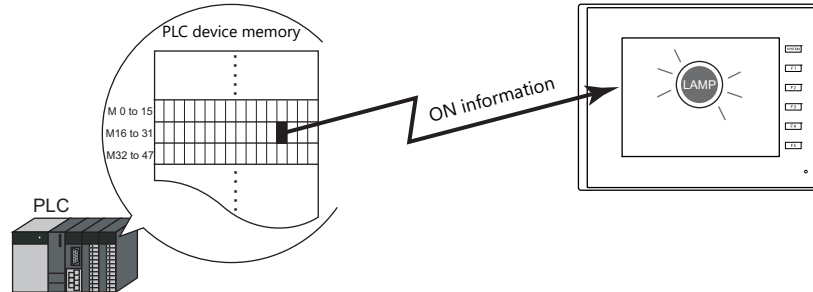
☞   For example settings, refer to "Using Bit Lamps" page 4-3.

  - Word lamp
    Lamp device memory: D100
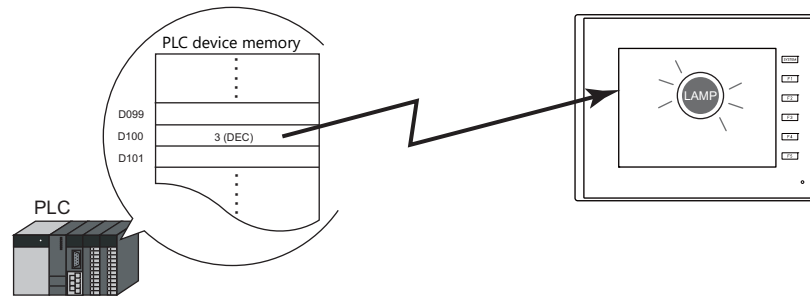
- Colors can be set on a pattern-by-pattern basis. For a [Draw Mode: REP] lamp, the text on the lamp can also be set for each pattern.
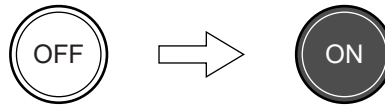
- Lamps can be set to light up when multiple conditions are satisfied. (N-state lamp)
  Up to four conditions can be defined using AND and OR operators.
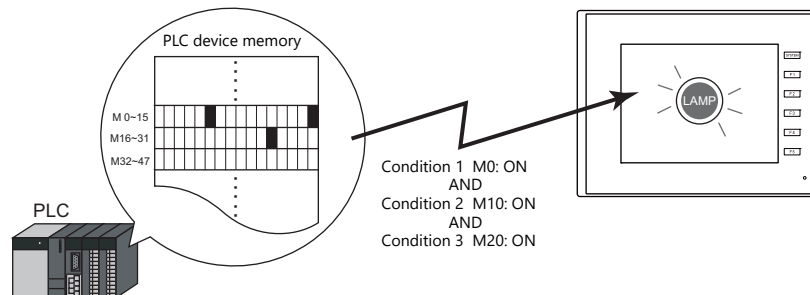
☞   For example settings, refer to "Using Lamps with Conditions (N-State Lamp)" page 4-4.

- A single lamp can change between a maximum of 128 patterns.
  This can be done using consecutive device memory addresses or by using any desired addresses (N-state lamp).

Pattern 0 (OFF)	Pattern 1 (ON)	Pattern 2 (P3)	Pattern 3 (P4)	Pattern 4 (P5)	Pattern 5 (P6)
Operation stop	⇨ Operation start	⇨ Tank alarm	⇨ Temperature increase	⇨ Temperature decrease	⇨ Water pressure drop

Pattern 127 (P128)	Pattern 126 (P127)			Pattern 7 (P8)	Pattern 6 (P7)
Production discontinued!	⇦ In preparation	– – – – – – – –		Electric leak warning!	⇦ Voltage drop

( ): Bit lamp patterns
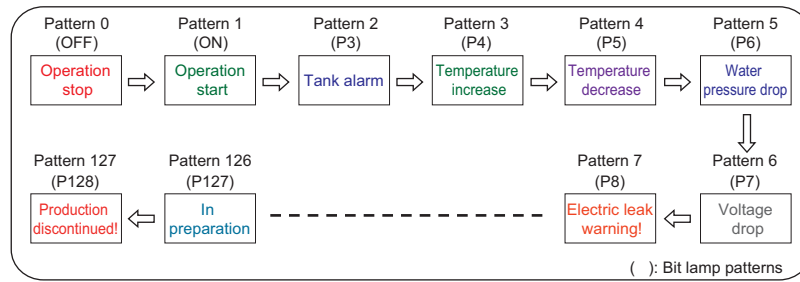
☞ For an example on setting device memory addresses as desired, refer to "Creating a Three-Pattern Lamp (N-State Lamp)" page 4-5.
For an example on setting consecutive device memory addresses, refer to "Placing 128 Pattern Lamps" page 4-6.

4.2   Setting Examples

Using Bit Lamps

When the M19 bit of the PLC device memory is ON, the lamp turns on, and when the M19 bit is OFF the lamp turns off.
Lamp device memory: M19
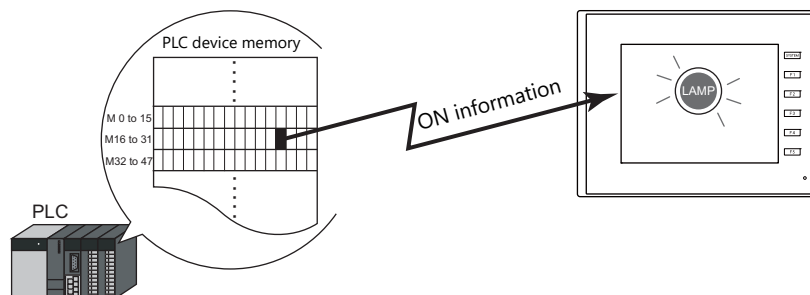
1. Click [Parts] → [Lamp] and place a lamp on the screen.
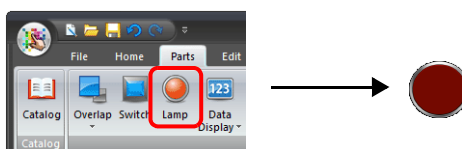
2. Double-click on the lamp to display the settings window.
   Configure the following settings for [Style] and then click [Finish].
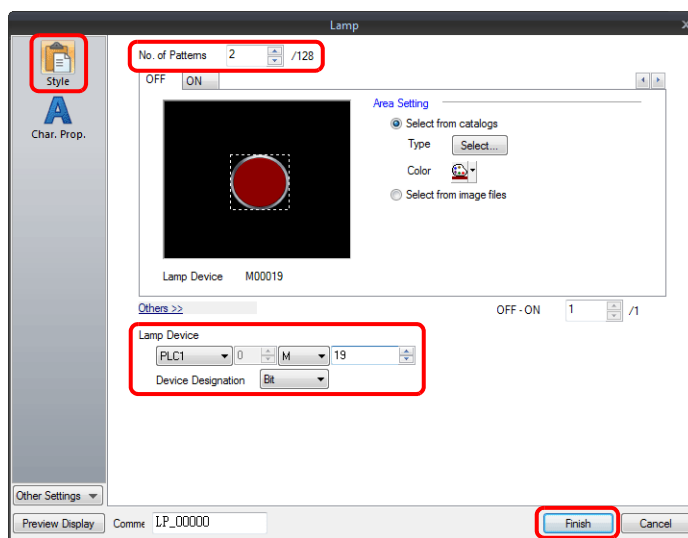
This completes the necessary settings.

Using Lamps with Conditions (N-State Lamp)

Set a lamp that lights up when the M0, M10, and M20 bits of PLC device memory all turn ON.
    Condition 1: M0 (ON)
    Condition 2: M10 (ON)
    Condition 3: M20 (ON)
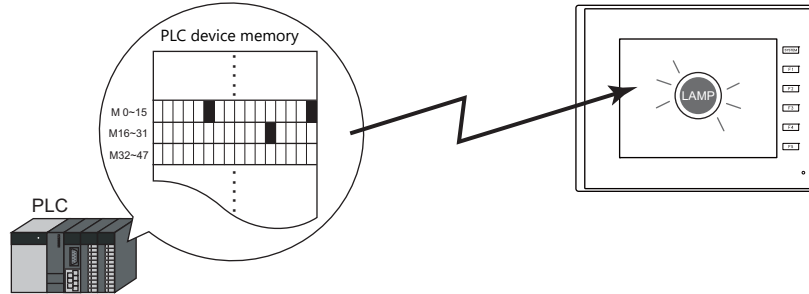
1. Click [Parts] → [Lamp] and place a lamp on the screen.
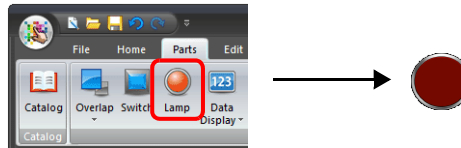
2. Double-click on the lamp to display the settings window.
    Configure the [N-state lamp] settings as shown below and then click [Finish].
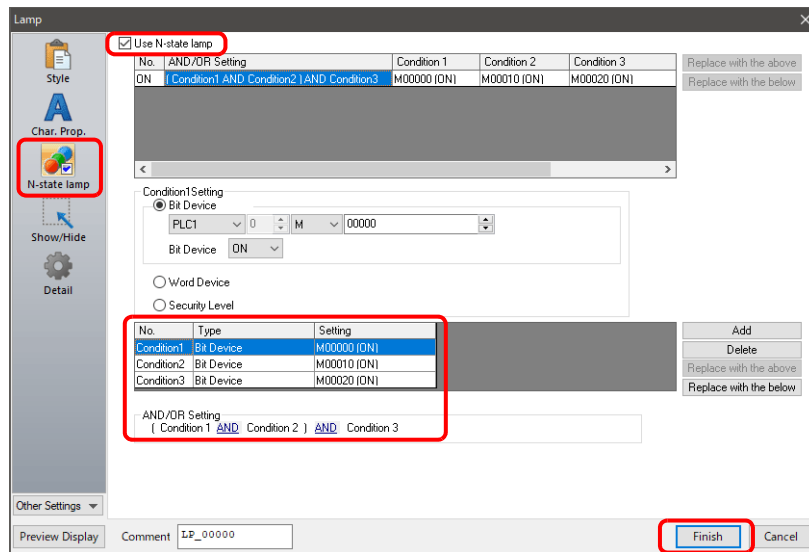
This completes the necessary settings.

The lamp lights up when the M0, M10, and M20 bits all turn ON.

Creating a Three-Pattern Lamp (N-State Lamp)

Set a lamp that shows the ON pattern when the M0 bit of the PLC device memory turns ON and the P3 pattern when the D100 value is between "1" and "50".
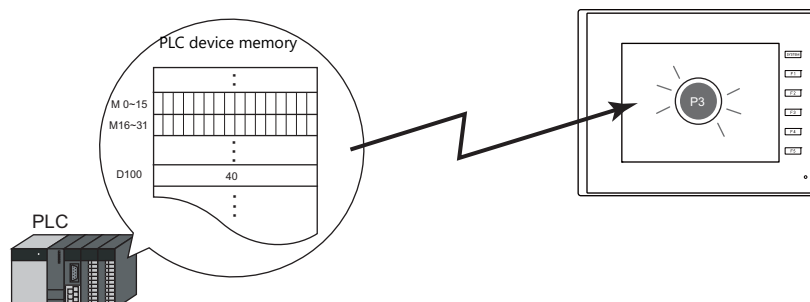
1. Click [Parts] → [Lamp] and place a lamp on the screen.
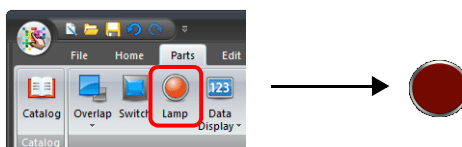
2. Double-click on the lamp to display the settings window.
    Set the [No. of Patterns] to "3" in the [Style] settings.
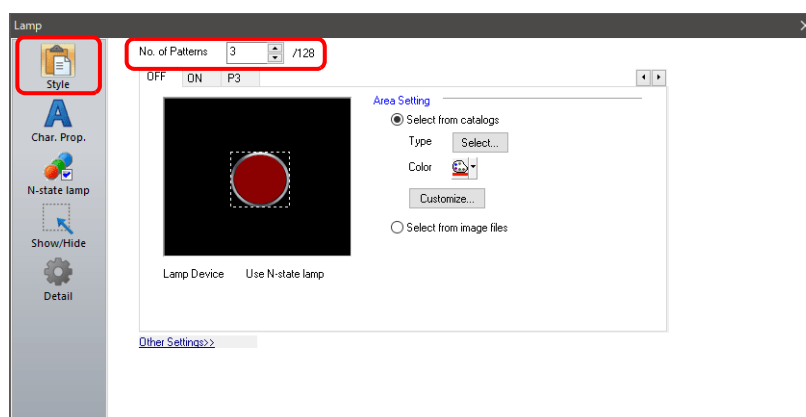
3. Configure the [N-state lamp] settings as shown below and then click [Finish].

Conditions for showing ON pattern   Conditions for showing P3 pattern

This completes the necessary settings.

The TS series unit checks conditions in order starting from ON, P3, P4, and through to P128. The pattern for which conditions are determined to be satisfied the earliest is displayed.
If all conditions are not satisfied, the OFF pattern is displayed.

Placing 128 Pattern Lamps

Set a 128 pattern lamp, like the one shown in the figure below.
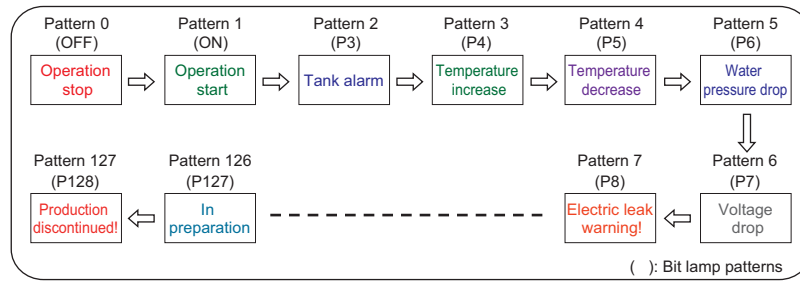
Setting procedure

1. Click [Parts] → [Catalog] to display the catalog window.
   Configure the following settings and drag and drop a lamp onto the screen.
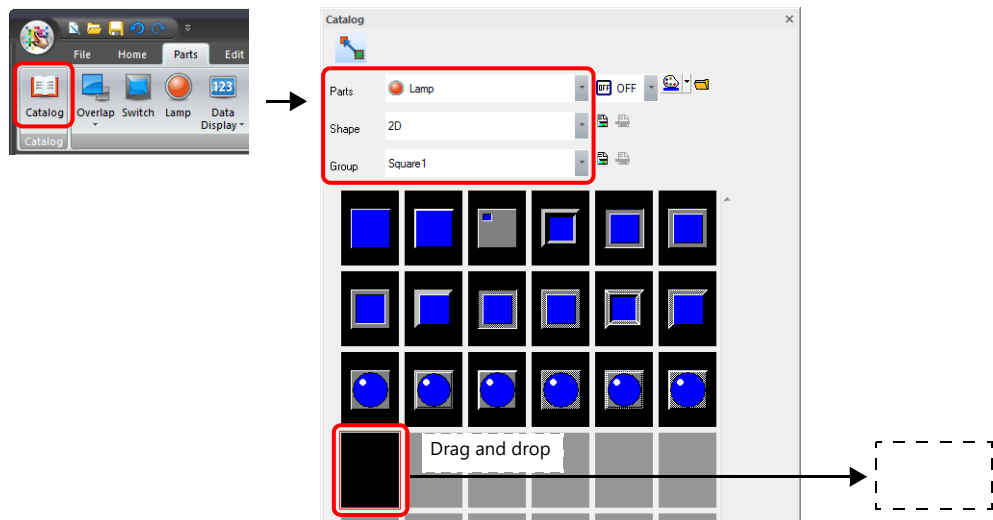
2. Double-click on the lamp to display the settings window.
   Configure the [Style] settings as shown below.
   - Bit lamp
       Lamp device memory: M0
       (Used lamp device memory range: M0 to M126)
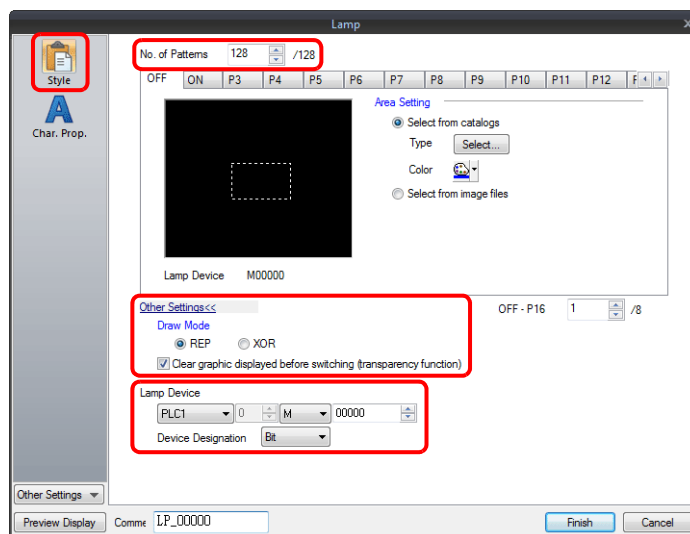
- Word lamp
  Lamp device memory: D100
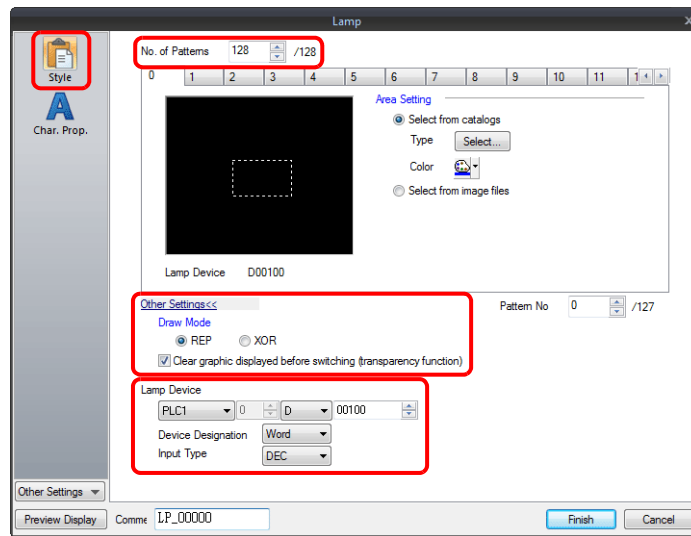
3. Configure the [Char. Prop.] settings as shown below.
   Change between the [OFF] to [P128] tab and [0] to [127] tab to register text for each pattern and then click [Finish].
   - Bit lamp
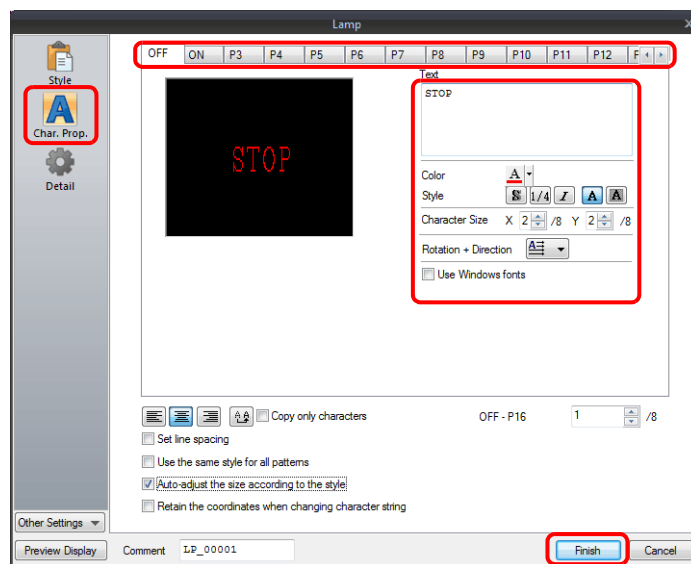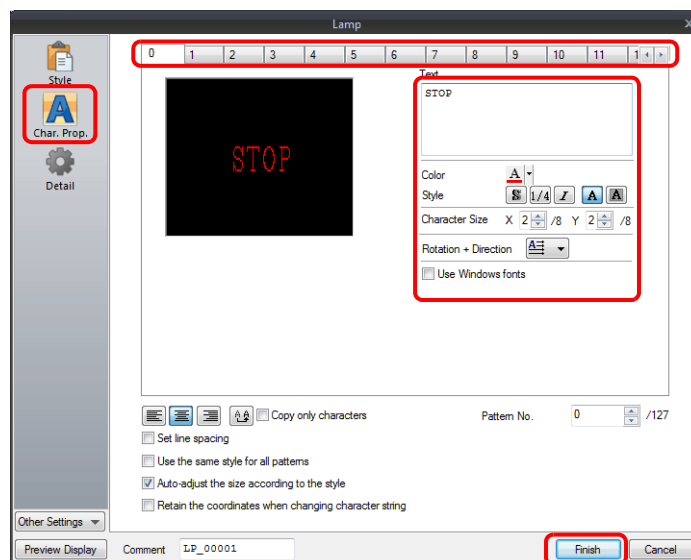
   - Word lamp

This completes the necessary settings.

Display example

- Bit lamp

When M0 to 126 is set to "OFF" in the PLC device memory, pattern 0 (OFF) is displayed.

Set M4 in the PLC device memory to ON. Pattern 5 (P6) is displayed.
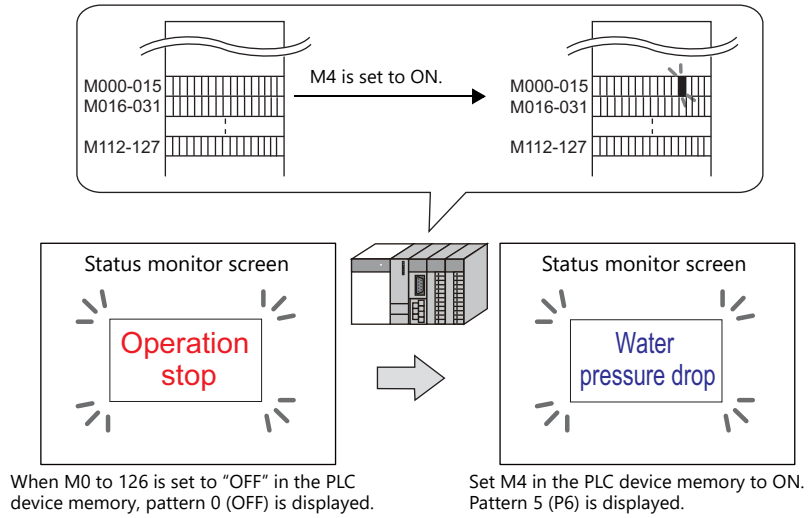
* When multiple bits are set to ON, a pattern is displayed according to the most significant bit.

Pattern 127 (P128) is displayed.

- Word lamp

When D100 is set to "0" in the PLC device memory, pattern 0 is displayed.

Set "3" for D100 in the PLC device memory. Pattern 3 is displayed.
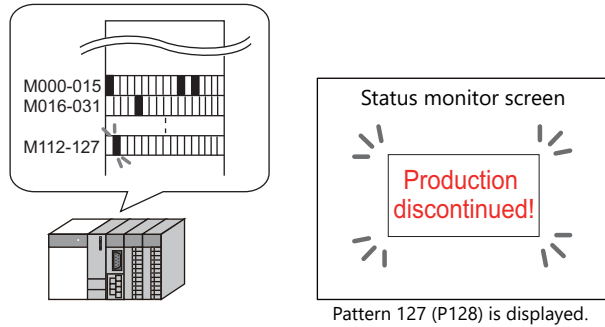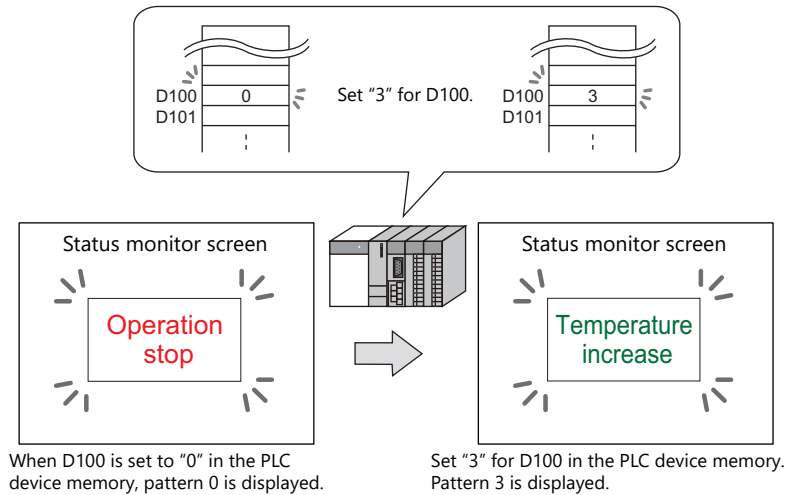
* If a value outside the specified range is set for the lamp device memory, the lamp display is not changed.

Notes

- When placing multiple lamps, set up consecutive addresses for the lamp device memory to ensure high-speed processing.
- When placing multiple lamps that have a different number of screen patterns and the lamp device memory are allocated with consecutive addresses, be careful configuring the settings of the lamp device memory. The required number of bits varies depending on the number of patterns.

4.3   Detailed Settings

Style

Item		Description
No. of Patterns (2 - 128)		Set the number of patterns that the lamp can display.
Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color.
	Select from image files	Select a bitmap file. The bitmap file can be set to all patterns by clicking [Apply to All Patterns].
Frame	Type	Select the frame type of the lamp. * Only available with 2D (Square2) parts.
	Color	Select the frame color of the lamp. * Only available with 2D (Square2) parts.
Enable flash display function (flashing with OFF pattern)		This item is available when a 3D pattern type [1] other than an OFF pattern (excluding "Sign" and "3D_128" parts) is selected. Select this checkbox to flash the display between the selected pattern and the OFF pattern.
Other Settings	Draw Mode REP/XOR	REP: Display using the color set in [Area Setting]. XOR: When the lamp device memory is ON, the frame and text are displayed in the color resulting from an XOR operation. For the difference between REP and XOR, refer to "4.4 Draw Mode" page 4-15.
	Clear graphic displayed before switching (transparency function)	The previous graphic is not retained when the checkbox is selected. For details, refer to "Notes on the transparency function" page 4-10.
Lamp Device [2]	Device Designation	Bit: The lamp display is changed by setting (ON) and resetting (OFF) bits. The required number of bits depends on the number of display patterns. (127 bits maximum) * **When multiple bits are set (ON), the most significant bit has priority.** Word: The lamp display is changed according to the value specified for the device memory address. The range of setting values varies with the number of patterns. (Range: 0 to 127) If a value outside the specified range is set, the lamp display is not changed.
	Input Type (DEC/BCD)	Specify the input format of the device memory.
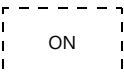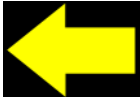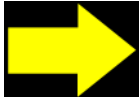
*1   Notes on 3D and 2D pattern types
Part shapes differ depending on the selection made in the catalog.
- 3D type: Real, Sign, 3D, 3D_128, HA
- 2D type: 2D
Selection of an image file corresponds to the 3D type.
*2   When the [Use N-state lamp] checkbox is selected, the setting is hidden.

Notes on the transparency function

The transparency function is used to create parts that are only displayed when ON or parts only consisting of characters.

The following shows how parts with transparency placed on the screen are displayed.

	OFF	ON
Part only displayed when ON	Hide	
Only characters displayed	OFF	ON
Custom parts (Black: transparent color)		

- Clear graphic displayed before switching (transparency function) Unselected
  The previously displayed image remains.
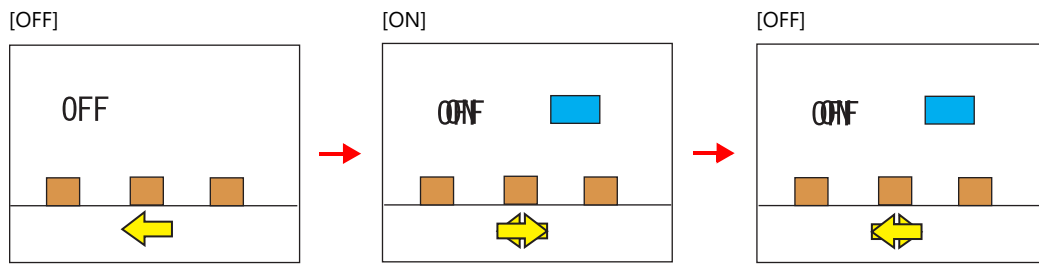
- Clear graphic displayed before switching (transparency function) Selected
  The previously displayed image does not remain. Parts can be displayed even with graphics placed in the background.
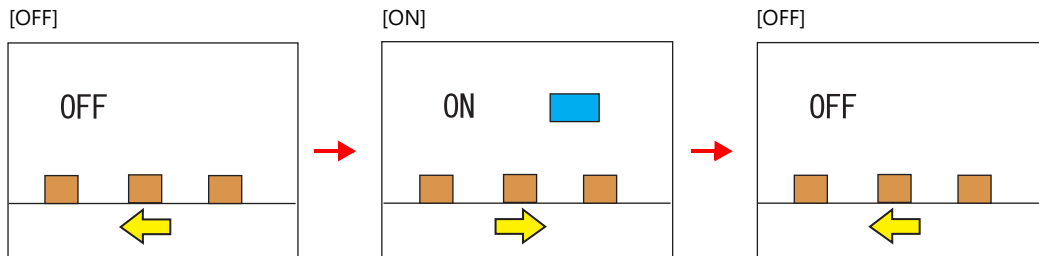
Notes
- Transparency cannot be set for [Lamp] → [Shape: 2D] → [Group: Square2] parts in the catalog window.
- *1 There is a limit to the number and size of lamps that can be placed on one screen. For details, refer to "Graphics" page 11-1.

Char. Prop.

Item	Description
[OFF] [ON] - [P128]	When [Style] → [Other Settings] → [Draw Mode] is [XOR]: Only [OFF] can be selected. Specify the text to be displayed.
Pattern No. (0 - 127)	When [Style] → [Other Settings] → [Draw Mode] is [REP]: Specify the text to be displayed on each pattern.
Text	Enter text to be displayed on the lamp. Up to 4 lines can be registered. Text properties can be set for each line. Text can be justified within the lamp part.
Color (text color, background color)	Set the color for text. The background color can also be set if set as "no transparency" in the following [Style] setting.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Rotation + Direction	Set the combination of text rotation and direction. Four combinations are displayed in the drop-down menu. When selecting an option other than the above, click the icon at the bottom. The window that allows selection from all options is displayed.
Use Windows fonts	Select this checkbox to use a Windows font.
Alignment	Set the text alignment. Center Flush Left Flush Right
Text copy Copy only characters	The text and its attributes for the current pattern (OFF, ON, P3) are copied to the other patterns. Select the [Copy only characters] checkbox to copy text and coordinate information to all other patterns. Note that the text properties will not be copied. If the destination for copy has no text, text properties will also be copied.
Set line spacing	Set the pitch between lines.
Use the same style for all patterns	Select this checkbox to configure the same settings as the opened pattern attributes with respect to all lamp patterns (for each respective line if multiple lines are included).
Auto-adjust the size according to the style	Select this checkbox to automatically adjust the lamp size to the entered text.
Retain the coordinates when changing character string	Newly registered text is placed by centering. When any registered text is changed while this checkbox is selected, the coordinates remain the same. When a line is added to the existing text while this checkbox is selected, the added line is aligned with the upper line.
4-Line Display	When using Windows fonts, selecting this checkbox divides the text entry area into four lines. This allows different properties to be specified for each line when using Windows fonts.

Function
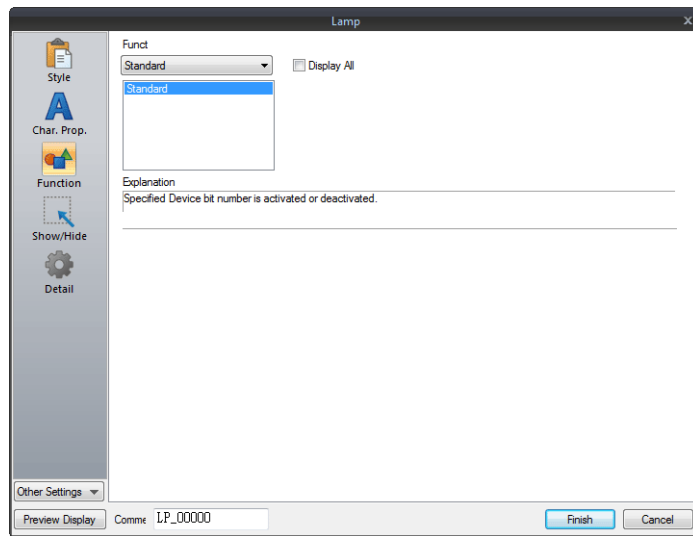
Item			Description
Function			Set the type of operation to be performed by the lamp.
	Standard	Standard	Use as a standalone part without any dependencies on other parts.
Display All			Select this checkbox to display all of the available lamp functions. [*1]

*1   The following function is added when the [Display All] checkbox is selected.

Name		Description	Linked Part	Refer to

Standard	Mode	Display a message on the lamp.	Alarm
			  Bit order alarming
			  Time order alarming
			 Message mode
				page 8-1
				 page 12-1

N-State Lamp

The number of patterns specified in the [Style] settings is displayed.

Item			Description
Use N-state lamp			Select this checkbox to use the N-state lamp function. Specify bit device memory or word device memory for each pattern.
	Condition Setting		Set the conditions for operating a lamp. Click [Add] and set up a maximum of four conditions for lighting up the selected pattern.
		Bit Device	Light the lamp by setting the specified bit device memory to ON or OFF.
		Word Device	Light the lamp by setting a conditional expression for the specified word device memory.
			Constant Display Type: Select the data type of the conditional expression. [DEC+−] / [DEC] / [BCD] / [HEX]
			Condition expression: Set an equal sign, value, and device memory address as the conditions for comparison.
		Security Level	This setting is available when using the security function. Light the lamp according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.
	AND/OR Setting		When setting two or more conditions, set whether to perform AND or OR operations on the conditions.

Precedence

The TS series unit checks conditions in order starting from ON, P3, P4, and through to P128. The pattern for which conditions are determined to be satisfied the earliest is displayed.

Pattern No.	Precedence
ON	High
P3	
:	
P128	Low

If all conditions are not satisfied, the OFF pattern is displayed.

Show/Hide

Item		Description
Show		Display the numerical data display on the screen.
Hide		Do not display the numerical data display on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

	Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
	Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

Item		Description
	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the lamp using X and Y coordinates.
	Width/Height	Set the size of the lamp by specifying width and height.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID (0 - 255)	Set the ID.

4.4   Draw Mode

XOR

Shape: 2D, group: square2
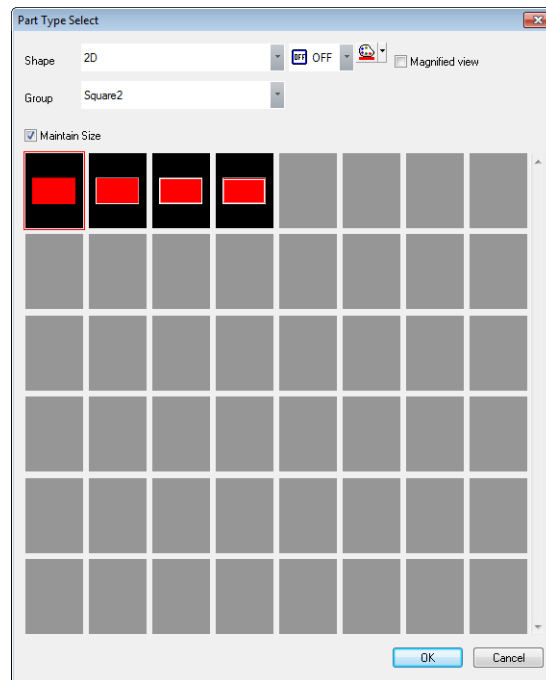
Text
> When setting text on a lamp, the same text is displayed for both OFF and ON statuses.
> Set text on the [OFF] tab of [Char. Prop.].

Color

- OFF frame color/ON color/OFF color
  Set the lamp color via [Style] in the lamp settings window.
- OFF text color
  Set the text color via [Char. Prop.] in the lamp settings window.
- ON frame color
  The frame color to use when the lamp is ON cannot be set. It is automatically determined by an XOR operation as shown below.
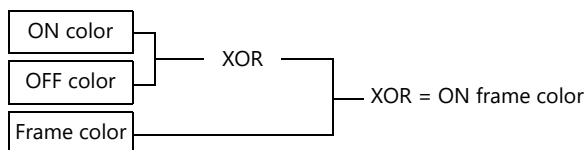
- ON text color
  The text color to use when the lamp is ON cannot be set. It is automatically determined by an XOR operation as shown below.
  The text displayed when the lamp is ON is the same as that displayed when the lamp is OFF.
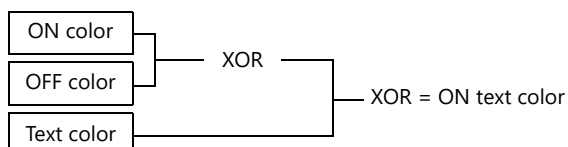
Display example

★[OFF color: Yellow]
[ON color: Red]
[Frame color: White] The frame color displayed when the lamp is ON

OFF color (yellow) A
(setting)
OFF color (red) B
(setting) — XOR → Green C — XOR → Purple = ON frame color
Frame color (white) D
(setting)

	Bla	Blu	(R)	Mag	Gre	C	Y	(W)
Bla	Bla	Blu	R	Mag	Gre	C	Y	W
Blu	Blu	Bla	Mag	R	C	Gre	W	Y
R	R	Mag	Bla	Blu	Y	W	Gre	C
Mag	Mag	R	Blu	Bla	W	Y	C	Gre
(Gre) C	Gre	C	Y	W	Bla	Blu	R	(Mag)
C	C	Gre	W	Y	Blu	Bla	Mag	R
(Y) A	Y	W	(Gre)	C	R	Mag	Bla	Blu
W	W	Y	C	Gre	Mag	R	Blu	Bla

(Top headers: B above column (R), D above column (W). Left labels: C, A. C marks the Gre diagonal cell.)

★[OFF color: Yellow]
[ON color: Red]
[Text color: Blue] The text color displayed when the lamp is ON

OFF color (yellow) A
(setting)
OFF color (red) B
(setting) — XOR → Green C — XOR → Light blue = ON text color
OFF color (blue) D
(setting)

	Bla	(Blu)	(R)	Mag	Gre	C	Y	W
Bla	Bla	Blu	R	Mag	Gre	C	Y	W
Blu	Blu	Bla	Mag	R	C	Gre	W	Y
R	R	Mag	Bla	Blu	Y	W	Gre	C
Mag	Mag	R	Blu	Bla	W	Y	C	Gre
(Gre) C	Gre	(C)	Y	W	Bla	Blu	R	Mag
C	C	Gre	W	Y	Blu	Bla	Mag	R
(Y) A	Y	W	(Gre)	C	R	Mag	Bla	Blu
W	W	Y	C	Gre	Mag	R	Blu	Bla

(Top headers: D above column (Blu), B above column (R). Left labels: C, A. C marks the Gre diagonal cell.)

For parts other than [Shape: 2D], [Group: Square2]

Text
When setting text on a lamp, the same text is displayed for both OFF and ON statuses.
Set text on the [OFF] tab of [Char. Prop.].

Color
- OFF color
  Set the lamp color via [Style] in the lamp settings window.
- ON color
  The color resulting from an XOR operation on the color specified for [Style] and the OFF color (explained above) is displayed.
- P3 to P128 color
  As with the ON color, the color resulting from an XOR operation on the color specified in the settings window and the OFF color is displayed.

REP

Shape: 2D, group: square2

Text

When placing text on a lamp part in "REP" draw mode, the following two modes are available.

- When displaying different text when the lamp is ON and OFF:

  OFF text

  Set text on the [OFF] tab of [Char. Prop.].

  ON text

  Set text on the [ON] tab of [Char. Prop.].

| Stop | | Run |

When the lamp is OFF
[Style]: Normal

When the lamp is ON
[Style]: Bold

The text property can be set as shown.
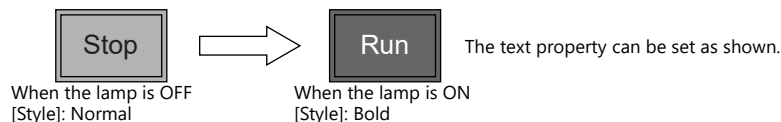
- When displaying the same text when the lamp is ON and OFF:

  OFF text

  Set text on the [OFF] tab of [Char. Prop.].

  ON text

  Nothing is set for the text on the [OFF] tab of [Char. Prop.].

  The text set in the character input box [OFF] is displayed when the lamp is ON.

| Error | | Error |
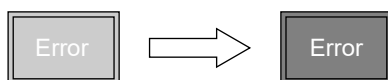
Color

- ON frame color, OFF frame color, ON color, OFF color

  Set the lamp color via [Style] in the lamp settings window.

  The same frame color is used when the lamp is ON and OFF.

- OFF text color

  Set color on the [OFF] tab of [Char. Prop.].

- ON text color

  Set color on the [ON] tab of [Char. Prop.].

  The part is displayed in the selected colors.

For parts other than [Shape: 2D], [Group: Square2]

This case is mostly the same as when [Group] is set to "Square2". (Refer to page 4-17.)

Differences

- ON frame color, ON color

  Set the lamp color via [Style] in the lamp settings window.

  A color different from the OFF frame color can be set.

- For P3 to P128, the selected colors are shown.

Notes

- When the OFF text color and the ON color are the same, the text cannot be shown when the lamp is turned ON.

4.5   Notes

Number of lamps

Maximum number per screen
- TS2060:   192
- TS1000S: 1024

Placing multiple lamp parts

When placing two or more lamp parts on one screen, do not allow them to overlap each other.
If overlaying is unavoidable, take the following points into consideration when creating the screen.
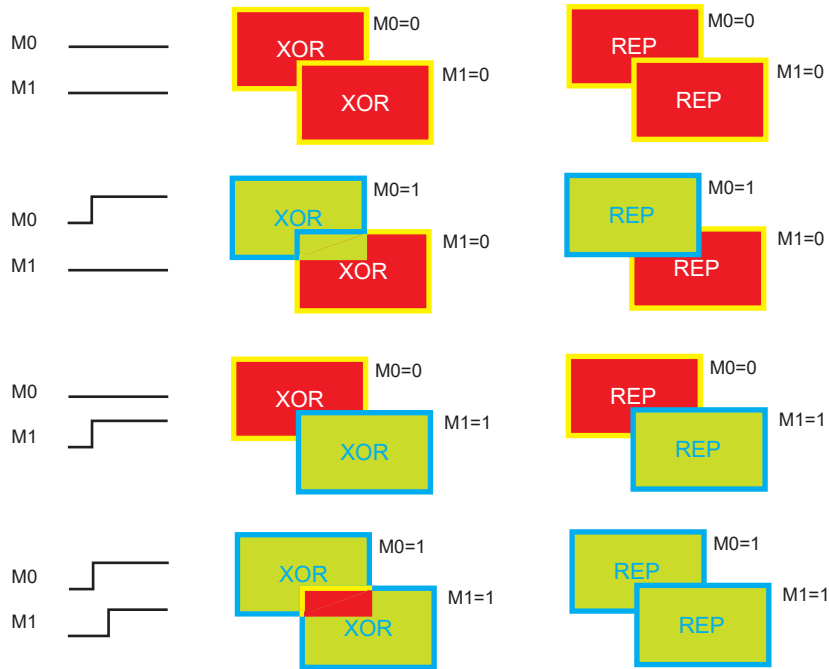
*   When XOR is selected, the overlapping section is shown in the XORed color.

*   When REP is selected, the part that changes last (0 → 1 or 1 → 0) is displayed on top.
*   When M0 = 0 in the above cases, lamps are shown as below.

5   Data Display

5.1   Numerical Display

5.1.1   Overview

- Numerical data read from the PLC is displayed in real time on the screen in any of the following formats: DEC (w/o sign), DEC (with sign −), DEC (with sign +−), HEX (hexadecimal), OCT (octal), BIN (binary) and Real Number Type (decimal floating-point).
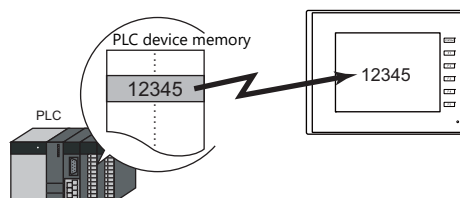
- It is possible to show data in a different color when it exceeds or falls short of a specific range.
  This setting can easily attract the operator's attention to the situation.
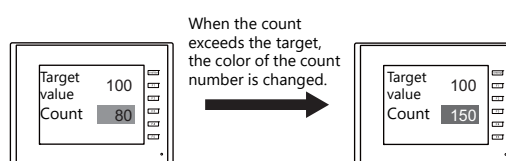
☞   For example settings, refer to "Monitoring PLC Device Memory" page 5-4.

- MONITOUCH can read data from the PLC, perform calculations, and display the result on the MONITOUCH screen.

MONITOUCH executes the following calculation on the read data of "789" and displays the result.
[−1000] + [789] × [1] = -211
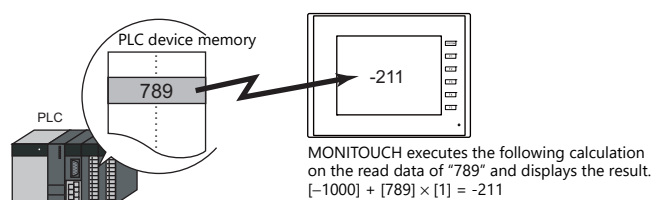
- In addition to using numerical data displays ([Num. Display]) independently, they can also be linked to other parts.
  For example, in order to indicate data as a percentage in the statistic graph as shown below, it is necessary to link [Num. Display] with [Statistic Graph].
  This allows the percentage value to automatically reflect changes in the data of the statistic graph.
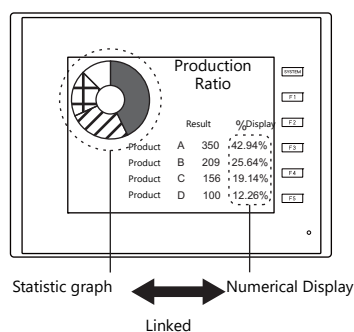
☞   For details, refer to "9.5 Statistic Bar Graph" "9.6 Statistic Pie Graph".

- Device memory for offset value designation
A single numerical display part can be used to show different data by switching the device memory address assigned to the part. This can help to reduce the number of screens or parts used and facilitate screen maintenance.

Example: Displaying scheduled production volume, non-defective count, and defective count for a machine selected from No. 1 to 3

Numerical Display

Machine number	: D100 (device memory)
Scheduled production volume	: D100 (base), D100 (offset value designation)
Non-defective count	: D110 (base), D100 (offset value designation)
Defective count	: D120 (base), D100 (offset value designation)

When D100 = 1, machine No. 1 data at D101, D111, and D121 are displayed.
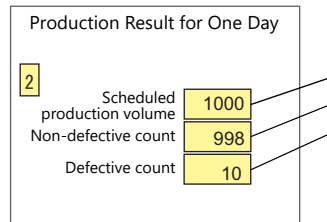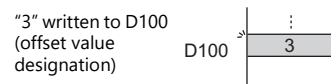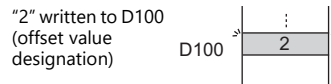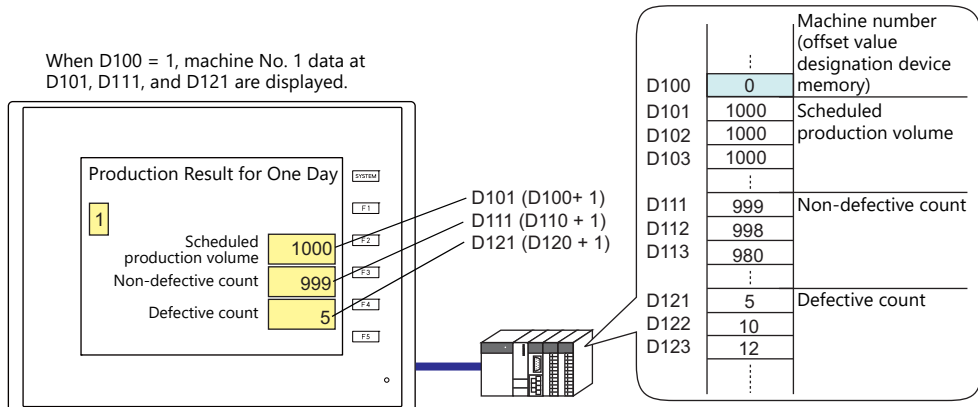
When D100 = 2, machine No. 2 data at D102, D112, and D122 are displayed.
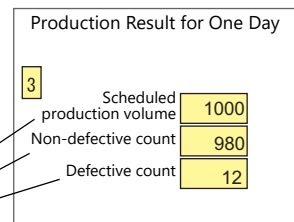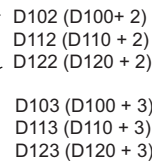
When D100 = 3, machine No. 3 data at D103, D113, and D123 are displayed.

- Specifying attributes using device memory
  The attributes (number of digits, decimal point, display type, or text color) of numerical display parts are easily changeable while MONITOUCH is in RUN mode.

  Example: Numerical data display D100 (no transparency)
  Change the decimal place from 0 to 1, text color from black to red, and background color from white to yellow.

  Device memory addresses for changing attributes

  Decimal Point   : D200

  Text color   : D201

  Back Color   : D202

  Display Type   : D203

D100	315
D200	0 (No decimal point)
D201	0 (Black)
D202	7 (White)
D203	0 (DEC w/o sign)

D200 = 1
D201 = 2
D202 = 6

D100	315
D200	1 (1 decimal place)
D201	2 (Red)
D202	6 (Yellow)
D203	0 (DEC w/o sign)

Room Temperature Check

315 °C

D100

Room Temperature Check

31.5 °C

The display now includes one decimal place and shows red-colored text on yellow-colored background.

D203 = 3

Room Temperature Check

13B °C

The display type is switched from DEC to HEX.
The setting for one decimal place (D200 = 1) is invalid.

5

5.1.2   Setting Examples

Monitoring PLC Device Memory

This example explains monitoring of a PLC device memory D100.
The numerical data display is shown in red when the value is less than "100" and yellow when the value exceeds "1000".

1.   Click [Parts] → [Data Display] → [Num. Display] and place a numerical data display on the screen.
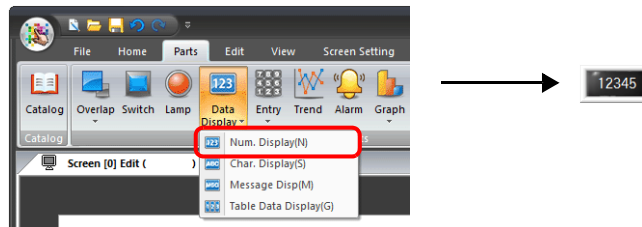
2.   Double-click on the switch to display the settings window.
     Configure the [Contents] settings as shown below.
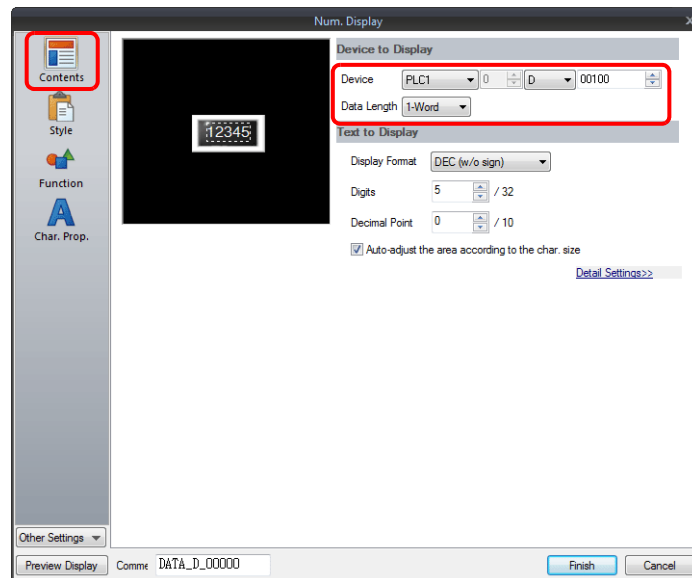
3.   Click [Other Settings] → [Operation/Alarm].
     Configure the following settings for [Operation/Alarm] and then click [Finish].
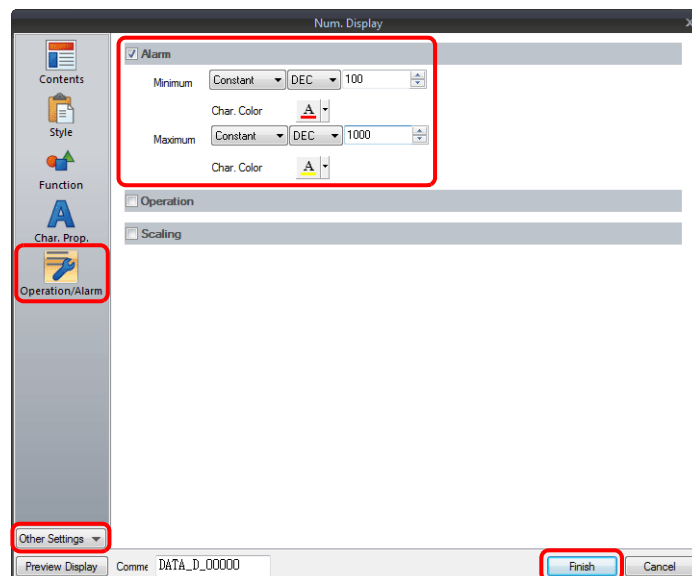
This completes the necessary settings.

5.1.3   Detailed Settings

Contents

Item		Description
Device to Display	Device (base device memory)	Specify the device memory address to use for numerical data display.
	Use offset value designation device *1 *2	Set the device memory address and the code used for storing an offset value with respect to the value in the base device memory.
		<table><tr><th>Code</th><th>Setting Range</th></tr><tr><td>DEC</td><td>0 - 65535</td></tr><tr><td>BCD</td><td>0 - 9999</td></tr><tr><td>Real Number Type (DEC)</td><td>0 - 65535</td></tr></table>
	Data Length *3 1-Word/2-Word	Select the data length used for this part.
Text to Display	Display Format	Select the format of numbers to be displayed on the screen.
	Designate by device *4	Select this checkbox to change the display format according to the value specified for the device memory address. * This item cannot be used when "Real Number Type" is specified above for [Display Format].
	Digits *5	Specify the number of digits for the numerical data display.
	Designate by device *4	Select this checkbox to change the number of digits according to the value specified for the device memory address.
	Decimal Point	Specify the decimal place. The number of decimal places must be smaller than the number of digits. When no decimal point is required, set "0".
	Designate by device *4	Select this checkbox to change the decimal point according to the value specified for the device memory address.
	Auto-adjust the area according to the char. size	Select this checkbox to automatically adjust the item size based on the [Digits] and [Decimal Point] settings.
	Code	When a [Designate by device] checkbox is selected, set the code used when reading values from the device memory address. This setting applies to [Display Format], [Digits], [Decimal Point], [Char. Color], and [Background].

*1   The device memory for offset value designation is read every cycle, regardless of the item processing cycle. Screen updates depend on the setting of the [Redraw the screen] checkbox in [Screen Setting] → [Screen Setting] → [Show/Hide Item] → [Redraw the screen].

- Selected:
  Update the screen when the value in the device memory for offset value designation changes. The screen is redrawn at this time.
- Unselected:
  The screen is updated at the following times.
  Screen change, screen redraw, multi-overlap change (when there are parts placed on a multi-overlap), or data block change (when there are parts placed on a data block)

*2   Notes on using the device memory for offset value designation

- An offset value designation device memory is counted as a setting device memory.
- When the screen is updated, the device memory for offset value designation is read for the items placed on the screen. This means that for a screen that includes multiple addresses of the device memory for offset value designation, the updated screen is displayed upon completion of reading all of these device memory addresses. If screen updates are taking too long, use of the internal device memory is recommended.
- When setting offset values on a screen, the setting needs to be completed before the screen is changed to another screen. In a case where an offset value is designated in an OPEN macro, the offset value is not valid when the screen is open, but becomes valid when the screen is updated.
- An error occurs if a value set to the device memory for offset value designation is outside the permissible range. Observe the specified range for setting.
  PLC device memory: Communication error Format
  Internal device memory: Error 46

*3   Relationship between data length and display format

Code Format	1-word Display Range	2-word Display Range
DEC (w/o sign)	0 - 65535	0 - 4294967295
DEC (with sign –)	–32768 - 32767	–2147483648 - 2147483647
DEC (with sign +–)	–32768 - +32767	–2147483648 - +2147483647
HEX	0 - FFFF	0 - FFFFFFFF
OCT	0 - 177777	0 - 37777777777
BIN (Binary)	0 - 1111111111111111	0 - 11111111111111111111111111111111
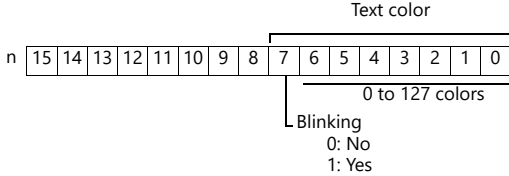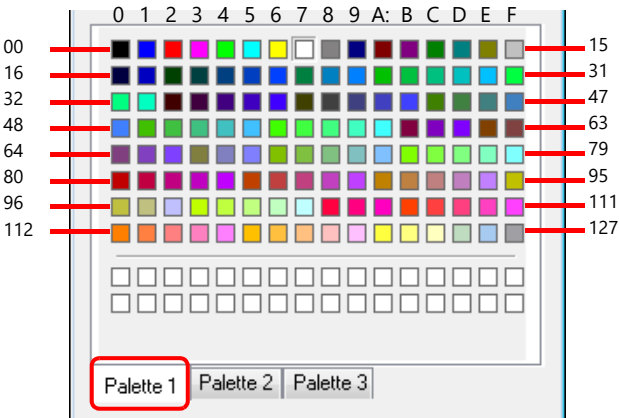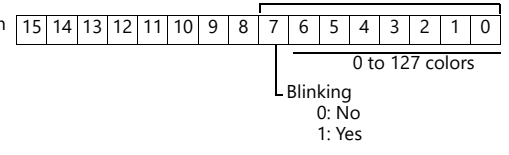
*4   For details on the method for specifying attributes using device memory, refer to "Specifying attributes using device memory" page 5-7.

*5   When a value exceeding the set number of digits is entered:

Code Format	DEC	HEX/OCT/BIN
Display	Overflow display	Numbers from the right
E.g.: Data length: 1 word Digits: 3 Entered value: 1010	– – –	010

Specifying attributes using device memory

When a [Designate by device] checkbox in [Contents] → [Detail Settings] or a [Designate by device] checkbox in [Char. Prop.] → [Detail Settings] is selected, the corresponding attribute can be changed by specifying a value using a device memory address.

	Item	Description
Contents	Display Format	Specify the display format for the numerical data display. Set a value according to the following. 0: DEC (w/o sign) 1: DEC (w/ −sign) 2: DEC (w/ +−sign) 3: HEX 4: OCT 5: BIN 6: FLOAT* 7: BCD (w/o sign) 8: BCD (w/ −sign) 9: BCD (w/ +−sign) *** This setting is enabled when "2-Word" is set for [Contents] → [Data Length].**
	Digits	When the numerical data display includes decimal places, specify the total number of digits including the number of decimal places. <table><tr><td>Display Type</td><td>Digits</td></tr><tr><td>DEC</td><td>1 - 10</td></tr><tr><td>HEX</td><td>1 - 8</td></tr><tr><td>OCT</td><td>1 - 11</td></tr><tr><td>BCD</td><td>1 - 8</td></tr><tr><td>BIN</td><td>1 - 32</td></tr><tr><td>FLOAT</td><td>1 - 32</td></tr></table> *** If a read value exceeds the limit specified for the number of digits, hyphens are displayed to indicate that an overflow occurred.**
	Decimal Point	Specify the number of decimal places for the numerical data display. <table><tr><td>Display Type</td><td>Digits</td></tr><tr><td>DEC</td><td>0 - 9</td></tr><tr><td>BCD</td><td>0 - 7</td></tr><tr><td>FLOAT</td><td>0 - 31</td></tr><tr><td>HEX/OCT/BIN*</td><td>-</td></tr></table> *** The number of decimal places must be smaller than the total number of digits. An overflow will occur if the number of decimal places is the same or more than the total number of digits.** **When [Display Format] is set to "HEX", "OCT", or "BIN (Binary)", the decimal point setting does not take effect.** **Even if a value is set for [Decimal Point] in such a case, it is assumed to be zero.**

5

Item		Description
Char. Prop.	Char. Color	Set the color for text. 31.5 —— Text color Bits 0 to 6: Color Bit 7 : Blinking (0: No, 1: Yes) A color can be selected from the 128 colors (and blinking) on [Palette 1] in the [Custom Color] window. Colors correspond to the following color codes.
	Background	Specify the background color of text. 31.5 —— Background color Bits 0 to 6: Color Bit 7: Blinking (0: No, 1: Yes) A color can be selected from the 128 colors (and blinking) on [Palette 1] in the [Custom Color] window. For details on color codes, refer to the "Char. Color" section. * **However, note that the background color setting does not take effect when [Char. Prop.] → [Style] is set to "transparent".**

Notes on changing attributes using device memory

- The update timing depends on the setting of [Detail] → [Process Cycle] of each part.
- For parts with a frame, the frame size does not change according to the setting of [Digits], [Decimal Point], or [Display Format].
  For this reason, the maximum number of digits in the screen program must be set in advance.
- When [Char. Prop.] → [Style] is set to "not transparent", the drawing range of the background drawing area will be affected by changes to the settings of [Digits], [Decimal Point], and [Display Format]. This means that if the set number of digits decreases, the background color will remain on the screen.
  For this reason, the maximum number of digits in the screen program must be set in advance. Alternatively, update the display by executing the "SYS (RESET_SCRN)" macro command or by changing the screen.
- If a displayed value has become higher than the maximum or lower than the minimum specified for alarm, the value is shown in the color specified for the alarm.
- The "CHG_DATA" macro command cannot be used with numerical data displays for which a [Designate by device] checkbox is selected.
- When "Entry Target" is set for [Function], the display is switched when the cursor is moved from the display field.

Style

Item		Description
Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color.
	Select from image files	Select a bitmap file.

5

Function

Item			Description
Function			Set the type of operation performed by the numerical data display.
	Standard	Num. Display	Display device memory values on the numerical data display in real time.
		Entry Target	Used in conjunction with the entry function. For details, refer to "6.1 Numerical Data Entry".
Display All			Select this checkbox to display all of the available numerical data display functions. [*1]

*1 The following function is added when the [Display All] checkbox is selected.

	Name	Description	Linked Part	Refer to
Standard	Entry Display Part	Temporarily display values entered using a keypad.	Entry	page 6-1
	Max. Value Display Part	Display the maximum value that can be entered using a keypad.		
	Min. Value Display Part	Display the minimum value that can be entered using a keypad.		
	Statistic Graph % Display	Display statistical data on the graph as a percentage.	Statistic graph Statistic pie graph	page 9-47 page 9-53
	Digital Switch	Display a digital switch value.	Switch	page 3-25
Sample	Sampling Count Display	Display the number of sampling times or the ordinal number of the sampled data within the trend data currently selected using the cursor.	Trend sampling Data Sampling Alarm logging	page 7-1 page 8-1
	Sampling Time Display	Display the last sampling time or the sampling time of the trend data currently selected using the cursor.		
	Mean Value Display	Display the average value of all data stored in the buffering area.	Trend sampling Data Sampling	page 7-1
	Max. Display	Display the maximum value of all data stored in the buffering area.		
	Min. Display	Display the minimum value of all data stored in the buffering area.		
	Total Display	Display the total value of all data stored in the buffering area.		
	Currently Selected Value Display	Display the latest sampling value or the cursor point value of each graph currently selected using the cursor.		
	Display start time	Display the sampling time of the oldest data on the currently displayed graph.	Trend sampling	
	Display end time	Display the sampling time of the newest data on the currently displayed graph.		

Char. Prop.

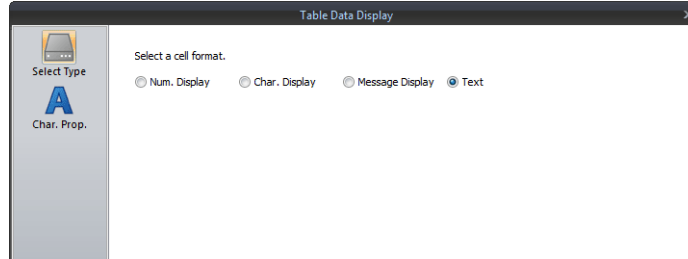| Item	Description
Alignment	Set the text alignment. Flush Left — Center — Flush Right (alignment icons)
Value to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the value to display using the editor.
Char. Color	Set the color for text.
Designate by device *1	Select this checkbox to change the text color according to the value specified for the device memory address.
Background	Set the background color of text.
Designate by device *1	Select this checkbox to change the background color according to the value specified for the device memory address.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Rotation + Direction	Set the combination of text rotation and direction. Four combinations are displayed in the drop-down menu. When selecting an option other than the above, click the icon at the bottom. The window that allows selection from all options is displayed.
Spacing	Select this checkbox to specify the spacing between characters.
Zero Suppress	Select this checkbox to use zero suppression. Spaces [☑ Zero Suppress] (Flush Right) → ⎵⎵⎵123 [☐ Zero Suppress] → 000123 When this checkbox is checked, select either [Flush Left] or [Flush right]. Flush Left → 123 Flush Right → 123
Windows Font	Select this checkbox to use a Windows font.
Code	When a [Designate by device] checkbox is selected, set the code used when reading values from the device memory. This setting applies to [Display Format], [Digits], [Decimal Point], [Char. Color], and [Background].

*1   For details on the method for specifying attributes using device memory, refer to "Specifying attributes using device memory" page 5-7.

Operation/Alarm

Item			Description
Alarm			Select this checkbox to display data in a different color when it exceeds or falls short of a specific range. When "Entry Target" is selected for [Function], the range of values that can be entered using a keypad can be set. For details on numerical value entry, refer to "6.1 Numerical Data Entry".
	Minimum		Set the minimum value used to trigger an alarm.
		Use offset value designation device	Set the device memory and code used for storing an offset value for the minimum value.
		Char. Color	Set the color for text.
		Background	Set the background color of text.
	Maximum		Set the maximum value used to trigger an alarm.
		Use offset value designation device	Set the device memory and code used for storing an offset value for the maximum value.
		Char. Color	Set the color for text.
		Background	Set the background color of text.
Operation [*1]			Select this checkbox to perform an operation on the value of the device memory specified in [Contents].
Scaling [*2]			Select this checkbox to display data after automatically converting the data read from the PLC ([Range before Scaling]) to the specified range ([Range after Scaling]). This eliminates the need for correction programs for data read from the PLC when displaying information such as temperature, rotation speed, etc.
	Range before Scaling		Specify the data to be read from the PLC.
	Range after Scaling		Specify the range of data to be shown on MONITOUCH.

*1   Operations
   Example: Data read from PLC is "789".
   • When "BCD" is selected for [Input Type] and negative numbers are displayed
     (Negative numbers do not exist in the BCD format.)
     Select either [DEC (with sign −)] or [DEC (with sign +−)] for [Contents] → [Display Type].

[offset value]	+	(data)	[×]	[multiplier]	=	display data
[0]	+	(789)	[×]	[−1]	=	−789
Or [−1000]	+	(789)	[×]	[1]	=	−211

   • Example of multiplication

[offset value]	+	(data)	[×]	[multiplier]	=	display data
[1000]	+	(789)	[×]	[1]	=	1789
[0]	+	(789)	[×]	[100]	=	78900

   • Example of division with a decimal point
     When "2" is entered for [Decimal Point] in [Contents], "7.89" is read into MONITOUCH.

[offset value]	+	(data)	[÷]	[divisor]	=	display data
[0]	+	(7.89)	[÷]	[100]	=	0.0789

   Data is rounded down to two decimal places to display "0.07".

   • Example of division without a decimal point

[offset value]	+	(data)	[÷]	[divisor]	=	display data
[0]	+	(789)	[÷]	[−100]	=	−7.89

   Data is rounded to a whole number to display "−7".

[offset value]	+	(data)	[÷]	[divisor]	=	display data
[200]	+	(789)	[÷]	[100]	=	207.89

   Data is rounded to a whole number to display "207".

   Example: When an operation is set for "Entry Target" (entry mode)
   • The value entered using a keypad is displayed (= result of operation).
     The value (i.e. data) stored in the device memory is the source value used in the operation.

[offset value]	+	(data)	[×]	[multiplier]
[0]	+	(A)	[×]	[100]

Input of "100"	→	100 = (A) × 100	→ (A) = 1
Input of "550"	→	550 = (A) × 100	→ (A) = 5 (remainder of 50 is ignored, "500" is displayed)
Input of "1340"	→	1340 = (A) × 100	→ (A) = 13 (remainder of 40 is ignored, "1300" is displayed)

[offset value]	+	(data)	[÷]	[divisor]
[0]	+	(A)	[÷]	[100]

Input of "100"	→	100 = (A) / 100	→ (A) = 10000
Input of "550"	→	550 = (A) / 100	→ (A) = 55000
Input of "1340"	→	1340 = (A) / 100	→ (A) = 2928 (A word exceeds 5 digit display)

5

*2 Scaling

- If data in the PLC device memory multiplied by the maximum value specified for [Range after Scaling] is greater than a double-word, it cannot be displayed correctly.
- Example: Numerical data display
  When data in the PLC device memory address D100 is "2000" with a range of 0 to 4000 specified for [Range before Scaling] and a range of 0 to 100 specified for [Range after Scaling], "50" is displayed on MONITOUCH.
- Example: When scaling is set for "Entry Target" (entry mode)
  When "25" is entered using a keypad and a range of 0 to 4000 is specified for [Range before Scaling] and a range of 0 to 100 is specified for [Range after Scaling], "1,000" is written to the PLC device memory address D100.
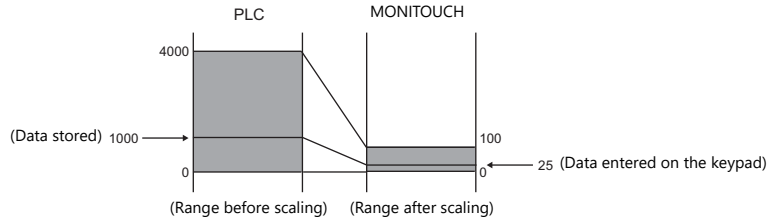
- Notes on using entry targets (entry mode)
  Errors may occur when using entry targets. The entered value will be displayed correctly if [Range before Scaling] is greater than [Range after Scaling].

When comparing [Range before Scaling] with [Range after Scaling], remove the decimal point from the display range.

Example: 0 to 10000 for [Range before Scaling] and 0.00 to 500.00 for [Range after Scaling]
The range after scaling is converted to 0 to 50000, which means [Range before Scaling] < [Range after Scaling] and the entered value is not displayed correctly.

Show/Hide

Item		Description	
Show		Display the numerical data display on the screen.	
Hide		Do not display the numerical data display on the screen.	
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.	
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.	
		Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
		Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.
	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.	

Detail

Item		Description
Overlap	Overlap ID (0 - 2)	When the [Function] for a numerical data display is set to "Entry Target" and the [Display the keyboard] checkbox is selected, specify the overlap ID for displaying the keyboard.
Coordinates	Start X/Start Y	Set the display position of the numerical data display using X and Y coordinates.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	Input Type	Select the code to use when reading data from the PLC device memory address. BCD, DEC, Actual Number [*1]
	1-Byte / 2-Byte	Select one-byte or two-bytes for displaying numerical data.
	Save an operation log	Used in conjunction with the operation log. For details, refer to the TS Reference Manual 2.
	ID (0 - 255)	Set the ID.

*1 For details on real numbers (floating point data), refer to "5.1.4 Real Numbers (Floating Point Numbers)" page 5-16.

5.1.4 Real Numbers (Floating Point Numbers)

MONITOUCH can handle real numbers specified by the IEEE 754 standard (32-bit single precision real number format).

Overview

IEEE 754 standard (32-bit single precision real number format)

32 bits are defined in the following format.

31	30	23	22	0
s	e		f	

The above format expresses decimal floating-point data as shown below.

- Normalized numbers

$$(-1)^s \times 2^{(e-127)} \times (1.f)$$

Symbol	Name	Description
s	Sign	0: Positive 1: Negative
e	Exponent	0 - 255 　*　However, if "255" is specified, it cannot be regarded as a decimal floating-point number. 　　If "0" is specified, it is regarded as a denormalized number.
f	Significand	This is a binary fraction less than 1. The final significand can be calculated using the following formula: [1.f] = [1 + f × 2^{-23}]

- Denormalized numbers (e = 0)

$$(-1)^s \times 2^{-126} \times (0.f)$$

Symbol	Name	Description
s	Sign	0: Positive 1: Negative
e	Exponent	Since e = 0, the exponent will be "-126".
f	Significand	f ≠ 0 This is a binary fraction less than 1. The final significand can be calculated using the following formula: [0.f] = [f × 2^{-23}]

Applicable range

$-3.402823 \times 10^{38} \le n \le -1.401298 \times 10^{-45}$
$1.401298 \times 10^{-45} \le n \le 3.402823 \times 10^{38}$
(Significant digits: approx. 7 (in decimal))

When the value satisfies the following conditions, it cannot be handled as a decimal floating-point number.
$e = 255, f \ne 0$ (non-numerical)
$e = 255, f = 0, s = 0$ ($+\infty$)
$e = 255, f = 0, s = 1$ ($-\infty$)
$e = (0)$

MONITOUCH display range

$-9.999999 \times 10^{31} \leq n \leq -1.000000 \times 10^{-31}$

$1.000000 \times 10^{-31} \leq n \leq 9.999999 \times 10^{31}$

A: Overflow display (- - - -)
B: 0
C: -0

Decimal Floating-point Data Example

Example 1

When the following 32-bit data is displayed as decimal floating-point data, it is calculated as shown below.

$10000000(\text{BIN}) = 128(\text{DEC})$

$(-1)^{s} \times 2^{(e-127)} \times (1.f)$

$[1 + f \times 2^{-23}]$
$= [1 + (2^{22} + 2^{19}) \times 2^{-23}] = [1 + (2^{22-23} + 2^{19-23})]$
$= [1 + 2^{-1} + 2^{-4}] = [1 + 0.5 + 0.0625]$
$= 1.5625$

$2^{(128-127)} = 2^{1} = 2$

$(-1)^{1} = -1$ 　　　　 $-1 \times 2 \times 1.5625 = -3.125$

As a result, a value of "-3.125" is shown on MONITOUCH.

Example 2

When the following 32-bit data is displayed as decimal floating-point data, it is calculated as shown below.

$10000000(\text{BIN}) = 128(\text{DEC})$

$(-1)^{s} \times 2^{(e-127)} \times (1.f)$

$[1 + f \times 2^{-23}]$
$= [1 + (2^{21}) \times 2^{-23}] = [1 + 2^{-2}]$
$= [1 + 0.25] = 1.25$

$2^{(128-127)} = 2^{1} = 2$

$(-1)^{0} = 1$ 　　　　 $1 \times 2 \times 1.25 = 2.5$

As a result, a value of "2.5" is shown on MONITOUCH.

5.2 Character Display

5.2.1 Overview

- Data read from the PLC is displayed in the form of characters on the MONITOUCH screen in real time. ANK codes are assigned to one-byte characters and Shift-JIS codes are assigned to two-byte characters.
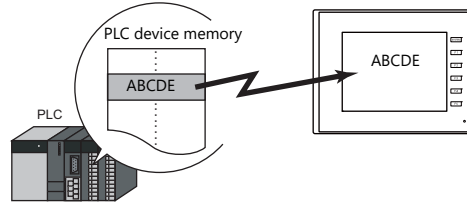
- In addition to using a character display ([Char. Display]) independently, it can also be linked with another part. For example, when a character key set up in [Entry] mode is pressed, the character is entered in the [Char. Display] part specified as "entry target." This is made possible by linking [Char. Display] with the [Entry] mode.
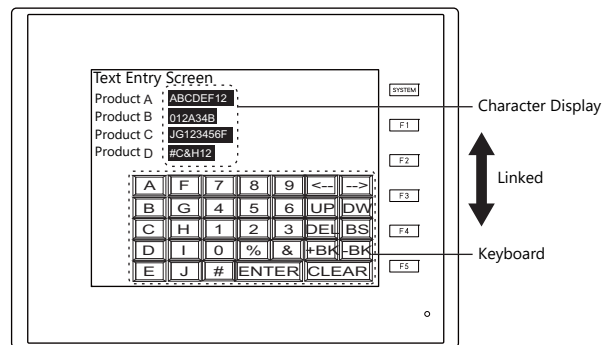
☞ For details, refer to "6.2 Character Input".

- Device memory for offset value designation
  A single character display part can be used to show different data by switching the device memory address assigned to the part. This can help to reduce the number of screens or parts used and facilitate screen maintenance.

  ☞ For details, refer to page 5-2.

- Device memory for changing attributes
  The attributes (number of bytes or text color) of character display parts are easily changeable while MONITOUCH is in RUN mode.

  ☞ For details, refer to page 5-3.

5.2.2   Detailed Settings

Contents

Item		Description
Device to Display	Device [*1] (base device memory)	Specify the device memory address to use for character display.
	Use offset value designation device [*2] [*3]	Set the device memory address and the code used for storing an offset value with respect to the value in the base device memory. {{TABLE}}
Text to Display	No. of Bytes (1 - 127)	Specify the number of bytes used by this part.
	Designate by device [*4]	Select this checkbox to change the number of bytes according to the value specified for the device memory address.
	Auto-adjust the area according to the char. size	Select this checkbox to automatically adjust the item size based on the [Digits] and [Decimal Point] settings.
	Code	When a [Designate by device] checkbox is selected, set the code used when reading values from the device. This setting applies to [No. of Bytes], [Char. Color], and the [Background] color.

Inner table for "Use offset value designation device":

Code	Setting Range
DEC	0 - 65535
BCD	0 - 9999
Real Number Type (DEC)	0 - 65535

*1   Code used for storing text of character display parts
- 1-byte characters: ANK code
- 2-byte characters: Shift-JIS code

*2   The device memory for offset value designation is read every cycle, regardless of the item processing cycle. Screen updates depend on the setting of the [Redraw the screen] checkbox in [Screen Setting] → [Screen Setting] → [Show/Hide Item] → [Redraw the screen].
- Selected:
  Update the screen when the value in the device memory for offset value designation changes. The screen is redrawn at this time.
- Unselected:
  The screen is updated at the following times.
  Screen change, screen redraw, multi-overlap change (when there are parts placed on a multi-overlap), or data block change (when there are parts placed on a data block)
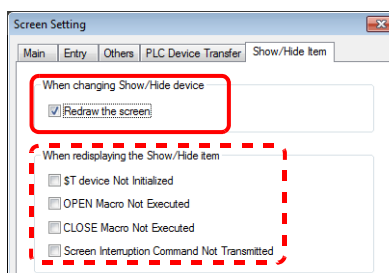
Select a checkbox to not execute the respective operation when redraw occurs.

*3   Notes on using the device memory for offset value designation
- An offset value designation device memory is counted as a setting device memory.
- When the screen is updated, the device memory for offset value designation is read for the items placed on the screen. This means that for a screen that includes multiple addresses of the device memory for offset value designation, the updated screen is displayed upon completion of reading all of these device memory addresses. If screen updates are taking too long, use of the internal device memory is recommended.
- When setting offset values on a screen, the setting needs to be completed before the screen is changed to another screen. In a case where an offset value is designated in an OPEN macro, the offset value is not valid when the screen is open, but becomes valid when the screen is updated.
- An error occurs if a value set to the device memory for offset value designation is outside the permissible range. Observe the specified range for setting.
  PLC device memory: Communication error Format
  Internal device memory: Error: 46

*4   For details on the method for specifying attributes using device memory, refer to "Specifying attributes using device memory" page 5-20.

Specifying attributes using device memory

When a [Designate by device] checkbox in [Contents] → [Detail Settings] or a [Designate by device] checkbox in [Char. Prop.] → [Detail Settings] is selected, the corresponding attribute can be changed by specifying a value using a device memory address.

	Item	Description
Contents	No. of Bytes	Specify the number of bytes of the character display. No. of Bytes: 1 to 127 *** Regardless of the setting for [No. of Bytes], 127 bytes (64 words) will always be read.**
Char. Prop.	Char. Color	Set the color for text. abc — Text color Bits 0 to 6: Color Bit 7 : Blinking (0: No, 1: Yes) Text color n [15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0] 0 to 127 colors Blinking 0: No 1: Yes A color can be selected from the 128 colors (and blinking) on [Palette 1] in the [Custom Color] window. Colors correspond to the following color codes. [Palette 1] 0 1 2 3 4 5 6 7 8 9 A: B C D E F 00 — 15 16 — 31 32 — 47 48 — 63 64 — 79 80 — 95 96 — 111 112 — 127 Palette 1 | Palette 2 | Palette 3
	Background	Specify the background color of text. abc — Background color Bits 0 to 6: Color Bit 7 : Blinking (0: No, 1: Yes) Background color n [15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0] 0 to 127 colors Blinking 0: No 1: Yes A color can be selected from the 128 colors (and blinking) on [Palette 1] in the [Custom Color] window. For details on color codes, refer to the "Char. Color" section. *** However, note that the background color setting does not take effect when [Char. Prop.] → [Style] is set to "transparent".**

Notes on changing attributes using device memory

- The update timing depends on the setting of [Detail] → [Process Cycle] of each part.
- For a display part provided with a frame, the frame size does not change regardless of the setting of [No. of Bytes].
  For this reason, the maximum number of bytes in the screen program must be set in advance.
- When [Char. Prop.] → [Style] is set to "not transparent", the drawing range of the background color will be affected by changes to the number of bytes. This means that if the set number of bytes decreases, the background color will remain on the screen.
  For this reason, the maximum number of bytes in the screen program must be set in advance. Alternatively, update the display by executing the "SYS (RESET_SCRN)" macro command or by changing the screen.
- The "CHG_DATA" macro command cannot be used with numerical data displays for which a [Designate by device] checkbox is selected.
- When "Entry Target" is set for [Function], the display is switched when the cursor is moved from the display field.

Style
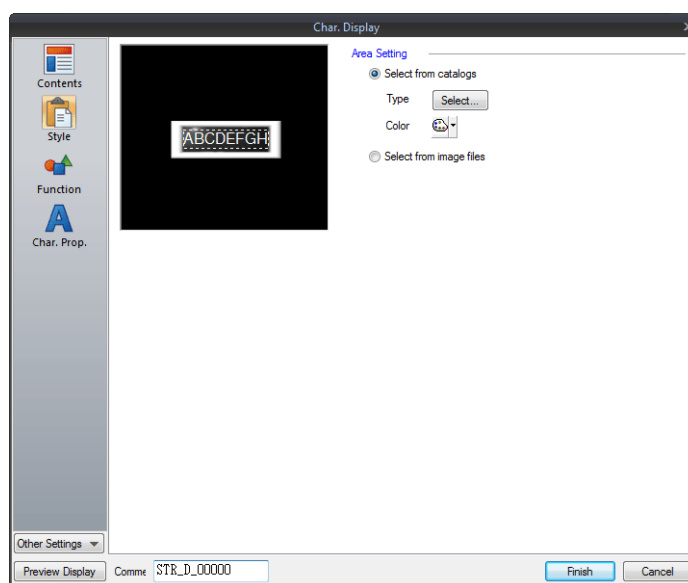
Item		Description
Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color.
	Select from image files	Select a bitmap file.

Function

Item			Description
Function			Set the function of the character display.
	Standard	Char. Display	Display device memory values on the character display in real time.
		Entry Target	Used in conjunction with the entry function.
		Password Input	For details, refer to "6.2 Character Input".
Display All			Select this checkbox to display all of the available character display functions. *1

*1 The following function is added when the [Display All] checkbox is selected.

	Name	Description	Linked Part	Refer to
Standard	Entry Display Part	Temporarily display values entered using character keys.	Entry	page 6-21
	Readings Registration	Set the reading of a term to be registered. (Entry in Kana only)		
	Phrase Registration	Register any term.		
Sample	Status Display	Display the currently displayed status (ON/OFF, ON, or OFF).	Alarm logging	page 8-1

Char. Prop.

Item	Description
Alignment	Set the text alignment.
Text to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the text to display using the editor.
Char. Color	Set the color for text.
Designate by device [*1]	Select this checkbox to change the text color according to the value specified for the device memory address.
Background	Set the background color of text.
Designate by device [*1]	Select this checkbox to change the background color according to the value specified for the device memory address.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Rotation + Direction	Set the combination of text rotation and direction. Four combinations are displayed in the drop-down menu. When selecting an option other than the above, click the icon at the bottom. The window that allows selection from all options is displayed.
Spacing	Select this checkbox to specify the spacing between characters.
Character Position	Select [Flush Left] or [Flush Right]. Flush-left → ABC Flush-right → ABC
Use Windows fonts	Select this checkbox to use a Windows font.
Windows Font Registration [*3]	Register a Windows font to use to display text.

*1 For details on the method for specifying attributes using device memory, refer to "Specifying attributes using device memory" page 5-7.

Show/Hide

Item		Description
Show		Display the numerical data display on the screen.
Hide		Do not display the numerical data display on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

		Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
		Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Overlap	Overlap ID (0 - 2)	When the [Function] for a character display is set to "Entry Target" and the [Display the keyboard] checkbox is selected, specify the overlap ID for displaying the keyboard.
Coordinates	Start X/Start Y	Set the display position of the character display using X and Y coordinates.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	Text Process	Set the order of the first and second bytes in words. [LSB → MSB] [MSB → LSB]
	Save an operation log	Used in conjunction with the operation log. For details, refer to the TS Reference Manual 2.
	ID (0 - 255)	Set the ID.

5.3 Message Display

5.3.1 Overview

- Use the message edit screen to register messages for display on the screen in advance. When a message registration number is specified for a device memory address, the corresponding message is displayed on the screen in real time.
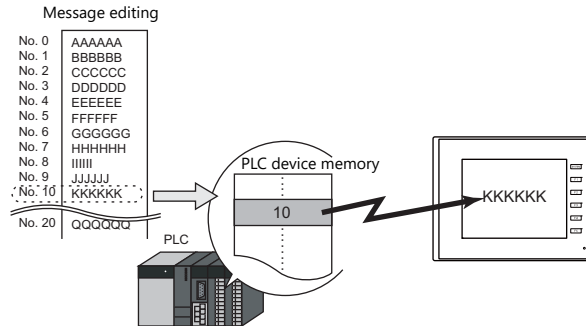
- Single line message can be displayed at any position.
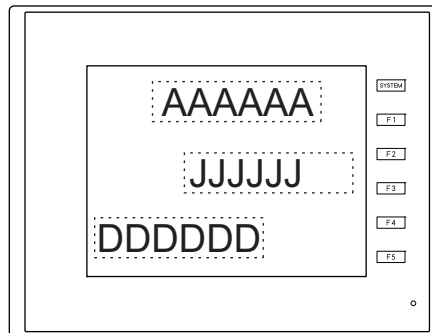
5.3.2　Detailed Settings

Device Memory
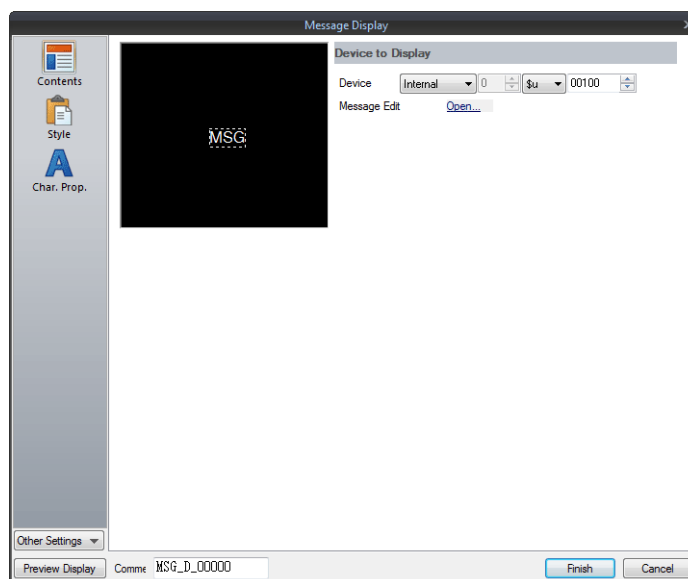
Item	Description
Device	One word is used for device memory specification. The message that corresponds to data contained at the specified device memory address is displayed on the screen. ***　Specify a message number using its absolute address (range: 0 to 32767).**
Message Edit	Click [Open] to display the [Message Edit] window.
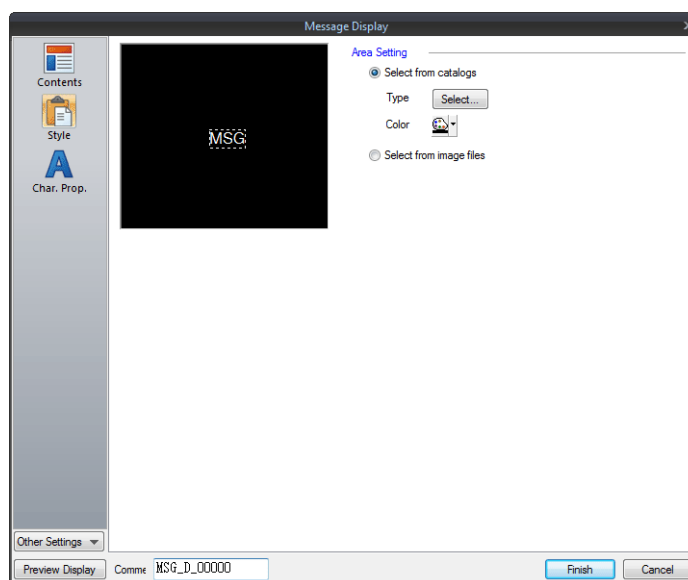
Style

Item		Description
Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color.
	Select from image files	Select a bitmap file.

Char. Prop.

Item	Description
Alignment	Set the text alignment. Center Flush Left ———— ———— Flush Right
Message No. to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the message to display using the editor.
Specify by absolute address	Unselected: Specify the message using the group number and line number. Selected: Specify the message using the absolute address. (absolute address = (group number × 256) + line number)
Char. Color	Set the color for text.
Background	Set the background color of text.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Rotation + Direction	Set the combination of text rotation and direction. Four combinations are displayed in the drop-down menu. When selecting an option other than the above, click the icon at the bottom. The window that allows selection from all options is displayed.
Use Windows fonts	Select this checkbox to use a Windows font.

Show/Hide

Item		Description
Show		Display the numerical data display on the screen.
Hide		Do not display the numerical data display on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

	Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
	Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the message display using X and Y coordinates.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID (0 - 255)	Set the ID.

5.4　Table Data Display

5.4.1　Overview

- Sets of data can be displayed in tabular format with ease.
- Select from number display, character display, message display, or text for the data display part.
- The properties of multiple data display parts can be changed at once.
- Average, maximum, minimum, and total values can be displayed.
- Table data display parts can be set as an entry target for entry mode.

	No.1	No.2	No.3	No.4	No.5	Average
1	100	150	120	130	200	140
2	120	100	180	190	200	158
3	130	120	160	100	150	132
4	50	60	40	150	20	64

5.4.2　Table Data Settings

Lines and Columns
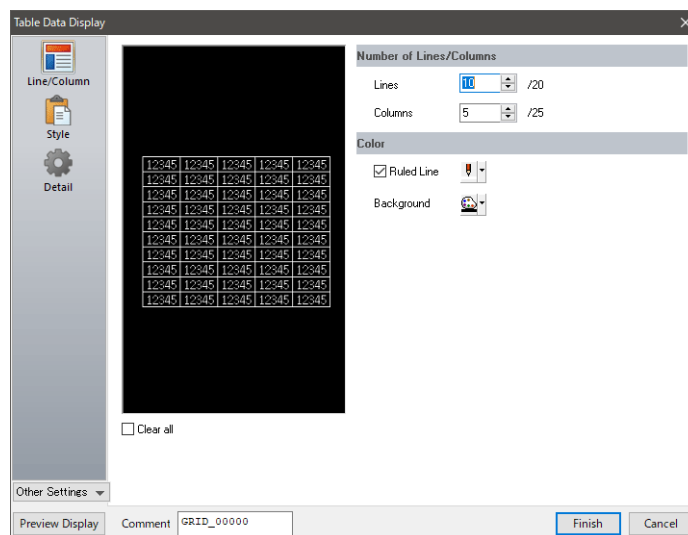
Item		Description
Number of Lines/Columns	Lines (1 to 20)	Specify the number of lines.
	Columns (1 to 25)	Specify the number of columns.
Color	Ruled Line	Select this checkbox to display ruled lines. The color of ruled lines can be specified when the checkbox is selected.
	Background	Select a background color for the table data.
Clear all		Set all cells to blank with [cell format: Text].

Style
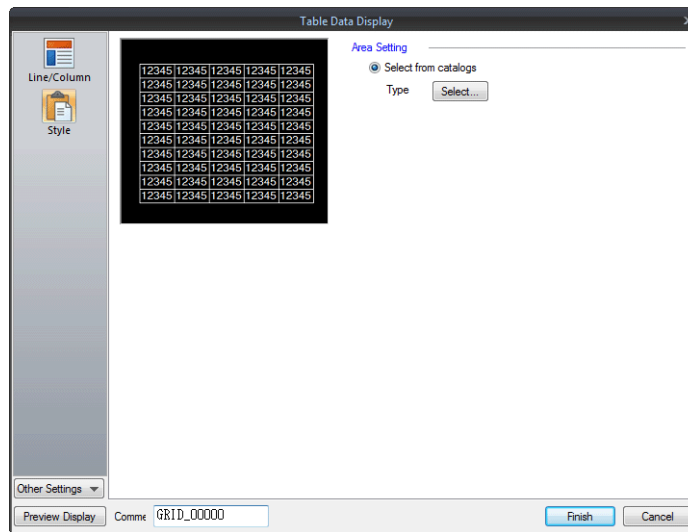
Item		Description
Area Setting	Select from catalogs	Select the part design.

Detail

Item		Description
Input Cursor Movement Control Device		Select this checkbox when using the item selection function. For details on the item selection function, refer to "6.3.1 Item Select Function".
Coordinate	Start X/Start Y	Set the display position of the table data display using X and Y coordinates.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	Order INC (0 - 255)	When the table data display contains multiple table data display parts for which [Function] is set to "Entry Target", specify the order of precedence of each table data display part.
	Cursor Direction (RGT/DWN)	This setting is available when [Cursor Moved by] is set to "UP/DW Switch" in the entry mode and bit 14 (cursor movement) of [Control Device] is set to ON. This option determines the direction in which the cursor moves when the [Write] key is pressed.
	ID (0 - 255)	Set the ID.

5.4.3   Numerical Data Display Settings

Each data cell can be selected to display a settings window for the corresponding cell.
This section explains the case when [Num. Display] is selected for [Select Type].

Select Type
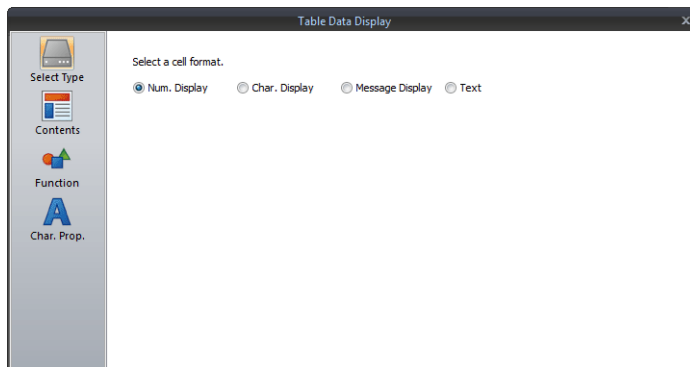
Item	Description
Num. Display Char. Display Message Display Text	Select [Num. Display].

Contents
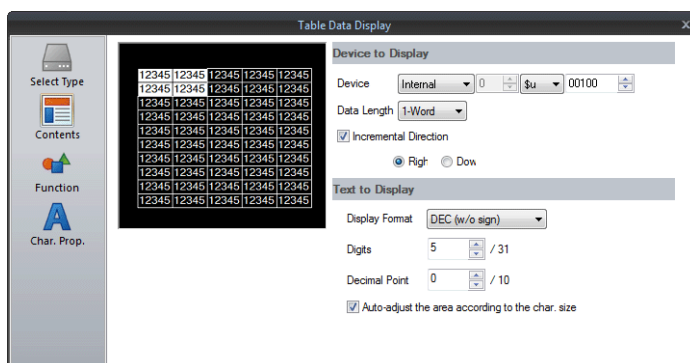
Item		Description
Device to Display	Device	Specify the device memory address to use for numerical data display.
	Data Length [*1] 1-Word/2-Word	Select the data length used for this part.
	Incremental Direction [*2]	This setting is available when multiple data in the table are selected. For details, refer to page 5-34.
Text to Display	Display Format [*1]	Select the format of numbers to be displayed on the screen.
	Digits [*3]	Specify the number of digits for the numerical data display.
	Decimal Point	Specify the decimal place. The number of decimal places must be smaller than the number of digits. When no decimal point is required, set "0".
	Auto-adjust the area according to the char. size	Select this checkbox to automatically adjust the item size based on the [Digits] and [Decimal Point] settings.

[*1] Relationship between data length and display format

Code Format	1-word Display Range	2-word Display Range
DEC (w/o sign)	0 to 65535	0 to 4294967295
DEC (with sign −)	−32768 to 32767	−2147483648 to 2147483647
DEC (with sign +−)	−32768 to +32767	−2147483648 to +2147483647
HEX	0 to FFFF	0 to FFFFFFFF
OCT	0 to 177777	0 to 37777777777
BIN (Binary)	0 to 1111111111111111	0 to 11111111111111111111111111111111

*2 Incremental Direction

Example:
Device memory: D200
[Incremental Direction] checkbox: selected (Down)

Select

12345	12345	12345	12345
12345	12345	12345	12345
12345	12345	12345	12345
12345	12345	12345	12345
12345	12345	12345	12345

The device memory addresses of the selected data display cells change as shown below.

12345	12345	12345	12345
12345	D200	D203	12345
12345	D201	D204	12345
12345	D202	D205	12345
12345	12345	12345	12345

*3 Digits
For details, refer to page 5-6.

Function
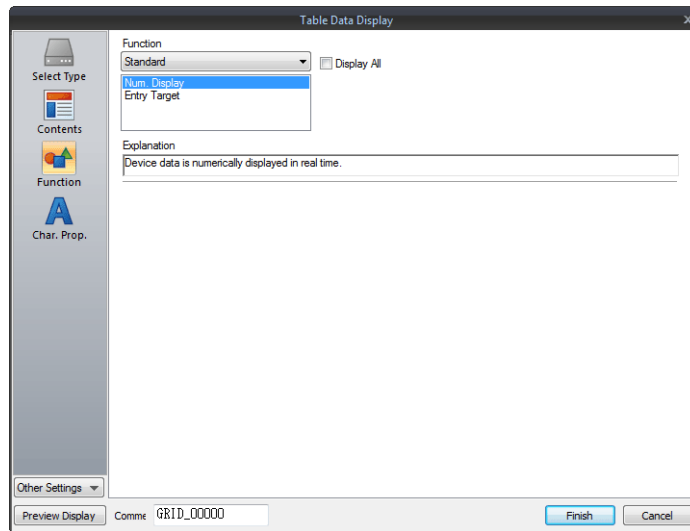
Item			Description
Function			Set the type of operation performed by the numerical data display.
	Standard	Numerical data display	Display device memory values on the numerical data display in real time.
		Entry Target	Used in conjunction with the entry function. For details, refer to "6.1 Numerical Data Entry".
Display All			Select this checkbox to display all of the available numerical data display functions. [*1]

*1 The following functions are added when the [Display All] checkbox is selected.

Name			Description
Standard	Mean Value Display	Start X/Y, End X/Y [*2]	Display the mean value of the selected data range.
	Max. Value Display Part	Start X/Y, End X/Y [*2]	Display the maximum value of the selected data range.
	Min. Value Display Part	Start X/Y, End X/Y [*2]	Display the minimum value of the selected data range.
	Total Display	Start X/Y, End X/Y [*2]	Display the total value of the selected data range.

*2 Start X/Y, End X/Y

X:1,Y:1	X:2,Y:1	X:3,Y:1
X:1,Y:2	X:2,Y:2	X:3,Y:2
X:1,Y:3	X:2,Y:3	X:3,Y:3
X:1,Y:4	X:2,Y:4	X:3,Y:4
X:1,Y:5	X:2,Y:5	X:3,Y:5

Select

12345	12345	12345
12345	12345	12345
12345	12345	12345
12345	12345	12345
12345	12345	12345

This numerical data display shows the mean value of the selected data range.
Display Function: Mean Value Display
Start   X: 2, Y: 1
End   X: 2, Y: 4

Char. Prop.

Item	Description
Value to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the value to display using the editor.
Char. Color	Set the color for text.
Background	Set the background color of text.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts or Gothic fonts)
Zero Suppress	Select this checkbox to use zero suppression. Spaces [☑ Zero Suppress] (Flush Right) → ⊔⊔⊔123 [☐ Zero Suppress] → 000123 When this checkbox is selected, specify [Flush Left], [Center] or [Flush Right]. Flush Left → 123 Center → 123 Flush Right → 123
Windows Font	Select this checkbox to use a Windows font.

Operation/Alarm

Item			Description
Alarm			Select this checkbox to display data in a different color when it exceeds or falls short of a specific range. When "Entry Target" is selected for [Function], the range of values that can be entered using a keypad can be set. For details on numerical value entry, refer to "6.1 Numerical Data Entry".
	Minimum		Set the minimum value used to trigger an alarm.
		Char. Color	Set the color for text.
	Maximum		Set the maximum value used to trigger an alarm.
		Char. Color	Set the color for text.
Operation *1			Select this checkbox to perform an operation on the value of the device memory address specified in [Contents].
Scaling *2			Select this checkbox to display data after automatically converting the data read from the PLC ([Range before Scaling]) to the specified range ([Range after Scaling]). This eliminates the need for correction programs for data read from the PLC when displaying information such as temperature, rotation speed, etc.
	Range before Scaling		Specify the data to be read from the PLC.
	Range after Scaling		Specify the range of data to be shown on MONITOUCH.

*1   For details on operations, refer to page 5-13.
*2   For details on scaling, refer to page 5-14.

Detail
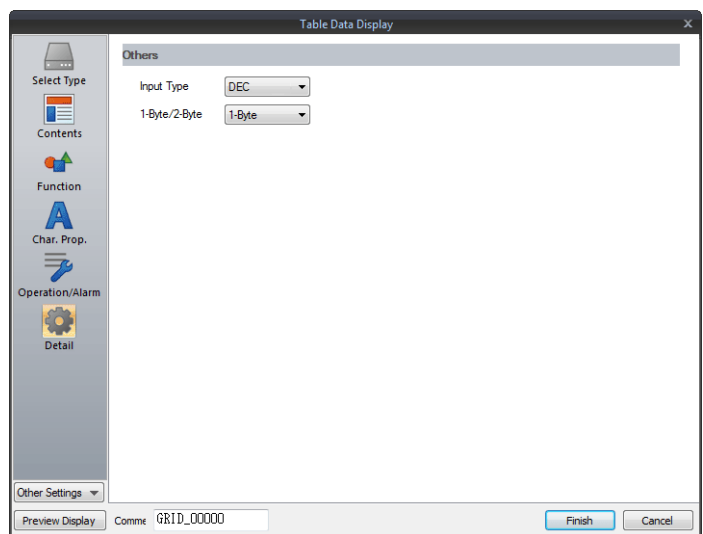
Item		Description
Others	Input Type	Select the code to use when reading data from the PLC device memory address. BCD/DEC
	1-Byte / 2-Byte	Select one-byte or two-bytes for displaying numerical data.

5.4.4   Character Display Settings

Each data cell can be selected to display a settings window for the corresponding cell.
This section explains the case when [Char. Display] is selected for [Select Type].

Select Type
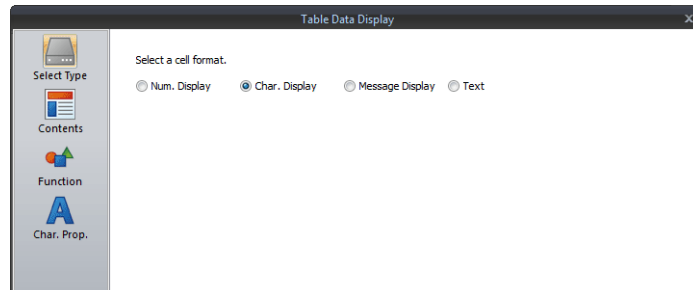
Item	Description
Num. Display Char. Display Message Display Text	Select [Char. Display].
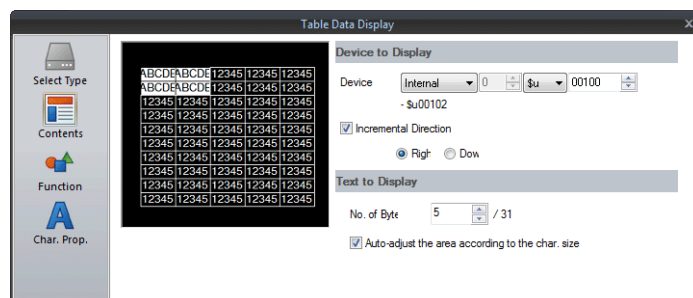
Contents

Item		Description
Device to Display	Device	Specify the device memory address to use for character display.
	Incremental Direction	This setting is available when multiple data in the table are selected. For details, refer to page 5-34.
Text to Display	No. of Bytes	Specify the number of characters to be displayed.
	Auto-adjust the area according to the char. size	Select this checkbox to automatically adjust the item size based on the [Digits] and [Decimal Point] settings.

Function

Item			Description
Function			Set the function of the character display.
	Standard	Char. Display	Display device memory values on the character display in real time.
		Entry Target	Used in conjunction with the entry function. For details, refer to "6.2 Character Input".

Char. Prop.
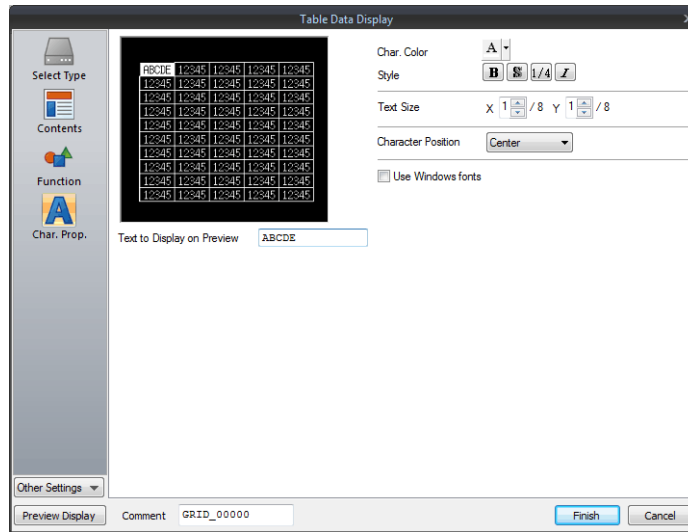
Item	Description
Text to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the text to display using the editor.
Char. Color	Set the color for text.
Background	Set the background color of text.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Character Position	The character position in the cell can be selected. Flush Left → 123 Center → 123 Flush Right → 123
Use Windows fonts	Select this checkbox to use a Windows font.
Windows Font Registration	Register a Windows font to use to display text.

Detail

Item		Description
Others	Text Process	Set the order of the first and second bytes in words. [LSB → MSB] 15 ... 0 MSB (2nd byte) LSB (1st byte) [MSB → LSB] 15 ... 0 LSB (1st byte) MSB (2nd byte)

5.4.5 Message Display Settings

Each data cell can be selected to display a settings window for the corresponding cell.
This section explains the case when [Message Display] is selected for [Select Type].

Select Type
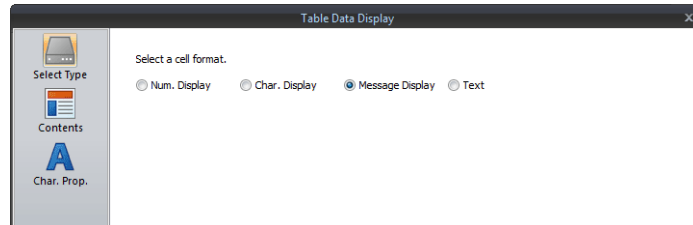
Item	Description
Num. Display Char. Display Message Display Text	Select [Message Display].

Contents
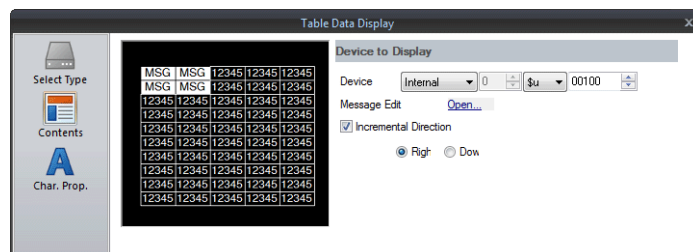
Item	Description
Device	Specify the device memory address to use for message display.
Message Edit	Click [Open] to display the [Message Edit] window.
Incremental Direction	This setting is available when multiple data in the table are selected. For details, refer to page 5-34.

Char. Prop.
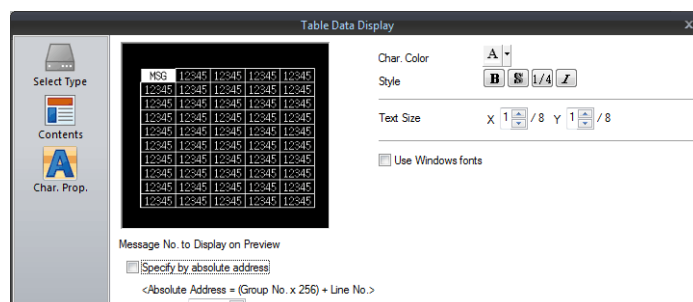
Item	Description
Message No. to Display on Preview	This item is available when the [Display for the editor] checkbox is selected on the [View] → [Display Environment] → [Display] tab. Set the message to display using the editor.
Char. Color	Set the color for text.
Background	Set the background color of text.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Use Windows fonts	Select this checkbox to use a Windows font.

5.4.6   Text Settings

Each data cell can be selected to display a settings window for the corresponding cell.
This section explains the case when [Text] is selected for [Select Type].

Select Type

Item	Description
Num. Display Char.Display Message Display Text	Select [Text].

Char. Prop.

Item	Description
Text	Enter the text for display.
Char. Color	Set the color for text.
Background	Set the background color of text.
Style	Set the text style.
Character Size (1 - 8)	Specify the enlargement factor for text. (when using bitmap fonts)
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts)
Character Position	The character position in the cell can be selected. Flush Left → 123 Center → 123 Flush Right → 123
Use Windows fonts	Select this checkbox to use a Windows font.

5.5　Notes

5.5.1　Transparency

There is a limitation on the use of the [Transparent] setting.

Item	Max. Number of Parts	Description
TS2060	64	131,072 dots in total (= 262,144 bytes ... 64 k/32 k colors) (= 131,072 bytes ... 128 colors/monochrome)
TS1000S	128	524,288 dots (same for 64 k/32 k/128 colors)

If this limitation is exceeded, the transparency setting does not work correctly.

If the displayed image is different from what you intend, reduce the number of display parts with which [Transparent] is selected.

> ***　In addition to data display parts, there are other items that have a limitation on the [Transparent] setting.**
> - Patterns (Draw, Graphic Display, Graphic Relay)
> - Switches/Lamps
>   For details, refer to the related chapter for each item.

Other Notes

- When [Shadow] is chosen for [Style], [Transparent] cannot be selected; however, it can be rendered in the same way as when [Transparent] is selected.
- Even for parts for which transparent can be selected, it is recommended to keep [Transparent] unselected.
  If [Transparent] is selected, flickering may occur when the displayed numerical data or character data changes. Also, the display speed will decrease.

5.5.2　Placing Switches or Lamps Overlaying Other Switches or Lamps

Placing Numerical Data Displays, Character Displays, and Message Displays

Take the following points into consideration when placing parts.

- When placing a data display part on a switch or lamp part
  It is recommended to create the screen under the following conditions.

  [Condition 1]　Switch/Lamp　Draw Mode: REP
  [Condition 2]　Data Display
  　　　　　　　Part type:　Parts that do not have any graphics on the background
  　　　　　　　　　　　　and simply consist of foreground and background colors
  If the above conditions are not met, the parts may not be displayed correctly.
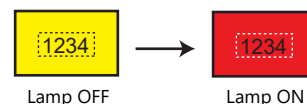
- When placing data display parts on a switch or lamp part
  When the above conditions are met, the parts can be displayed correctly with multiple data display parts.

- When placing a data display part on multiple switch or lamp parts
  Due to the part property, the parts cannot be displayed correctly.

Draw Mode: REP

The data display part is hidden under the lamp.

Draw mode: XOR

The XORed color is displayed.
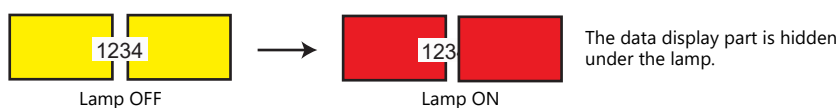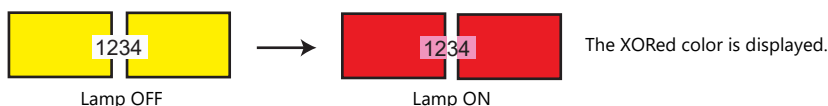
Placing Table Data (with Switches)

When [Text] is selected for the cell in the first column and first row of the table data, the entire first row is assigned the switch function.

Consequently, any switch part placed on the first row will not be recognized correctly because it is the same as placing a switch on a switch. (In this case, the switch function of the table data has priority.)

Example:
If [Text] is selected for the first column and hidden switch parts are placed on other columns.

Since [Text] is set for the cell in the first column and first row, the hidden switch parts on the first row are invalid.

No. 1	1004	50	888.9
No. 2	1006	65	100.7
No. 3	999	45	434.0
No. 4	1005	55	123.2
No. 5	1008	41	770.8

6 Entry

6.1   Numerical Data Entry

6.1.1   Overview

Numerical data can be entered using keypads and slider switches and then written to specified device memory addresses. If the target data display is a numerical data display when entering data using a keypad, enter numerical data.

Keypad

- Enter numerical data with respect to the entry target using a keypad placed on the screen.
  The keypad display can be configured to show the value being entered and include allowable input ranges.
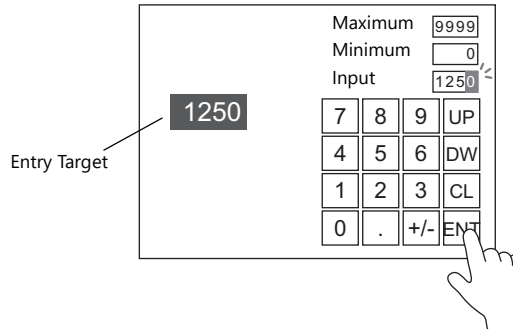
☞   For setting examples, refer to "Placing an Entry Target and Keypad on the Screen" page 6-2 and "Specifying an Entry Range" page 6-6.

- A keypad can be displayed when needed and numerical data can be entered with respect to the entry target. The keypad can remain hidden at other times.
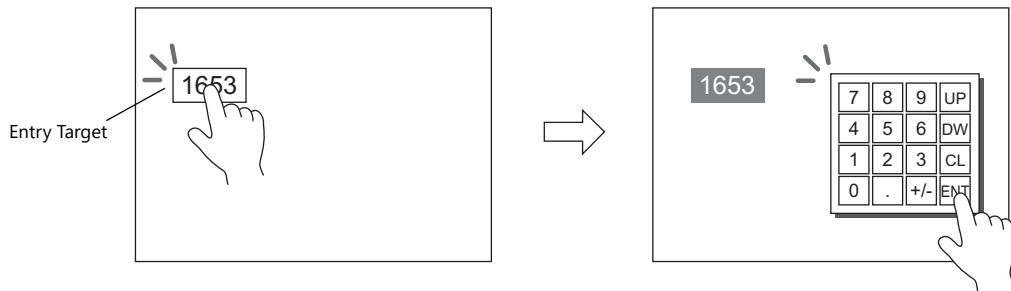
☞   For setting examples, refer to "Showing the Keypad Only When Necessary" page 6-4.

- Cursor movement can be limited to certain entry targets.
  ☞   For details, refer to "6.3.1 Item Select Function" page 6-33.

Slider switch

Numerical data can be entered using slider switches.
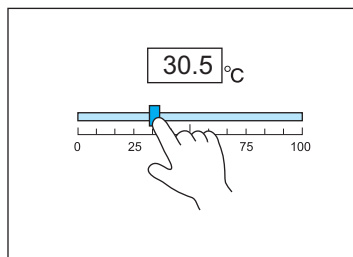
Move the slider switch while holding it down and release it to write the data change.

☞   For setting examples, refer to "Slider Switch" page 6-7.

6.1.2   Setting Examples

Placing an Entry Target and Keypad on the Screen

There are two methods for placing these parts: placement using an entry target or placement using a keypad. Each procedure is described below using an example.
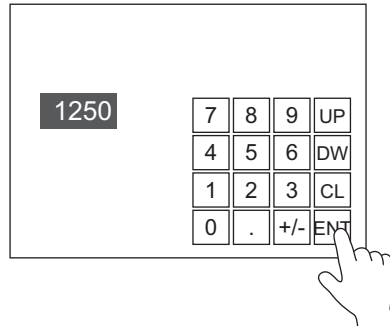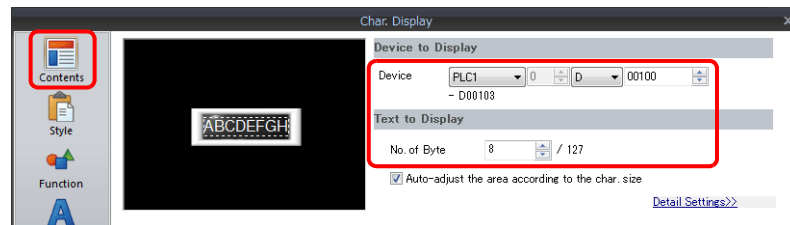

Placement Using an Entry Target

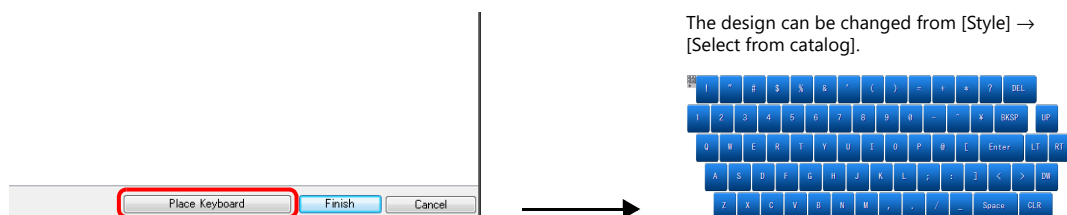1.   Click [Parts] → [Data Display ▼] → [Num. Display] and place a numerical data display on the screen.
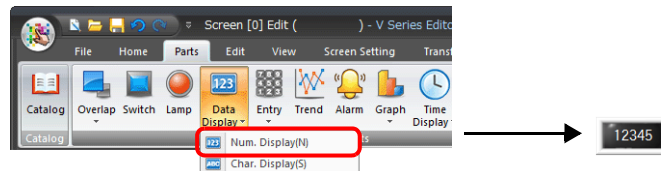
2.   Display the settings window for the numerical data display and set the device memory for writing via [Contents] → [Device].
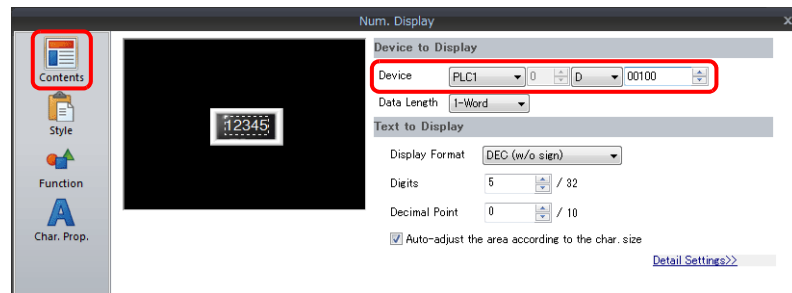

3.   Set [Function] to "Entry Target".
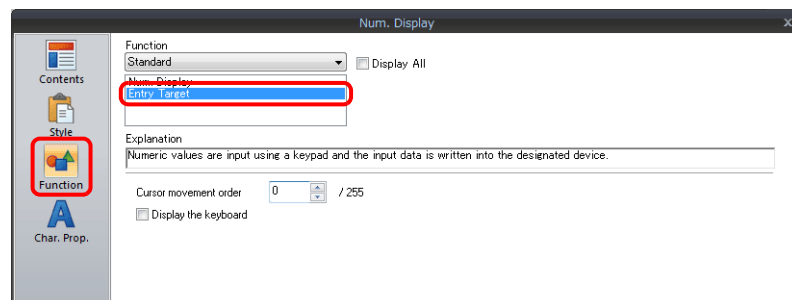
4.   Click [Place Keypad] to place a keypad.
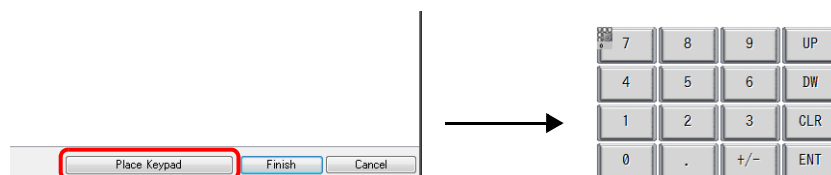
This completes the necessary settings.

Placement Using a Keypad

1. Click [Parts] → [Entry ▼] → [Keypad] and place a keypad on the screen.
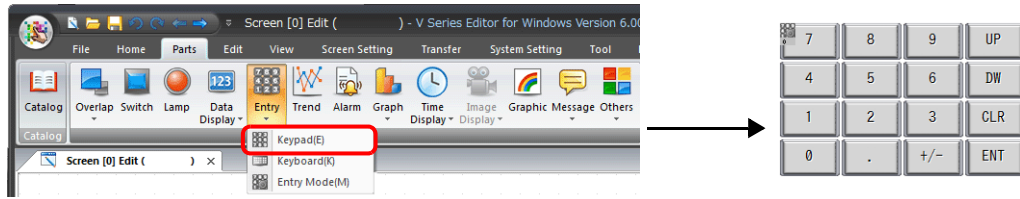
2. Display the settings window for the keypad, click the [Place Entry Target], and place an entry target.
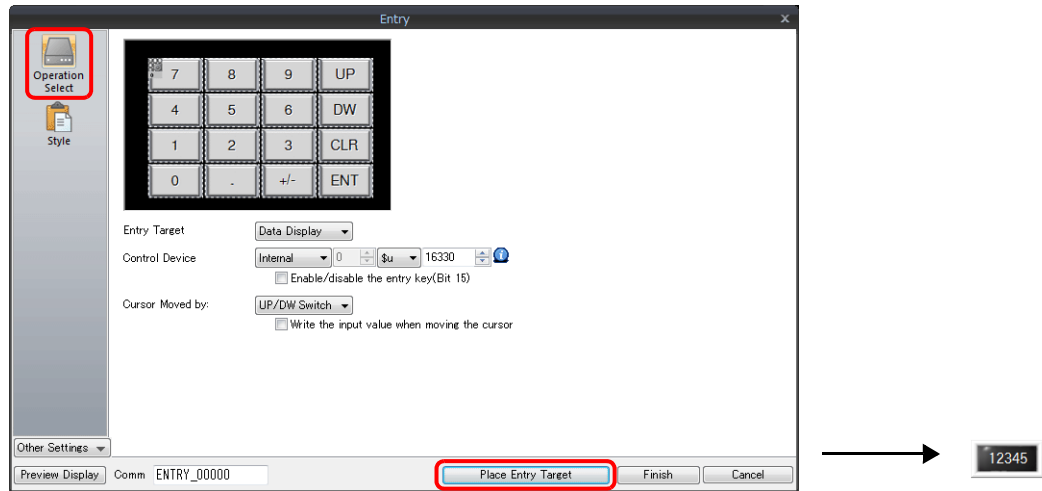
3. Display the settings window for the entry target and set the device memory for writing via [Contents] → [Device].
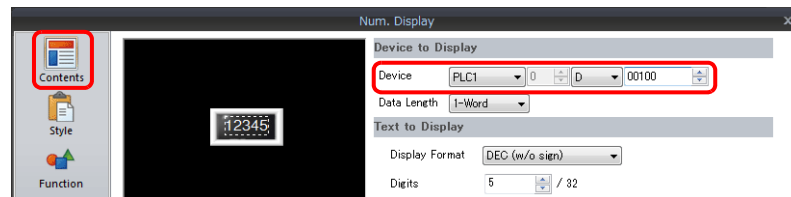
This completes the necessary settings.

*   An entry target can also be placed according to the following procedure.

    1) Click [Parts] → [Data Display ▼] → [Num. Display] and place a numerical data display on the screen.

    2) Display the settings window for the numerical data display and set the device memory for writing via [Contents] → [Device].
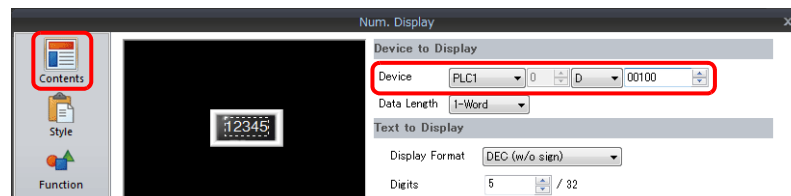
    3) Set [Function] to "Entry Target".
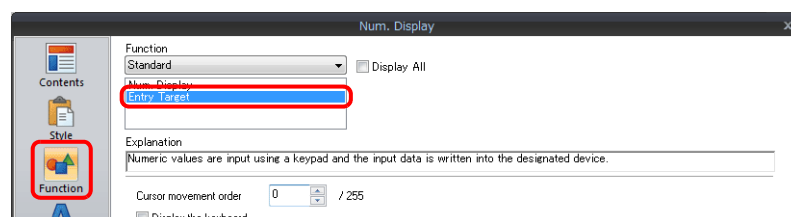
Showing the Keypad Only When Necessary

This procedure is described below using an example. (The keypad disappears after entry.)
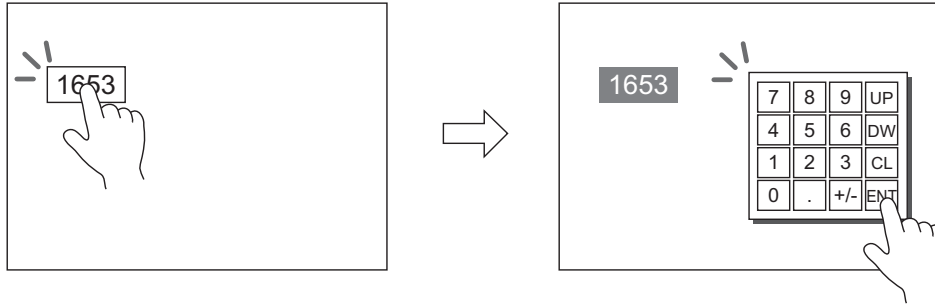
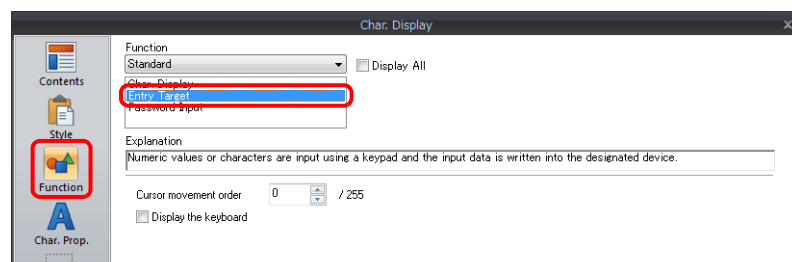1. Click [Parts] → [Data Display ▼] → [Num. Display] and place a numerical data display on the screen.
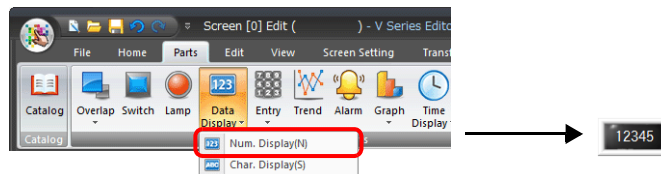
2. Display the settings window for the numerical data display and set the device memory for writing via [Contents] → [Device].
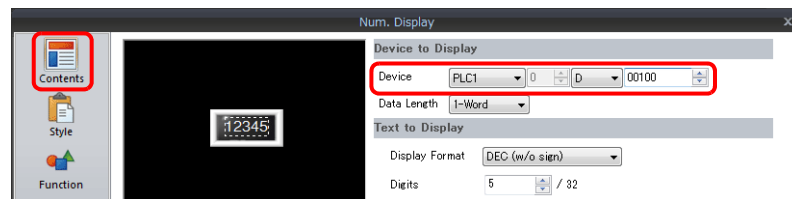
3. Set [Function] to "Entry Target".

4. Select the [Display the keyboard] checkbox and select a keypad.
   When registering a new keypad, click [Register] and select a keypad.

Click for a new registration
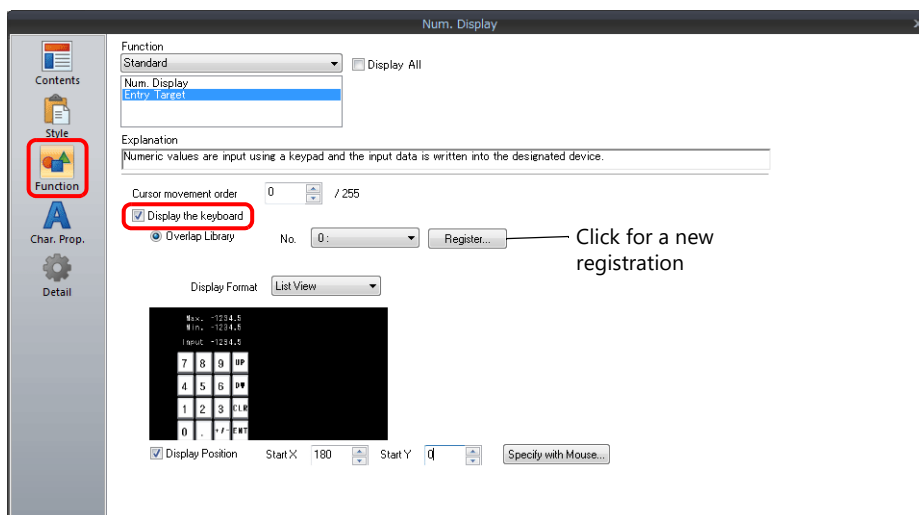
5. Select the [Display Position] checkbox and set the display position of the keypad.

This completes the necessary settings.

⚠ This setting cannot be performed for table data display entry targets.

Placing an Entry Display (Value Entry)

This procedure is described below using an example.
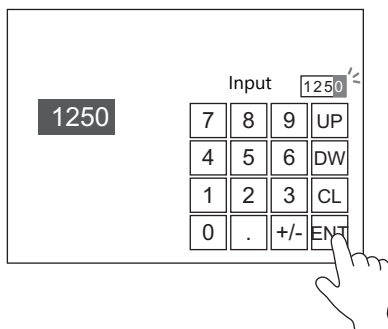
1. Double-click the keypad placed on the screen to display the settings window.

2. Select the [Entry Display Part (Num. Display)] checkbox in [Style] → [Additional Parts List].
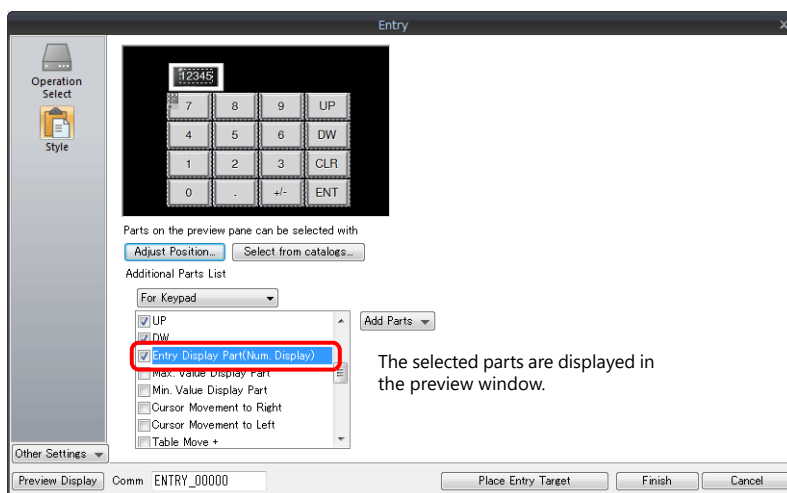
3. Click [Adjust Position] to specify the position of the part.
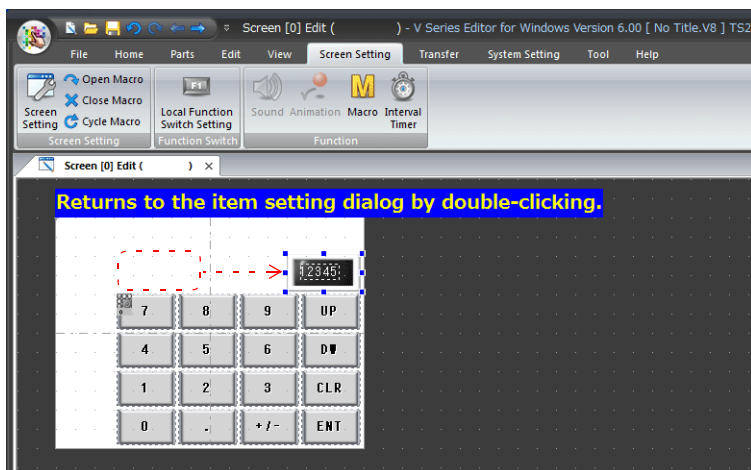
This completes the necessary settings.

Specifying an Entry Range

This procedure is described below using an example. Example: Entry range: 0 to 9999
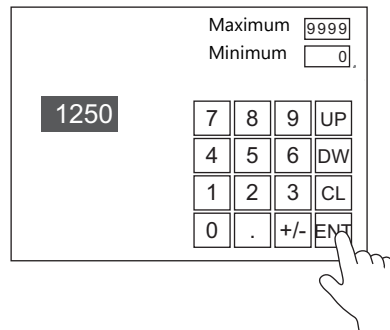
1. Display the numerical data display settings window, click [Operation/Alarm] → [Alarm], and set "0" for the minimum value and "9999" for the maximum value.
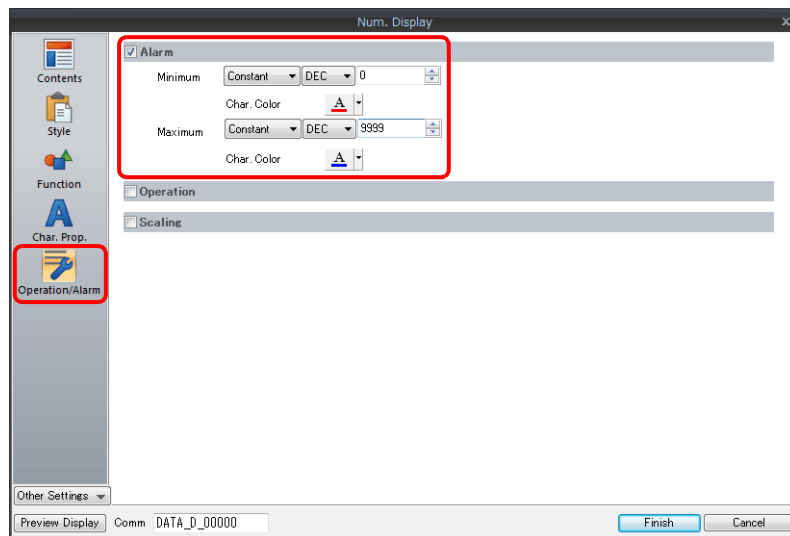
2. Double-click the keypad placed on the screen to display the settings window.

3. Select the [Max. Value Display Part] and [Min. Value Display Part] checkboxes in [Style] → [Additional Parts List].

The selected parts are displayed in the preview window.
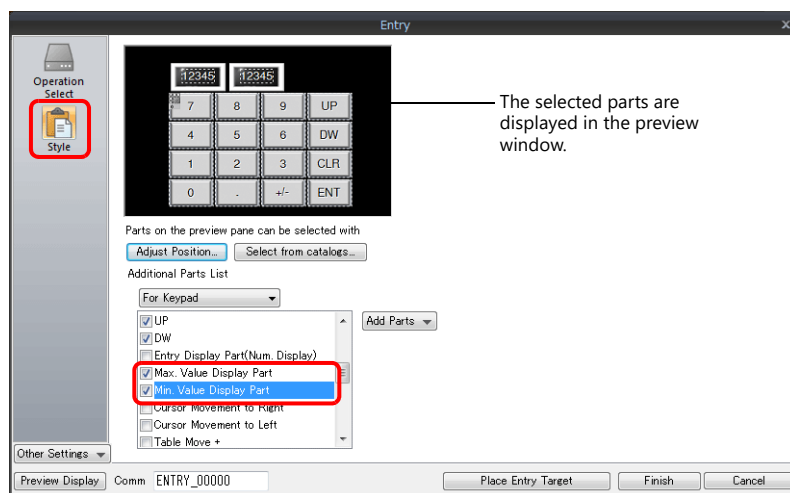
4. Click [Adjust Position] to specify the position of the part.

This completes the necessary settings.

Slider Switch

This procedure is described below using an example.
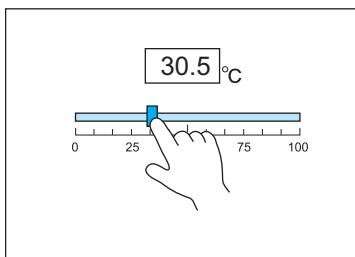
Move the slider switch while holding it down
and release it to write the data change.

1. Click [Parts] → [Others] → [Slider Switch] and place a slider switch on the screen.

2. Display the settings window for the slider switch and set the device memory for writing via [Output Setting] → [Device].
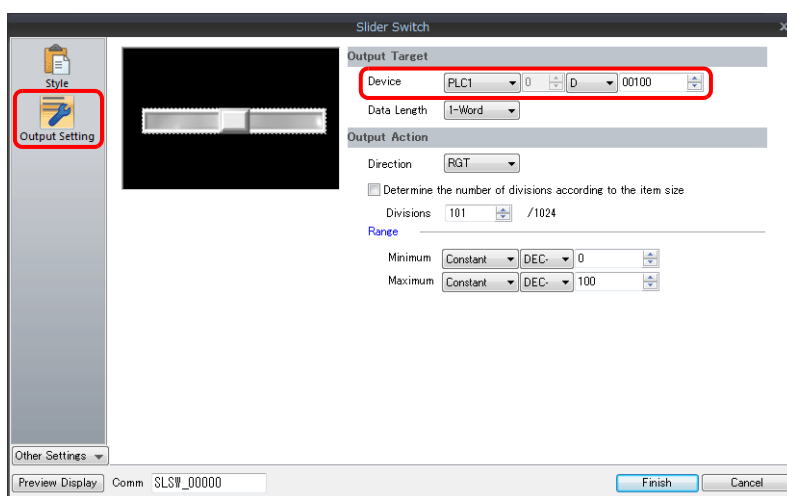
3. Click [Parts] → [Data Display ▼] → [Num. Display] and place a numerical data display on the screen.
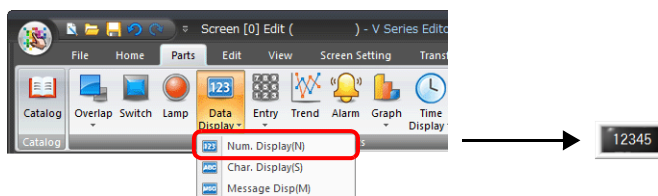

4. Display the settings window for the numerical data display and set the same device memory as in step 2 for [Contents] → [Device].
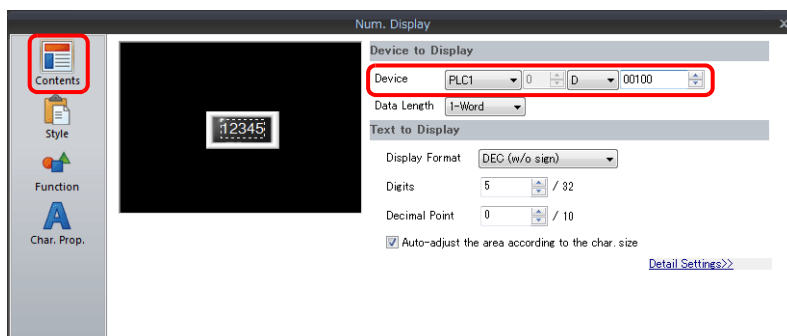
This completes the necessary settings.

6.1.3 Detailed Settings

Keypad

Operation Select
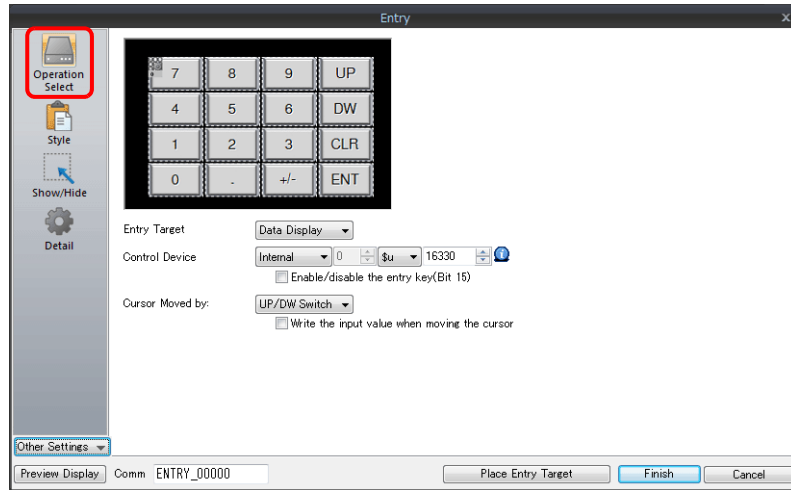
Item			Description
Entry Target			Data Display Enter data with respect to an entry target placed on the screen or an overlap.
Control Device (PLC → TS)			This device memory controls entry. For details, refer to page 6-9.
Enable/disable the entry key (Bit 15)			Select this checkbox to use the 15th bit of the control device memory to prohibit entry key writing. For details, refer to page 6-9.
Cursor Moved by	UP/DW Switch		Perform entry target selection and cursor movement using [UP] and [DW] switches.
		Write the input value when moving the cursor	Write the entry value to the corresponding device memory when moving the cursor to the next entry target. For details, refer to page 6-8.
	Control Device		Perform cursor movement and entry target selection by specifying a cursor movement order number for the control device memory. In this case, the [UP] and [DW] switches cannot be used. For details, refer to page 6-9.

Write the input value when moving the cursor

Selecting this option will write the entry value to the corresponding device memory and the cursor is moved to the next entry target using an up or down switch instead of the [ENT] key.
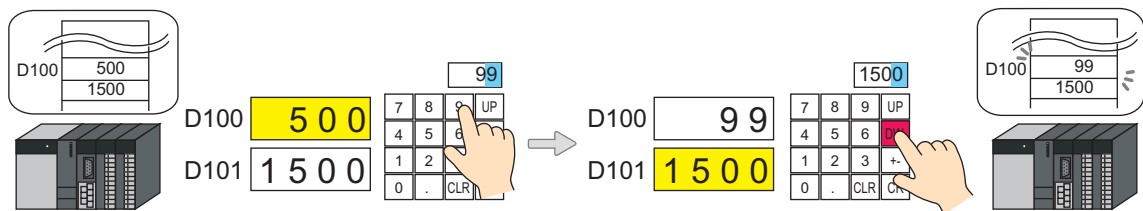
- List of applicable switches

Function	Description	Function	Description
UP	Move the cursor to the previous entry target. (Cursor movement order number – 1)	Table Move +	Move the cursor to the next table data display. (Cursor movement order number + 1)
DW	Move the cursor to the next entry target. (Cursor movement order number + 1)	Table Move –	Move the cursor to the previous table data display. (Cursor movement order number – 1)
Cursor Movement to Right	Move the cursor to the right in the table data display.		
Cursor Movement to Left	Move the cursor to the left in the table data display.		

- Note
  When pressing an entry target to call a keypad, the keypad is not hidden after writing is set to occur in conjunction with cursor movement. However, the keypad is hidden after writing completes when the [ENT] key is pressed.

Control device memory

Control device memory controls entry. Consecutive addresses are used.
The method of control differs depending on the setting of [Operation Select] → [Cursor Moved by].

- [Cursor Moved by]: UP/DW Switch

Device Memory	Description
n	MSB ... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0 0 0 0 0 Entry area selection — 1: Enabled, 0: Disabled Entry area designation Cursor movement — 1: Automatic, 0: Manual Write enabled* — 1: Enabled, 0: Disabled Not used (always set to "0") * The [Enable/disable the entry key (Bit 15)] checkbox must be selected.

	Entry area designation	These bits are enabled when the entry area selection bit is set to "1" (enabled). Specify the range of cursor movement. The contents are shown below:

Bit Number			Type	
02	01	00	Data Display	Data Block
0	0	0	Base screen	Data block area No. 0
0	0	1	Overlap ID 0	Data block area No. 1
0	1	0	Overlap ID 1	Data block area No. 2
0	1	1	Overlap ID 2	Data block area No. 3
1	0	0	Global overlap ID 3	-

	Entry area selection	Specify the cursor movement range for the entry target.
		
		0: Disabled
		   The cursor moves between areas in the following order:
		   1) Screen
		   2) Overlap ID 0
		   3) Overlap ID 1
		   4) Overlap ID 2
		   5) Overlap ID 3
		   :
		1: Enabled
		   Move the cursor within only a single specified range. Specify the range using entry area designation bits 0 to 2

	Cursor movement	Control cursor movement when the [ENT] key is pressed.
		This can be used when "UP/DW Switch" is set for [Cursor Moved by].
		
		0: Manual
		   The cursor remains in the same position even when the [ENT] key is pressed. Use the [UP] and [DW] switches to move the cursor.
		1: Auto
		   Press the [ENT] key to simultaneously write the entry value to the device memory and move the cursor to the next entry target.

	Write enabled/disabled	This can be used when the [Enable/disable the entry key (Bit 15)] checkbox is selected.
		
		0: Disabled
		   Operation of all entry switches is prohibited. If an entry key is pressed, an error beep sounds and no entry is possible. However, cursor movement can be performed with the [UP] and [DW] switches.
		1: Enabled
		   Operation of entry switches is allowed.

6

- [Cursor Moved by]: Control Device

Device Memory	Description
n

Cursor movement order number
Specify the cursor movement order number for the data display (numerical display, character display) or table data display entry target. The following bits are used.
- For DEC specification: Bits 0 to 7
- For BCD specification: Bits 0 to 9

Entry area designation
Specify the range of cursor movement. The contents are shown below:

Bit Number			Type	
13	11	10	Data Display	Data Block
0	0	0	Base screen	Data block area No. 0
0	0	1	Overlap ID 0	Data block area No. 1
0	1	0	Overlap ID 1	Data block area No. 2
0	1	1	Overlap ID 2	Data block area No. 3
1	0	0	Global overlap ID 3	-

Entry target data selection
Select the type of data targeted for cursor movement.

0: Data display (numerical display, character display)
1: Table data display part
For lines and columns in the table, specify using "control device memory n + 1".

Write enabled/disabled
This can be used when the [Enable/disable the entry key (Bit 15)] checkbox is selected.

0: Disabled
Operation of all entry switches is prohibited. If an entry key is pressed, an error beep sounds and no entry is possible.
1: Enabled
Operation of entry switches is allowed. |
| n+1 | The following are used when the value specified for entry target data selection is "1" (table data display part). Specify the line numbers and column numbers of the table.

 |

Style
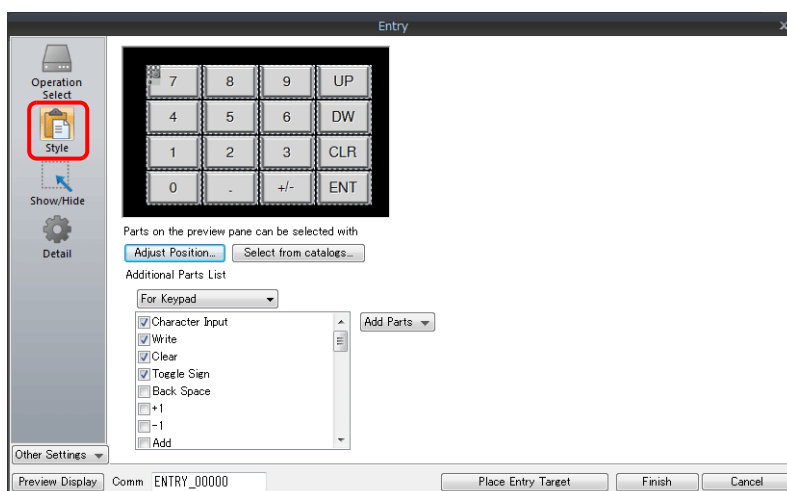
Item	Description
Adjust Position	Change the layout of the keypad and other added parts.
Select from catalogs	Change the keypad part.
Additional Parts List *	Select [For Keypad]. Use this list to add or remove entry-related parts.

* The following switches can be used on keypads.

Part	Function	Description
Switch	Character Input	Enter numerical values or character codes corresponding to the text on the switch.
	Write	Transfer the entered data to the specified device memory address. The screen can be changed after the execution of data writing.
	Clear	Clear the entered data.
	Toggle Sign	Invert the sign of the entered data.
	Back Space [*1]	Delete the character to the left of the cursor.
	DELETE [*1]	Delete the character at the current cursor position.
	+1	Increment the number at the current cursor position by one.
	-1	Decrement the number at the current cursor position by one.
	Add	Add the specified constant value. (Data is written when the [ENT] key is pressed.)
	Subtraction	Subtract the specified constant value. (Data is written when the [ENT] key is pressed.)
	Cancel	Restore the initially displayed value (the value prior to entry) during an entry operation.
	LFT [*1]	Move the cursor left.
	RGT [*1]	Move the cursor right.
	UP [*2]	Move the cursor to the previous entry target. (Cursor movement order number −1)
	DW[*2]	Move the cursor to the next entry target. (Cursor movement order number + 1)
	Cursor Movement to Right [*2]	Move the cursor to the right in the table data display.
	Cursor Movement to Left [*2]	Move the cursor to the left in the table data display.
	Table Move + [*2]	Move the cursor to the next table data display. (Cursor movement order number + 1)
	Table Move – [*2]	Move the cursor to the previous table data display. (Cursor movement order number – 1)
	Max. Value Entry	Press this switch for an entry target with an alarm setting to display the maximum value on the entry display. Pressing the [ENT] key will write the maximum value to the entry target.
	Min. Value Entry	Press this switch for an entry target with an alarm setting to display the minimum value on the entry display. Pressing the [ENT] key will write the minimum value to the entry target.
Numerical data display	Entry Display Part (Num. Display)	Temporarily display the entered value.
	Max. Value Display Part	Display the maximum value set for the entry target.
	Min. Value Display Part	Display the minimum value set for the entry target.

*1 This setting is available when the [Allow to use Insert/DELETE keys when entering values] checkbox is selected in [System Setting] → [Unit Setting] → [General Setting].
This allows insertion by moving the cursor with the [LFT] and [RGT] function switches and deletion using the delete and backspace switches. This setting is enabled for keypads on all screens. However, take the following points into consideration.

- During entry operations, entered values are displayed in flush-right format with zero suppression regardless of the display format of the numerical data display. The display returns to the specified display format after value entry is complete.
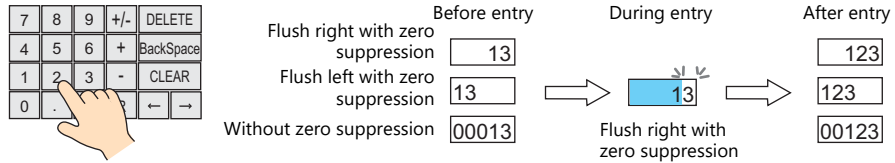
- Insertion at the whole number part
Values are inserted to the right of the cursor. When values exist at all places, entering a new value deletes the most significant digit.
Additionally, entering a value at the most significant digit of the whole number part overwrites the current value.

- Insertion at the fractional part
Values are inserted to the left of the cursor. When values exist at all places, entering a new value deletes the least significant digit of the fractional part.
Additionally, entering a value at the least significant digit of the fractional part overwrites the current value.
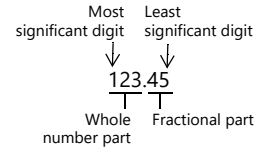
*2 Cursor movement for table data display parts
- If there are multiple entry targets in a table data display part, move the cursor using the [DW] and [UP] function switches or [Cursor Movement to Right] and [Cursor Movement to Left] function switches.

Press the [Cursor Movement to Right] switch to move the cursor to the entry target on the right.
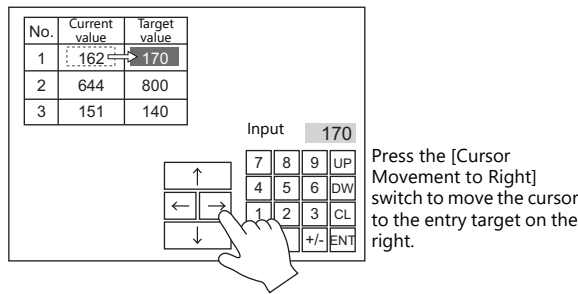
- If there are multiple table data entry targets, move the cursor between the table data display parts using the [Table Move +] and [Table Move −] function switches.

Press this switch to move the cursor to the top cell in the other table data display part.
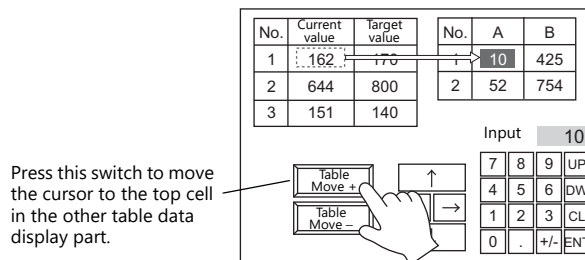
- Special functions
Setting the cell on the first line of the first column ("No." in the example below) of a table data display part that has entry targets to a text value will add switch functionality to the first line.
When the first line is pressed, the cursor moves to the first entry target cell in the table data display part.
(This works in the same way as the [Table Move +] and [Table Move −] function switches.)

Press the first line in the table to move the cursor to the first entry target.

Works in the same way as these switches
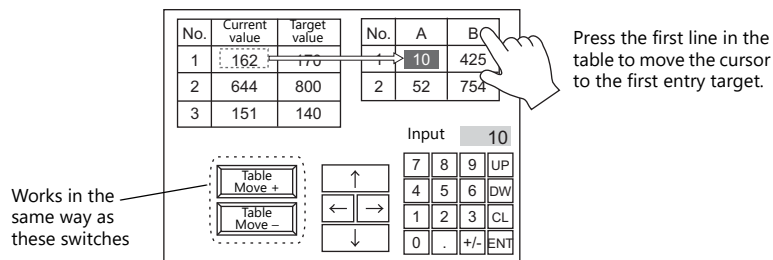
This function is enabled when [Operation Select] → [Entry Target] is set to "Data Display" for the keypad.

Detail

Item		Description
Graphic		The text placed on the graphic library can be regarded as entry text. Change between multiple graphic libraries using a switch that has [Function] set to "Graphic Library".
Coordinates		Set the placement position of the keypad.
Others	Information Output Device (TS → PLC)	This is the device memory that stores the entry state. Processing differs depending on the setting of [Detail] → [Output row/column numbers in table data display to information output device]. For details, refer to page 6-14.

	Write to	Entry Target Device.
		   Data from the entry target is written to the specified device memory address.
		Information Output Device
		   For numerical data entry → n + 2, n + 3
		   For text entry → n + 2 onwards (number of bytes ÷ 2 = number of words used)
		    - Example: Text
		     Entering one-byte 10 characters into PLC device memory starting at D100:
		     10 ÷ 2 = 5 words
		     D100 to D104 of the PLC device memory are used.

	Highlight the entry target	Highlight the display of the entry target selected with the cursor.
	Clear the entry display	Clear the data value on the entry display each time the [ENT] key is pressed.
	Output row/column numbers in table data display to information output device	This setting is available when the entry target is a table data display part. Select this checkbox to store line and column numbers of table data in the device memory specified for [Information Output Device] n + 1. For details, refer to page 6-14.

	Show [Data Block], [Memory Card], [Recipe Item] and [Direct] under [Entry Target]	The number of types listed for [Operation Select] → [Entry Target] increases.
		
		Data Block
		   Use when entering data into a data block area.
		Memory Card
		   Use on a keypad to perform name editing in memory card mode.
		Recipe Item
		   Use on a keypad to perform name editing in recipe mode.
		Direct
		   Use when controlling all processing up to the data write operation using external commands.

Process Cycle		Set the process cycle. For details, refer to "1.2 Process Cycle".
ID		Set the ID.

Information output device memory

This is the device memory that stores the entry mode state. Consecutive addresses are used.
Processing differs depending on the setting of [Detail] → [Output row/column numbers in table data display to information output device].

- [Output row/column numbers in table data display to information output device]: Unselected

Device Memory	Description	
n	MSB LSB | 15 | 14 | 13 | 12 | 11 | 10 | 09 | 08 | 07 | 06 | 05 | 04 | 03 | 02 | 01 | 00 | | | | | 0 | | | | | | | | | | | | | Cursor movement order numbers 0 to 255 Entry area Entry operation 1: Enabled, 0: Disabled Write status 1: Completed, 0: Not written	
	Cursor movement order number	The cursor movement order number of the currently selected entry target is stored. The following bits are used. - For DEC specification: Bits 0 to 7 - For BCD specification: Bits 0 to 9
	Entry area	Specify the range of cursor movement. The contents are shown below: | Bit Number | | | Type | | | 13 | 11 | 10 | Data Display | Data Block | | 0 | 0 | 0 | Base screen | Data block area No. 0 | | 0 | 0 | 1 | Overlap ID 0 | Data block area No. 1 | | 0 | 1 | 0 | Overlap ID 1 | Data block area No. 2 | | 0 | 1 | 1 | Overlap ID 2 | Data block area No. 3 | | 1 | 0 | 0 | Global overlap ID 3 | - |
	Entry operation	If multiple keypad parts are displayed, the bit of the keypad in the foreground is set to "1" and the keypad becomes available for entry. If only one keypad is displayed, it is always set to "1".

	Write status	This bit shows whether the [ENT] key has been pressed or not.
		
		0: Not written
		   Indicates that the [ENT] key has not been pressed.
		1: Completed
		   Indicates that the [ENT] key was pressed and data was written to the device memory. Unless the cursor moves to another entry target, this bit remains set to "1". It is recommended to clear this bit to "0" after confirmation.

n + 1	When [Operation Select] → [Entry Target] is set to "Data Block", the currently displayed data block number is stored. No. 0 - 1023	

n + 2 to n + m	When [Detail] → [Write to] is set to "Information Output Device", the entered value is stored.
	   Numerical value: 2 words maximum
	   Text: Number of bytes ÷ 2 words (if the number of bytes is odd, 1 byte is added.)	

- [Output row/column numbers in table data display to information output device]: Selected

Device Memory	Description

n	MSB ... LSB
	
	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
	
	└ Cursor movement order numbers 0 to 255
	└ Entry area
	└ Entry target data selection
	  1: Table data display part, 0: Data display part
	└ Entry operation
	  1: Enabled, 0: Disabled
	└ Write status
	  1: Completed, 0: Not written

	Entry target data selection	The data type of the currently selected entry target is stored. 0: Data display part 1: Table data display part
	Cursor movement order number	Settings are the same as those described in "[Output row/column numbers in table data display to information output device]: Unselected" page 6-14
	Entry area	
	Entry operation	
	Write status	

Device Memory	Description
n + 1	The line and column numbers of the selected table data cell are stored. MSB ... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 Column selection (1 to 25) Line selection (1 to 20)
n + 2	When [Operation Select] → [Entry Target] is set to "Data Block", the currently displayed data block number is stored. No. 0 - 1023

n + 3 to n + m	When [Detail] → [Write to] is set to "Information Output Device", the entered value is stored.
	   Numerical value: 2 words maximum
	   Text: Number of bytes ÷ 2 words (if the number of bytes is odd, 1 byte is added.)

6

Entry Target

This section only explains the essential entry settings.

Numerical Data Display

Contents

Item	Description
Device	Set the device memory for writing.

Function

Item	Description
Function	Set the entry target.
Cursor movement order	Set the cursor movement order. The cursor can be moved with the [UP] and [DW] switches or using a control device memory.
Display the keyboard	Select a keypad. Click [Register] when registering a new keypad part.
Display Format	Change the list view of the overlap library.
Display Position	Unselected: Display using the position of the keypad registered in the overlap library. Selected: Specify the keypad display position. The display coordinates can be set with the mouse by clicking [Specify with Mouse].

Operation/Alarm

Item	Description
Alarm	Set the entry range. Data can be entered within the range of the minimum and maximum values. If data that exceeds the specified range is entered using an external command (other than a keypad), the entry target is displayed in the specified color.

Table Data Display

General settings

Location of settings: Double-click on the table data display

- Detail

Item	Description
Input Cursor Movement Control Device	Perform cursor movement control. For details, refer to "6.3.1 Item Select Function" page 6-33.
Order INC	When the table data display contains multiple table data display parts for which [Function] is set to "Entry Target", this determines the order of precedence of each table data display part.
Cursor Direction	Select the direction in which the cursor moves when the [ENT] key is pressed. This setting is available when [Operation Select] → [Cursor Moved by] is set to "UP/DW Switch" for the keypad and bit 14 (cursor movement) of [Control Device] is set to ON.
ID	Set an ID number.

Table cells

Location of settings: Right-click on table cell → right-click menu → [Detail Setting]

- Select Type
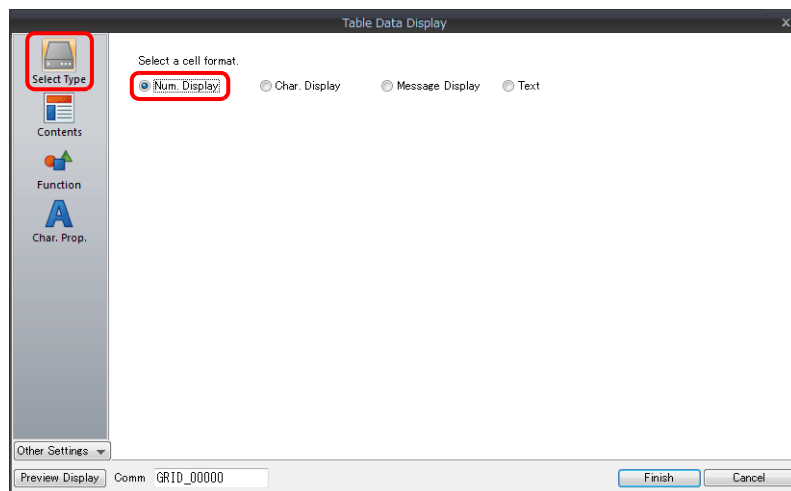
Item	Description
Select Type	Set the display format to [Num. Display].

- Contents
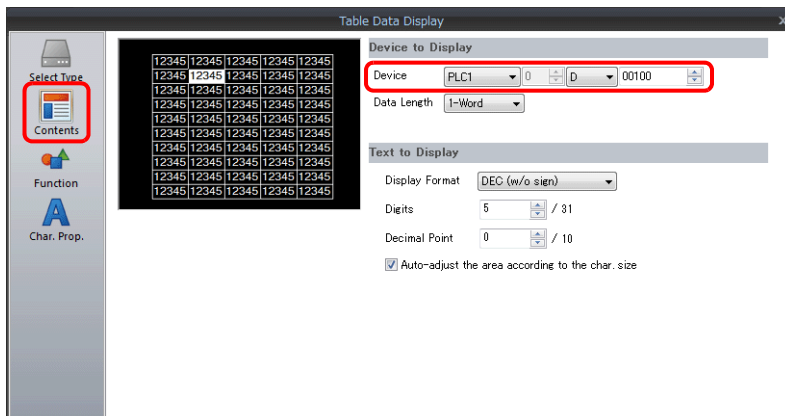
Item	Description
Device	Set the device memory for writing.
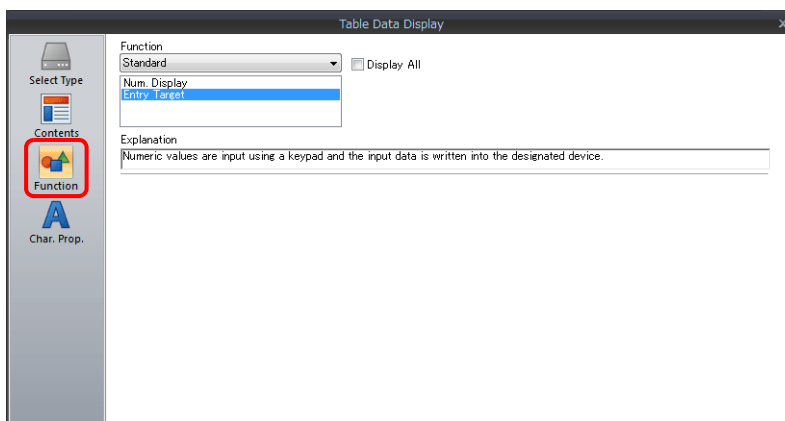
- Function

Item	Description
Function	Set the entry target.

- Operation/Alarm

Item	Description
Alarm	Set the entry range. Data can be entered within the range of the minimum and maximum values. If data that exceeds the specified range is entered using an external command (other than a keypad), the entry target is displayed in the specified color.

Slider Switch

Style
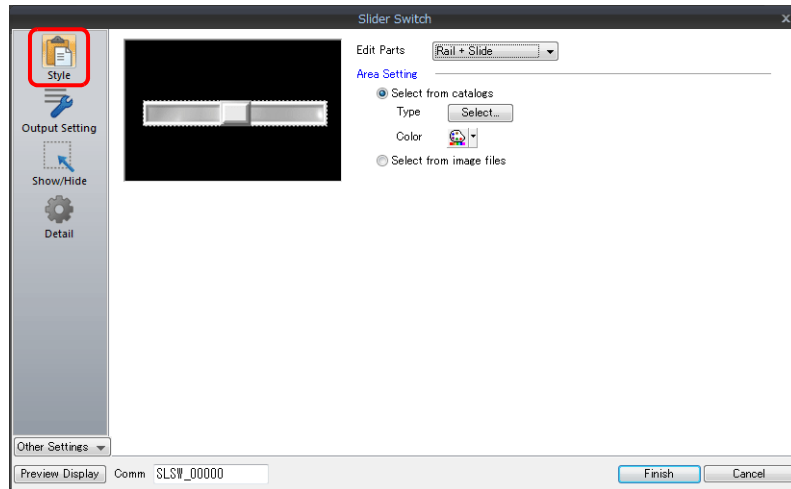
Item	Description
Area Setting	Set the part design.

Output Setting

Item	Description
Device	Set the device memory for writing data.
Data Length	Set data length for the device memory. (1-Word/2-Word)
Direction	Set the sliding direction.
Determine the number of divisions according to the item size	Select this checkbox to automatically define the number of divisions for the rail according to the size and scale value of the rail.
Divisions	Set the number of rail divisions. (2 to 1024) * If the rail size is smaller than the number of divisions, the rail is divided by the set number in the same manner as when the [Determine the number of divisions according to the item size] checkbox is selected.
Range	Set the writable range of the slider switch. This range can be changed by switching to device memory specification.

6.2 Character Input

6.2.1 Overview

A keyboard (or USB keyboard) or barcode reader can be used to enter text data (ASCII code data) to be written to the specified device memory address.
If the target data display is a character display when entering data using a keyboard, enter text data.

Keyboard

- Enter characters with respect to the entry target using a keyboard placed on the screen.
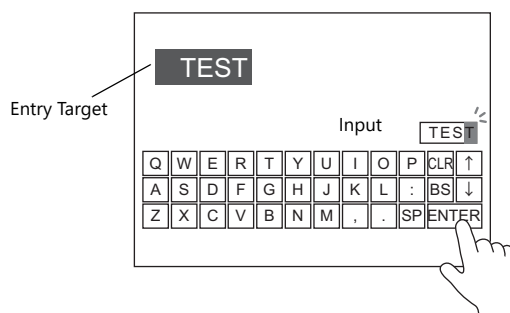
☞ For setting examples, refer to "Placing an Entry Target and Keyboard on the Screen" page 6-23.

- A keyboard can be displayed when needed and character data can be entered with respect to the entry target. The keyboard can remain hidden at other times.
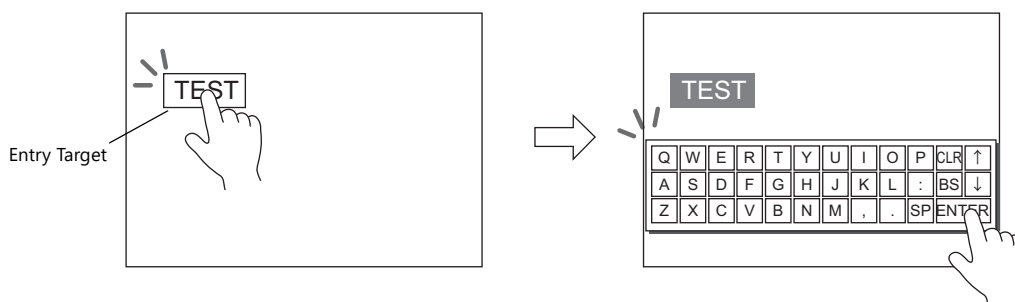
☞ For setting examples, refer to "Showing the Keyboard Only When Necessary" page 6-25.

- Cursor movement can be limited to certain entry targets.

☞ For details, refer to "6.3.1 Item Select Function" page 6-33.

USB keyboard

- Text can be entered with respect to the entry target using a USB keyboard connected to the USB-A port.
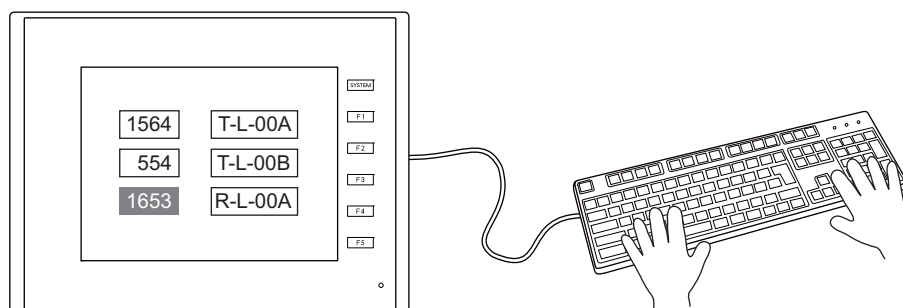
* Supported keyboards
  - Japanese keyboard (106 keyboard, 109 keyboard, etc.)
  - US keyboard (101 keyboard, 104 keyboard, etc.)
  - Keypad

☞ For setting examples, refer to "USB Keyboard Entry" page 6-26.

Password

A password entry screen can be created using a character display.

Judgment result
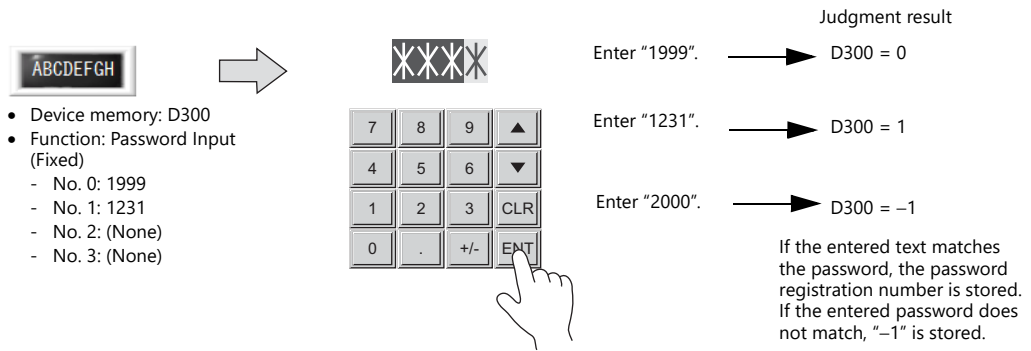
- Device memory: D300
- Function: Password Input (Fixed)
  - No. 0: 1999
  - No. 1: 1231
  - No. 2: (None)
  - No. 3: (None)

Enter "1999". → D300 = 0

Enter "1231". → D300 = 1

Enter "2000". → D300 = −1

If the entered text matches the password, the password registration number is stored. If the entered password does not match, "−1" is stored.

☞   For details on the setting method, refer to "Password Input" page 6-27.

Barcode reader

The TS reads barcode data, converts the necessary data into ASCII code, and stores results in the specified PLC device memory address. This allows various types of information to be transferred immediately using barcodes.

Barcode reader

The TS reads barcode data and transfers it to the PLC.

PLC
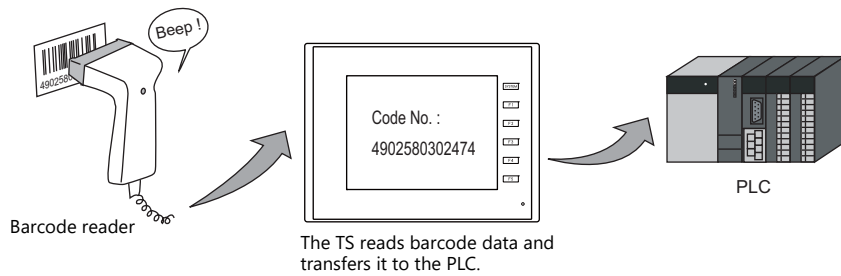
☞   For details, refer to "17 Barcode".

6.2.2 Setting Examples

Placing an Entry Target and Keyboard on the Screen

There are two methods for placing these parts: placement using an entry target or placement using a keyboard. Each procedure is described below using an example.
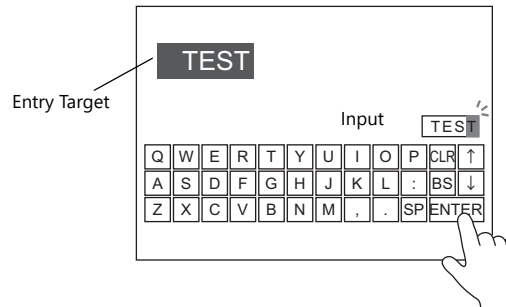
Placement Using an Entry Target

1. Click [Parts] → [Data Display ▼] → [Char. Display] and place a character display on the screen.
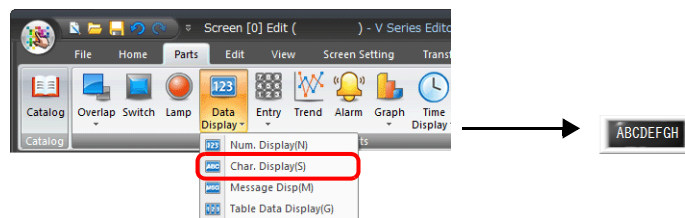
2. Display the settings window for the character display and set the [Contents] → [Device] and [No. of Bytes] settings.

3. Set [Function] to "Entry Target".
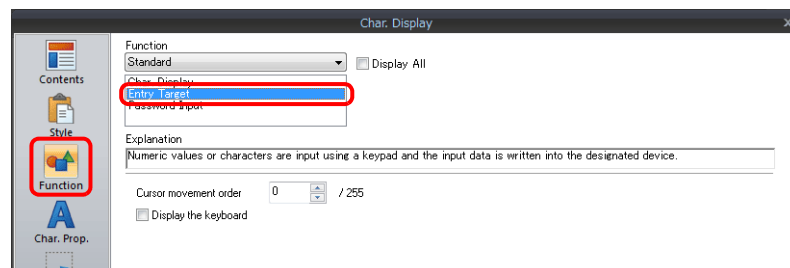
4. Click [Place Keyboard] to place a keyboard.

The design can be changed from [Style] → [Select from catalog].

This completes the necessary settings.

Placement Using a Keyboard

1. Click [Parts] → [Entry ▼] → [Keyboard] and place a keyboard on the screen.
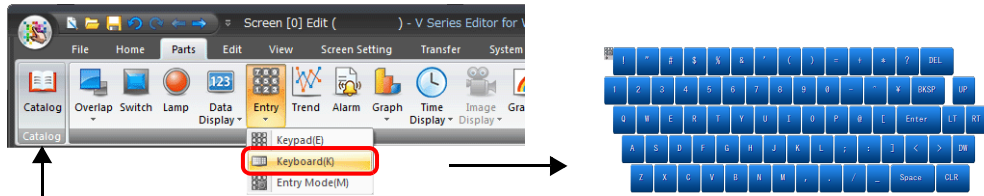
A keyboard can also be placed after
selecting a design from [Catalog].

2. Display the settings window for the keyboard, click the [Place Entry Target], and place an entry target.
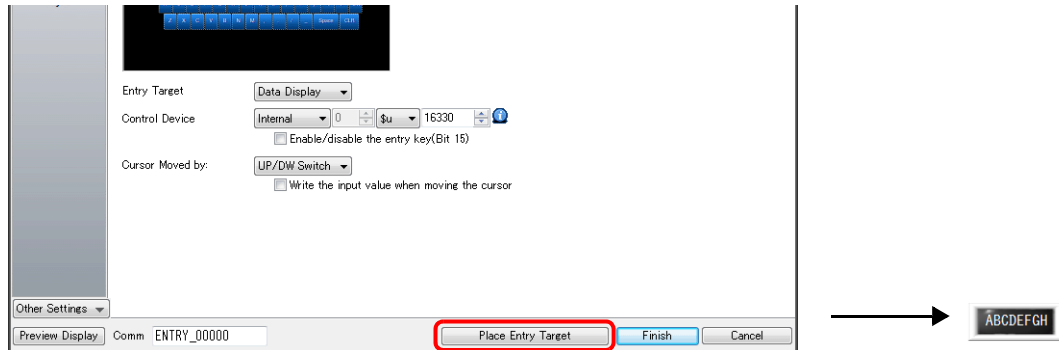
3. Display the settings window for the entry target (character display) and set the [Contents] → [Device] and [No. of Bytes]
   settings.
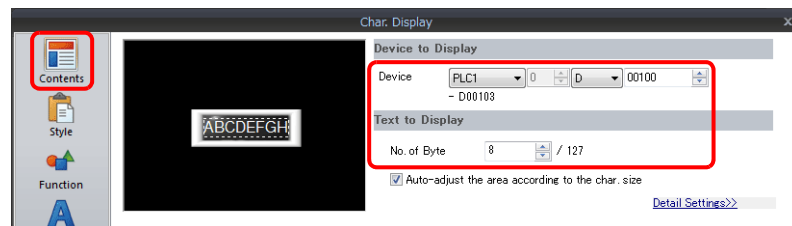
This completes the necessary settings.

* An entry target can also be placed according to the following procedure.

   1) Click [Parts] → [Data Display ▼] → [Char. Display] and place a character display on the screen.

   2) Display the settings window for the character display and set the device memory for writing via [Contents] →
      [Device].
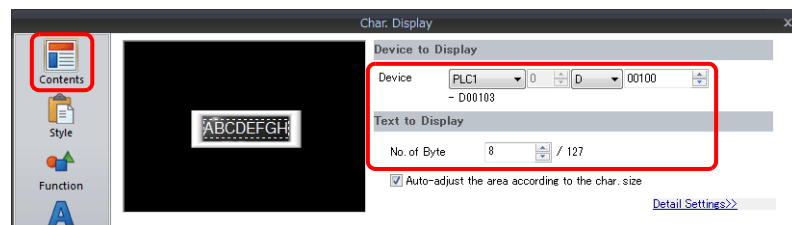
   3) Set [Function] to "Entry Target".

Showing the Keyboard Only When Necessary

This procedure is described below using an example. (The keyboard disappears after entry.)
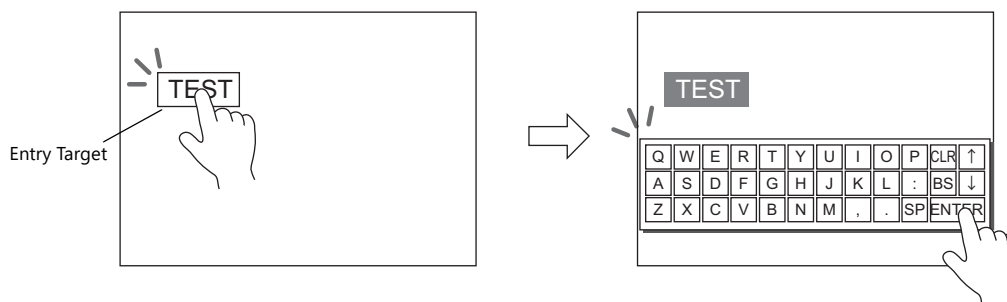
1. Click [Parts] → [Data Display ▼] → [Char. Display] and place a character display on the screen.
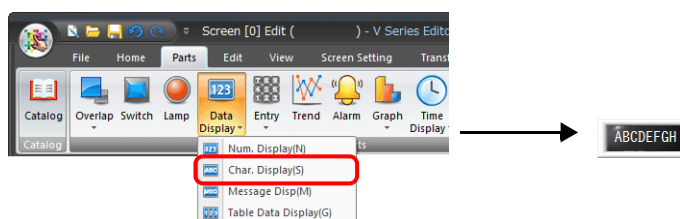
2. Display the settings window for the character display and set the device memory for writing via [Contents] → [Device].
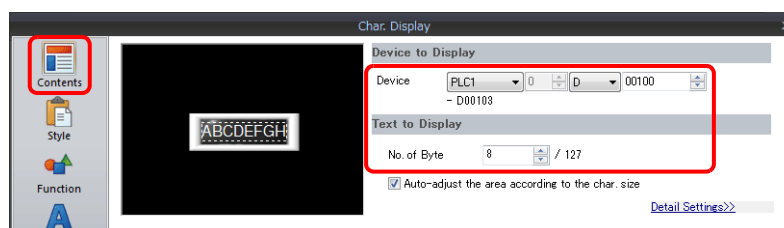
3. Set [Function] to "Entry Target".

4. Select the [Display the keyboard] checkbox and select a keyboard.
    When registering a new keyboard, click [Register] and select a keyboard.

Click for a new registration
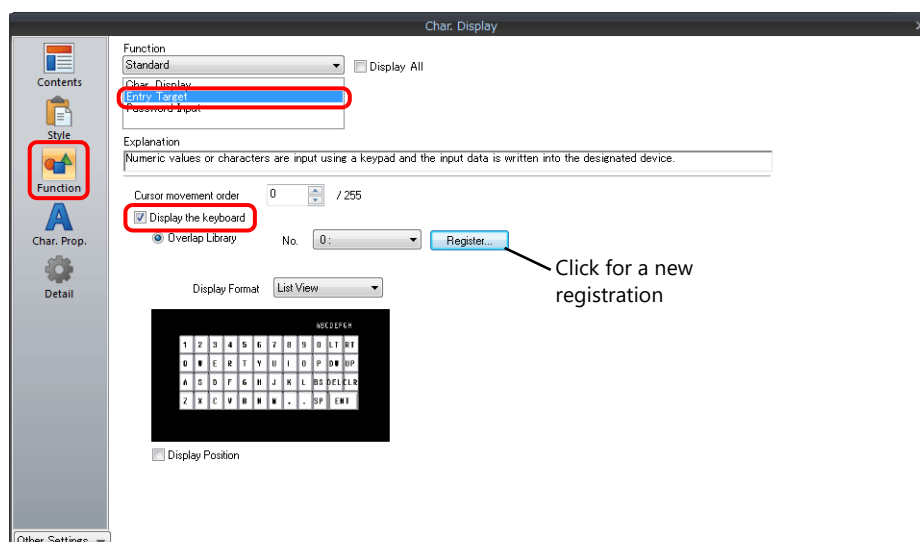
5. Select the [Display Position] checkbox and set the display position of the keyboard.

This completes the necessary settings.

⚠ This setting cannot be performed for table data display entry targets.

USB Keyboard Entry

Text can be entered with respect to the entry target using a USB keyboard connected to the USB-A port.
Only one USB keyboard can be connected.
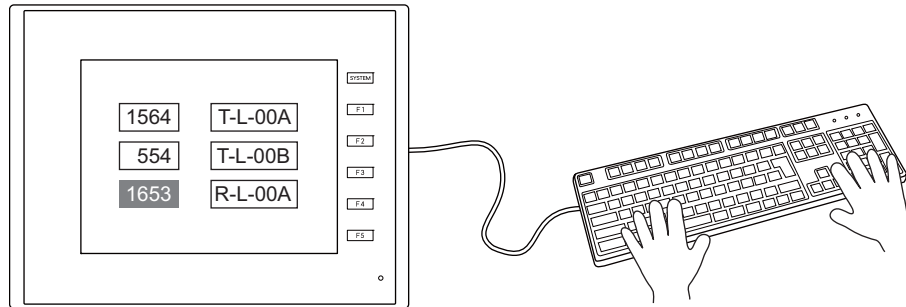
1. Click [Parts] → [Data Display ▼] → [Char. Display] and place a character display on the screen.
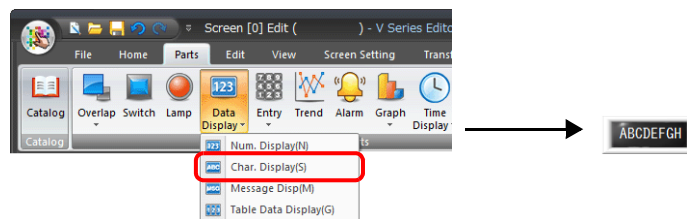
2. Display the settings window for the character display and set the device memory for writing via [Contents] → [Device].
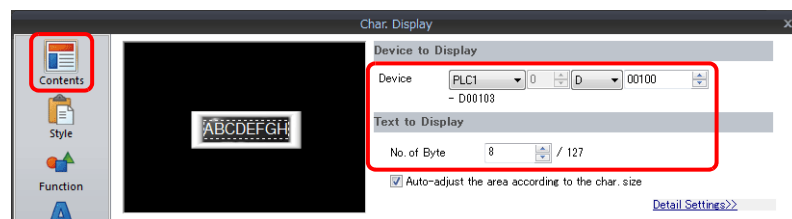
3. Set [Function] to "Entry Target" and click [Finish].

4. Click [Parts] → [Entry] → [Entry Mode] and place an icon on the screen.
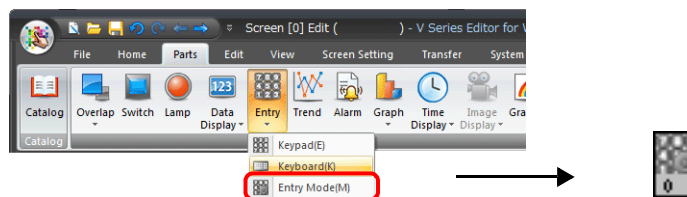
This completes configuration of the screen program. Next, select the language for the keyboard on the Main Menu screen of the TS unit.
(Settings are not necessary for a keypad.)

5. Press [Main Menu] → [I/O Test] to display the I/O Test screen

6. Press [Keyboard] to display the Keyboard Selection screen and select the language for the keyboard. Then press [Setting Finished].

This completes the necessary settings on MONITOUCH.

Password Input

This procedure is described below using an example.
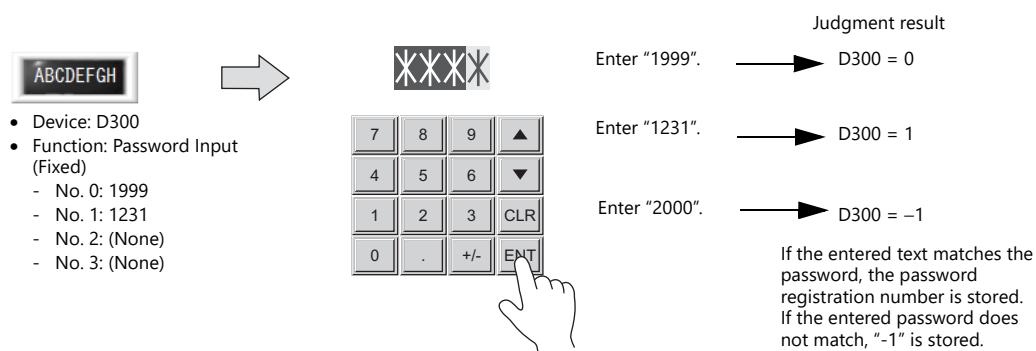
Judgment result

ABCDEFGH

- Device: D300
- Function: Password Input (Fixed)
  - No. 0: 1999
  - No. 1: 1231
  - No. 2: (None)
  - No. 3: (None)

7	8	9
4	5	6
1	2	3	CLR
0	.	+/-	ENT

Enter "1999".   D300 = 0

Enter "1231".   D300 = 1

Enter "2000".   D300 = −1

If the entered text matches the password, the password registration number is stored. If the entered password does not match, "-1" is stored.

1. Click [Parts] → [Entry ▼] → [Keypad] and place a keypad on the screen.
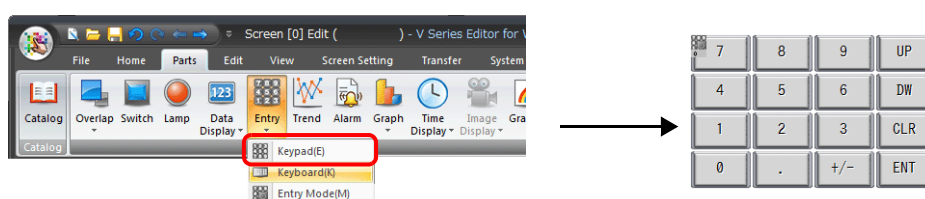
2. Display the settings window for the keypad, select the [Style] → [Additional Parts List] → [For Keyboard] → [Password Input] checkbox, and then click [Others].
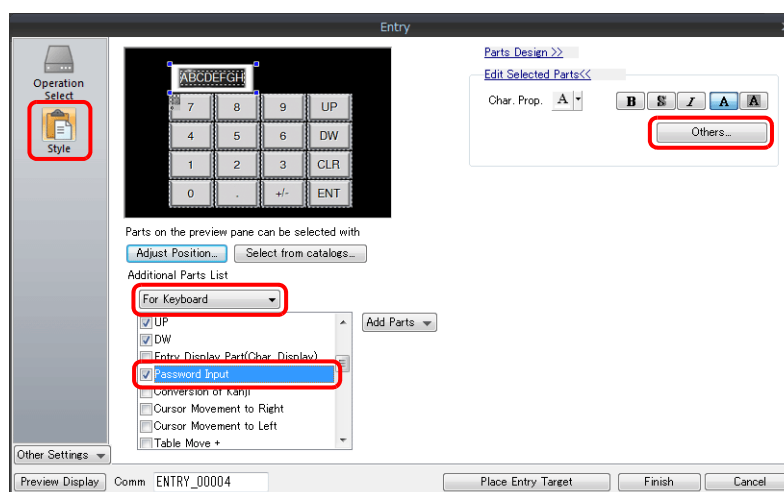
3. Register a password in the settings window of the character display under [Function].

* One-byte and two-byte characters are treated differently.

Password registration number
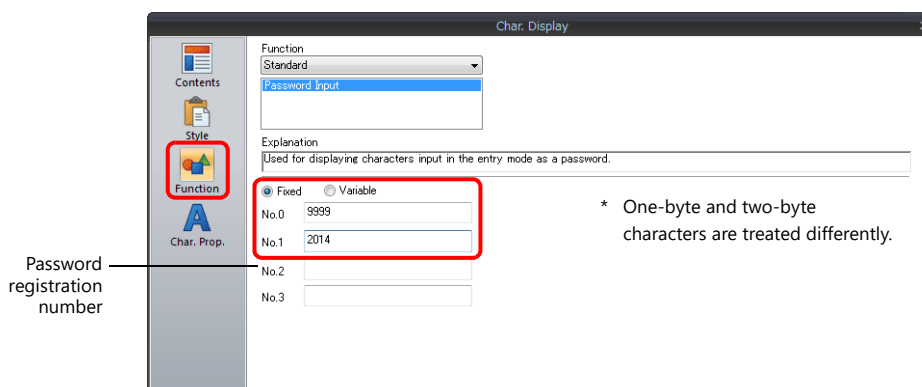
Fixed	Register the number of passwords required using the four provided password fields numbered 0 to 3 (maximum of 32 one-byte alphanumeric characters).
Variable	Select the checkboxes of the four provided passwords numbered 0 to 3 as required and store the password as an ASCII code at the specified device memory address.

4. Set the device memory for outputting the password judgment result with [Contents] → [Device]. E.g. D300.
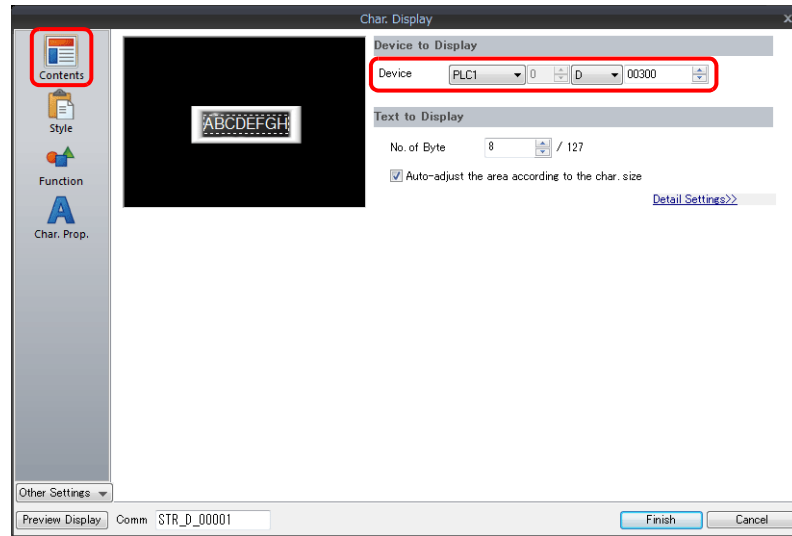
This completes the necessary settings.
The password judgment result is stored in D300.
- Password matches: When the password is accepted, No. 0 to 3 is stored.
- Password does not match: −1 (FFFF H) is stored.

6.2.3   Detailed Settings

Keyboard

Operation Select / Detail

These are the same as for the keypad.

☞   For details, refer to "Operation Select" page 6-8."Detail" page 6-13

Style
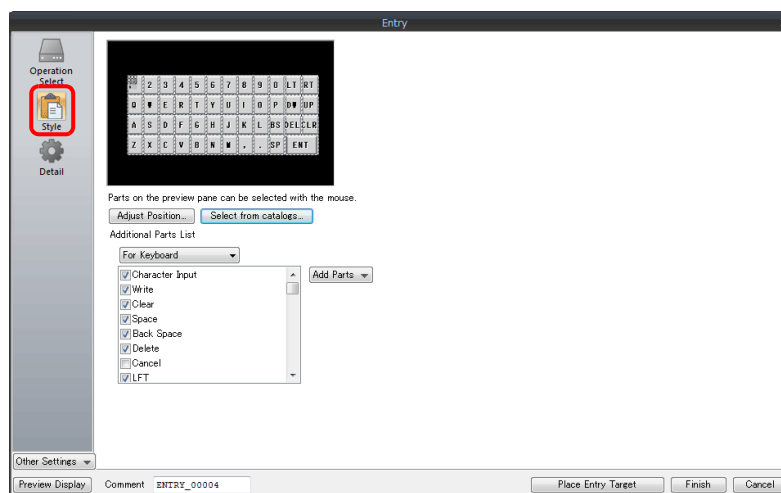
Item	Description
Adjust Position	Change the layout of the keyboard and other added parts.
Select from catalogs	Change the keyboard part.
Additional Parts List *	Select [For Keyboard]. Use this list to add or remove entry-related parts.

  * The following switches can be used on a keyboard.

Part	Function	Description
Switch	Character Input	Enter numerical values or character codes corresponding to the text on the switch.
	Write	Transfer the entered data to the specified device memory address. The screen can be changed after the execution of data writing.
	Clear	Clear the entered data.
	Spaces	One-byte space is entered.
	Back Space	Delete the character to the left of the cursor.
	DELETE	Delete the character at the current cursor position.
	Cancel	Restore the initially displayed value (the value prior to entry) during an entry operation.
	LFT	Move the cursor left.
	RGT	Move the cursor right.
	UP	Move the cursor to the previous entry target. (Cursor movement order number –1)
	DW	Move the cursor to the next entry target. (Cursor movement order number + 1)
	Conversion of Kanji	Enable kanji mode with conversion of one character at a time. * JIS level-1 kanji set only
	Cursor Movement to Right	Move the cursor to the right in the table data display. For details, refer to page 6-12.
	Cursor Movement to Left	Move the cursor to the left in the table data display. For details, refer to page 6-12.
	Table Move +	Move the cursor to the next table data display. (Cursor movement order number + 1)
	Table Move –	Move the cursor to the previous table data display. (Cursor movement order number – 1)

6

Part	Function	Description
Switch	Multi-char. Input	Changeover the text for each pattern with the [Char. Switching (+)] and [Char. Switching (−)] switches. Text on switches changeover according to the conversion modes of 1-byte/2-byte and caps lock.
	Switching (Entry Mode Change)	-
	Switching (1-byte/2-byte Char. Change)	-
	Switching (Caps Lock)	-
	Direct Input	-
	Word Registration	-
	Char. Switching (+)	Changeover the pattern and text of the [Multi-char. Input] switch in order from "OFF" to "P15."
	Char. Switching (−)	Changeover the pattern and text of the [Multi-char. Input] switch in order from "P15" to "OFF."
Character display	Entry Target	Temporarily display the entered value.
	Password Input	Displays input values as asterisks. This can be used for password inputs. For details, refer to page 6-27.

Entry Target

This section only explains the essential entry settings.

Character Display

Contents

Item	Description
Device	Set the device memory for writing.
No. of Bytes	Specify the number of bytes (number of characters).

Function

Item	Description
Function	Set the entry target.
Cursor movement order	Set the cursor movement order. The cursor can be moved with the [UP] and [DW] switches or using a control device memory.
Display the keyboard	Select a keyboard. Click [Register] when registering a new keyboard part.
Display Format	Change the list view of the overlap library.
Display Position	Unselected: 　Display using the position of the keyboard registered in the overlap library. Selected: 　Specify the keyboard display position. The display coordinates can be set with the mouse by clicking [Specify with Mouse].

Table Data Display

General settings

Location of settings: Double-click on the table data display

- Detail

Item	Description
Input Cursor Movement Control Device	Perform cursor movement control. For details, refer to "6.3.1 Item Select Function" page 6-33.
Order INC	When the table data display contains multiple table data display parts for which [Function] is set to "Entry Target", this determines the order of precedence of each table data display part.
Cursor Direction	Select the direction in which the cursor moves when the [ENT] key is pressed. This setting is available when [Operation Select] → [Cursor Moved by] is set to "UP/SW Switch" and bit 14 (cursor movement) of [Control Device] is set to ON.
ID	Set an ID number.

Table cells

- Select Type
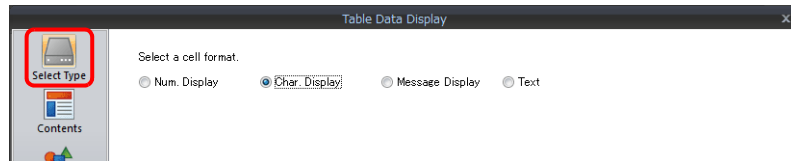
Item	Description
Select Type	Select [Char. Display].
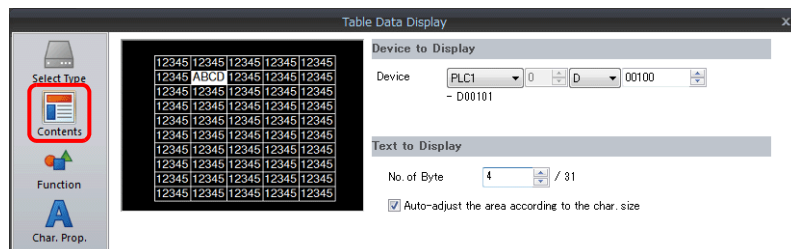
- Contents

Item	Description
Device	Set the device memory for writing.
No. of Bytes	Specify the number of bytes (number of characters).
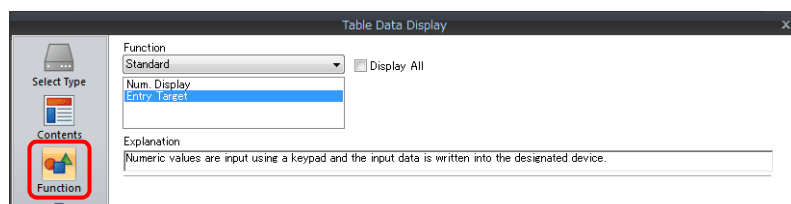
- Function

Item	Description
Function	Set the entry target.

6.3   Convenient Functions

6.3.1 Item Select Function

Overview

The cursor can be moved to a specific entry target. This is called the "item select function."
There are two methods for moving the cursor: using a switch or using an external command from the device memory specified for [Input Cursor Movement Control Device] (page 6-34).
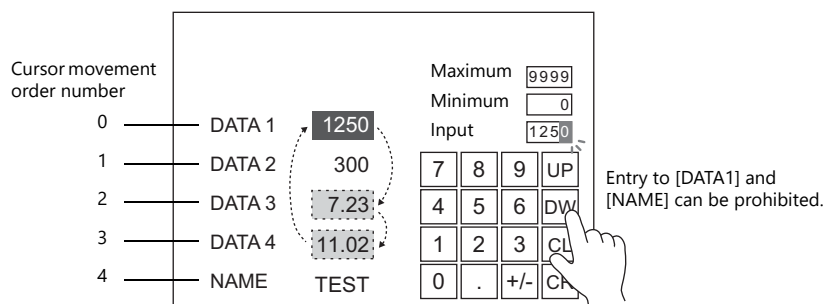
Item Select Function with a Switch

A switch with [Function] set to "Item Select" can be overlaid on a specific entry target so that the cursor can be moved to the entry target.

Setting Procedure

This procedure is described below using an example.
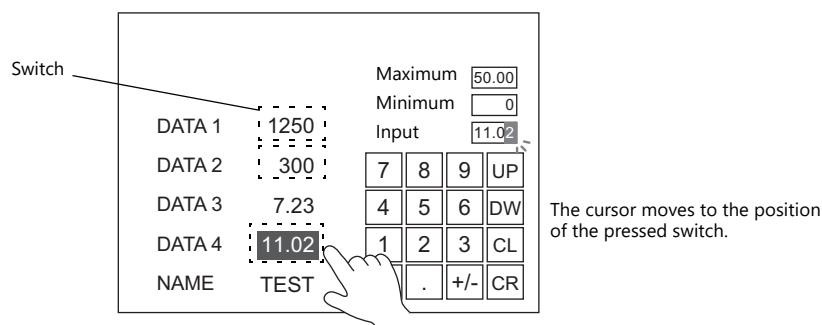
1.   Set [Function] to "Item Select" for the switch.
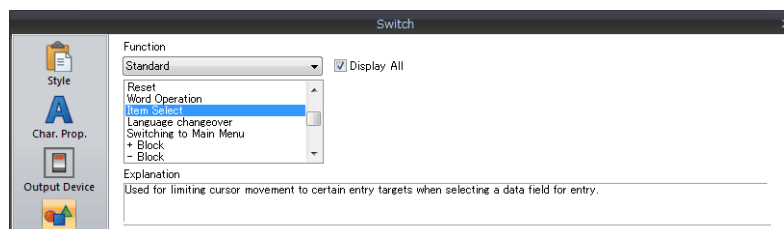
2.   Place the switch so that it overlaps an entry target.

This completes the necessary settings.
Pressing the entry target moves the cursor to the pressed position.

Notes

- Place the switch set with "Item Select" for [Function] on the same editing layer (screen, overlap ID 0 to 3) as the keypad.
- For the keypad, set [Operation Select] → [Entry Target] to "Data Display" and [Cursor Moved by] to "UP/DW Switch".

Item Select with [Input Cursor Movement Control Device]

Set a [Input Cursor Movement Control Device] at the position of the placed entry target. The cursor can be moved to the specific entry target by setting the relevant [Input Cursor Movement Control Device] bit either ON or OFF.
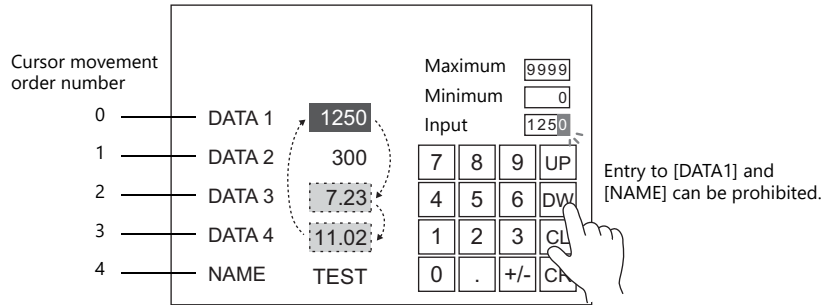
Location of Setting

The location of this setting differs depending on the placement location of the entry target. Specify the top device memory address for [Input Cursor Movement Control Device] at the location of this setting.

Entry Target		Location of the [Input Cursor Movement Control Device] Setting
Type	Placement Location	
Numerical Data Display Character Display	Screen	[Screen Setting] → [Screen Setting] → [Entry] → [Input Cursor Movement Control Device]
	Normal overlap	Normal overlap settings window → [Detail] → [Input Cursor Movement Control Device]
	Multi-overlap	Multi-overlap settings window → [Detail] → [Input Cursor Movement Control Device]
	Call-overlap	Call-overlap settings window → [Detail] → [Input Cursor Movement Control Device]
	Global overlap	Global overlap settings window → [Detail] → [Input Cursor Movement Control Device]
	Data Block Area	Data block area settings window → [Detail] → [Input Cursor Movement Control Device] under [Device Setting]
Table Data Display	-	Table data display settings window → [Detail] → [Input Cursor Movement Control Device]

Details of the [Input Cursor Movement Control Device] Setting

The control method differs depending on whether the entry target is a numerical data display, character display, or table data display.
One bit is assigned to each entry target and cursor movement is controlled by the ON/OFF state of this bit.

Bit status
OFF (0): Cursor movement prohibited
ON (1): Cursor movement allowed

When the entry target is a numerical number display or character display

[Input Cursor Movement Control Device] is associated with [Entry Target] and the [Cursor movement order] number in the following way.
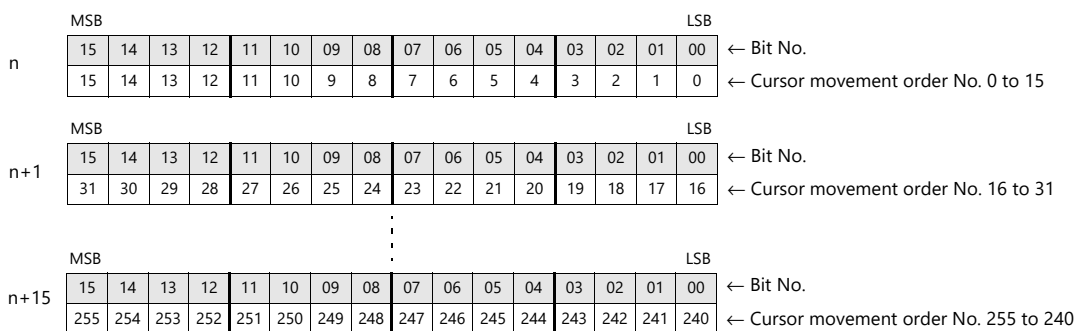
When the entry target is a table data display

Assignment depends on the number of columns of the table data display part.

- Table with 1 to 16 columns
  For a table with 1 to 16 columns, one word is used for each line.
  The total number of words used is the same as the number of lines.

	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	← Column number
	MSB															LSB	
n	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	← Bit No.
																	← Line 1
	MSB															LSB	
n+1	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	← Bit No.
																	← Line 2
	MSB															LSB	
n+19	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	← Bit No.
																	← Line 20
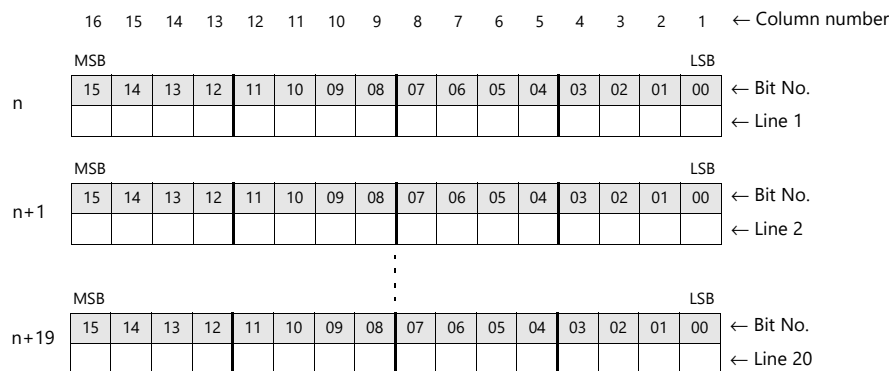
- Table with 17 to 25 columns
  For a table with 17 or more columns, 2 words are used for each line.
  The total number of words used is "2 ÷ number of lines".

	MSB											LSB		MSB														LSB		
	25	24	23	22	21	20	19	18	17					16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	Column number
n + 1	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00												n	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00															Bit No. Line 1
n + 3	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00												n + 2	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00															Bit No. Line 2
n + q	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00												n + p	15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00															Bit No. Line m
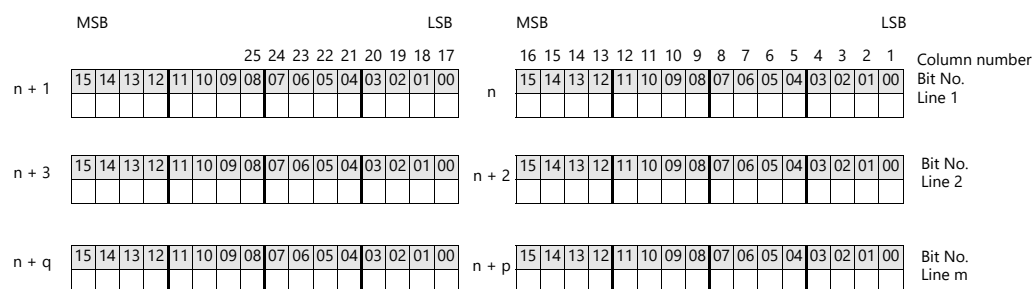
Usage Example

An example of when a numerical data display or character display entry target and a keypad are placed on the screen is explained below.

1. Set [Screen Setting] → [Screen Setting] → [Entry] → [Input Cursor Movement Control Device]. Example: PLC device memory D200

2. Only the 0th, 2nd, and 3rd bits of the device memory for input cursor movement control are set to ON from the unit.

	MSB															LSB	
D200	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00	← Bit No.
	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	1	← Cursor movement order No. 0 to 15
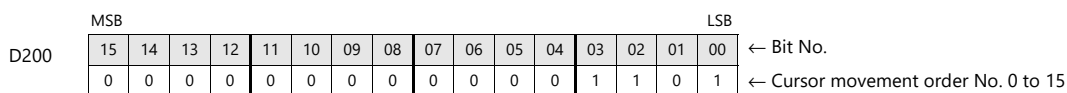
The cursor moves according to the cursor movement order numbers 0, 2, and 3.

Notes

In this case, the [Cursor movement order] number of each table data display is ignored.
The line and column numbers are also assigned to those consisting of text only.

6.3.2   Data Block Area

Overview

If the screen display area is not sufficient, you can switch over the entry targets displayed on the screen.
Register the data for these entry targets to be switched as data blocks.
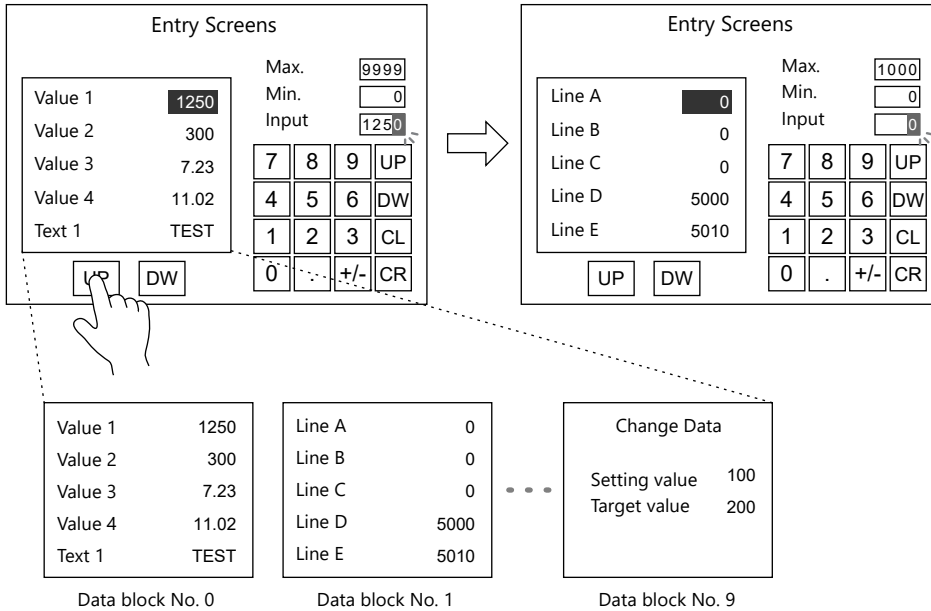
Data block No. 0	Data block No. 1	Data block No. 9

Setting Procedure

1. Click [Parts] → [Entry] → [Keypad] or [Keyboard] and place an entry part.
2. Configure settings on the settings window of the entry part as shown below.
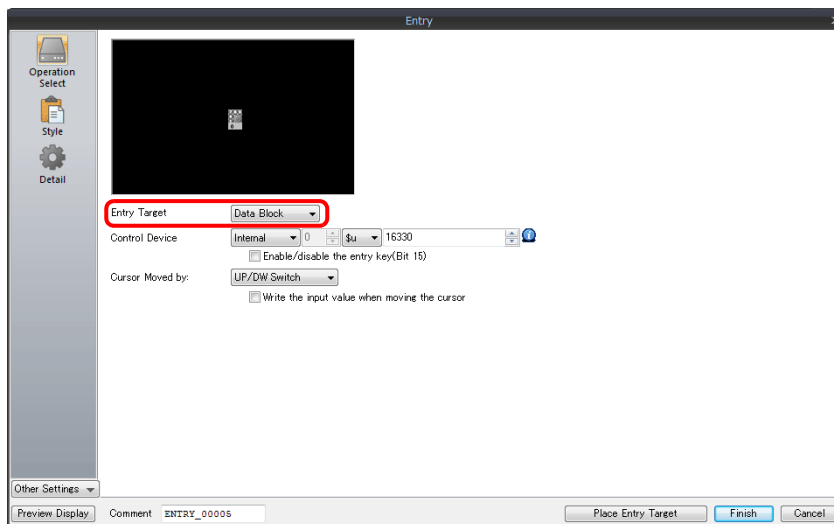
	Item	Description
Operation Select	Entry Target	Data Block
Detail	Others	Show [Data Block], [Memory Card], [Recipe Item] and [Direct] under [Entry Target] Selected

3. Click [Parts] → [Others] → [Data Block Area] and place a data block area.

☞   For details, refer to "13.1 Data Block Area".

4. Click [Home] → [Registration Item] → [Data Block] and place a data display part (entry target).

This completes the configuration of settings.

6.3.3 Switching over Characters Displayed on Entry Keys

Overview

If the screen display area is not sufficient, you can switch over characters displayed on the entry keys.
Register the characters to be switched as graphic libraries.
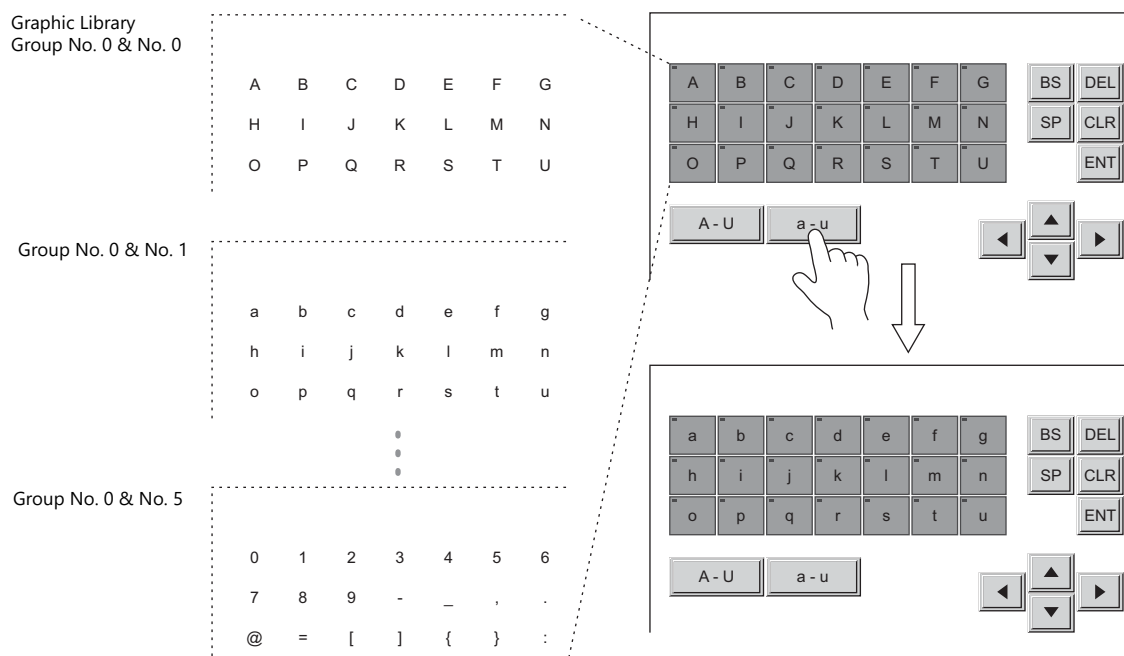
Setting Procedure

Switch (Entry Key) Configuration

1. Click [Parts] → [Switch] and place a [Shape: 2D], [Group: Square2] switch.
2. Set the [Function] as [Entry: Character Input].
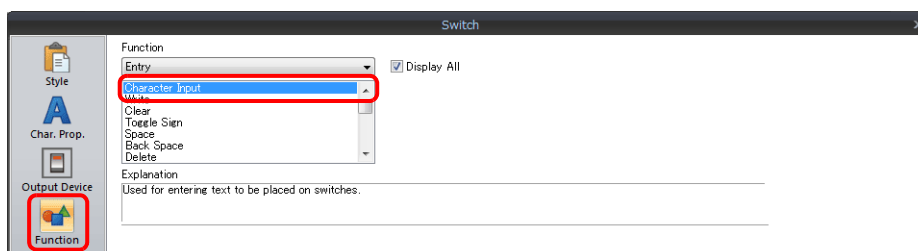
3. Create copies of the switch from [Edit] → [Multi-copy].

Graphic Library Configuration

1. Click [Home] → [Registration Item] → [Graphic Library] to display the [Graphic Library Edit] tab window.
2. Click [View] → [Display Environment], and select the [Others] tab window.
3. Select the [Base Screen Dsp.] checkbox and set the screen number where the switches are placed.
   The switches on that screen are displayed on the [Graphic Library Edit] tab window.
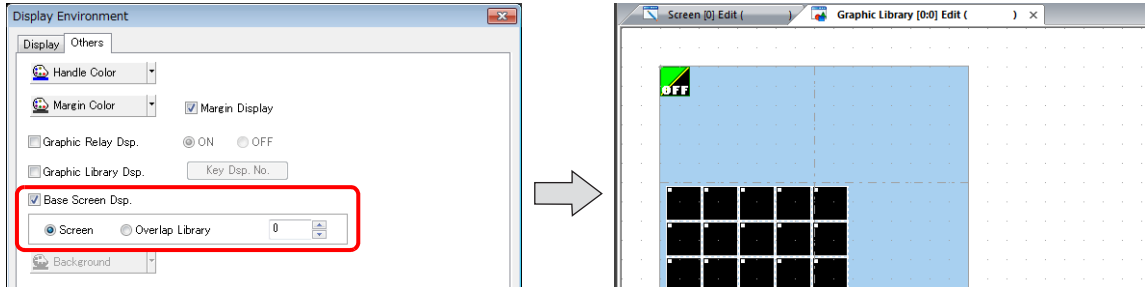
4. Place one letter on each switch. When you have finished the first graphic library, move to the next graphic library and place the next batch of letters in the same manner.
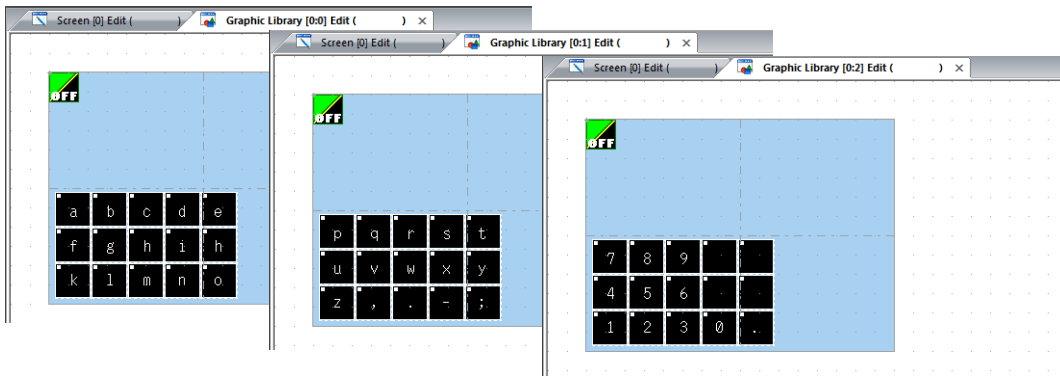
Entry Mode Settings

1. Click [Parts] → [Entry] → [Entry Mode] and place an entry mode part.
2. Configure [Detail] settings on the settings window of the entry mode.
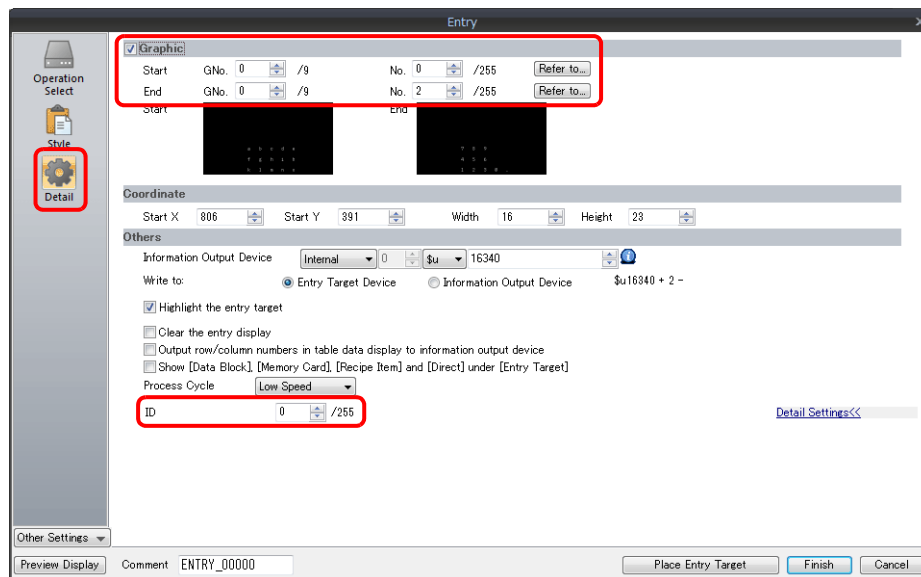
	Item	Description
Others	Graphic	Specify the graphic library number on which the characters are registered.
	ID	Set the same ID as specified for the entry keys.

Switch (Character Change Key) Configuration

This section describes how to create a switch for switching over the created graphics. Configure the [Function] settings.
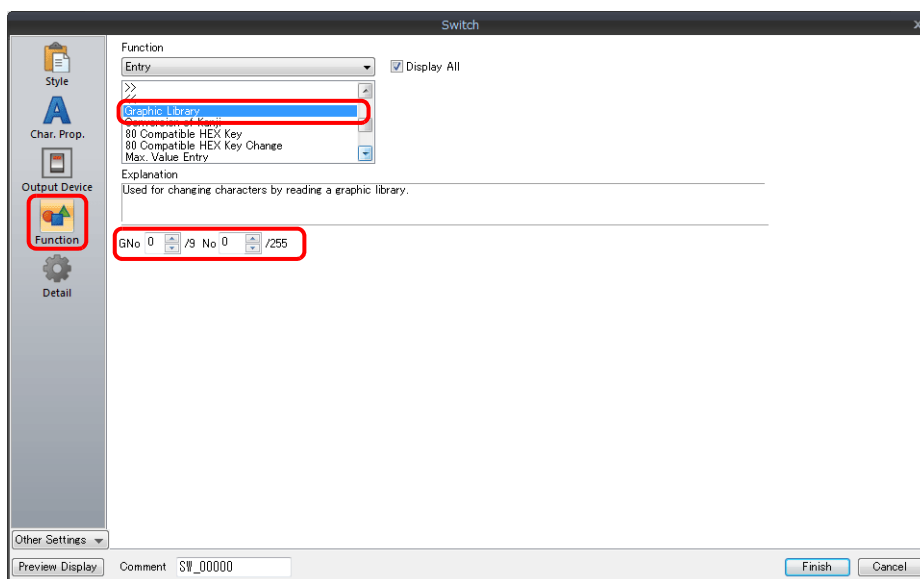
Item		Description
Entry	Graphic Library	Specify the graphic library number on which the characters are registered.
	ID	Set the same ID as specified for the entry keys.

Configuration of Other Switches

Create switches required for entry such as [ENT], [↑], [↓], etc. Refer to .

This completes the configuration of settings.

6.3.4 Type: Direct

Overview

Select [Type: Direct] to externally control the data format, number of digits, number of decimal places, etc.

Setting Procedure

1. Click [Parts] → [Entry] → [Keypad] or [Keyboard] and place an entry part.
2. Configure settings on the settings window of the entry part as shown below.
   - Operation Select
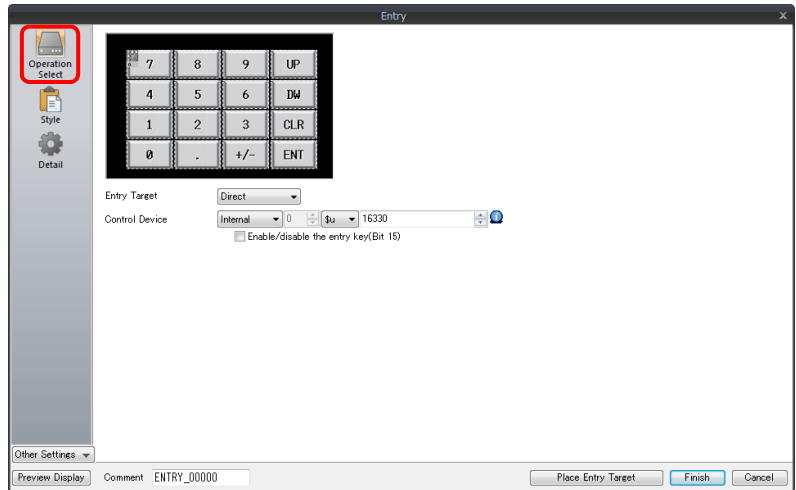
Item	Description
Entry Target	Direct
Control Device	This is device memory for controlling entry. For details, refer to page 6-41.
Enable/disable the entry key	Select this checkbox to use the 15th bit of the control device memory to prohibit writing to device memory by the entry key. For details, refer to page 6-9.

- Detail
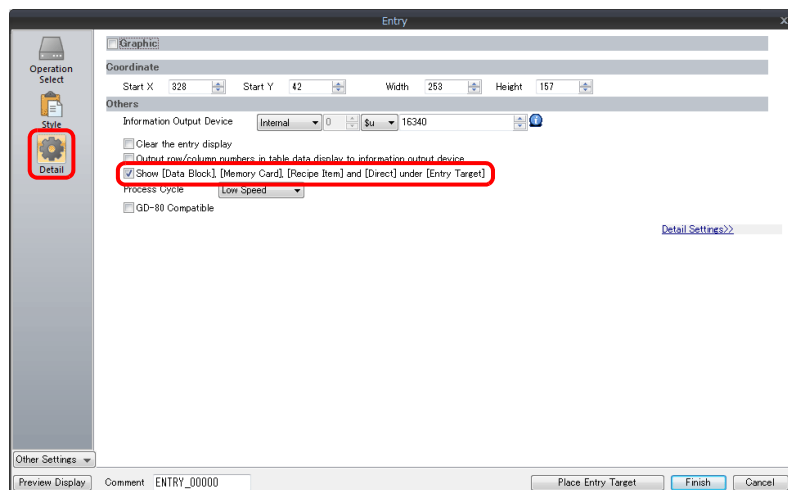
Item		Description
Others	Information Output Device	This is the device memory that stores the entry state. For details, refer to page 6-42.
	Show [Data Block], [Memory Card], [Recipe Item] and [Direct] under [Entry Target]	Selected

3. Click [Parts] → [Data Display] → [Num. Display] or [Char. Display] and place a display part. Set the [Function] to "Entry Target".

This completes the configuration of settings.

Control Device

Device Memory	Description
n	MSB ... LSB | 15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	0	0	0	0	0	0	0	0	0	0		0				 Clear — bit 14 Write format (bits 08–04) 0: DEC 1: BCD Display format (bits 02–00)
	Display format — Specify the display format for the entered data. | Bit Number ||| Display format
---	---	---	---
02	01	00	
0	0	0	DEC (w/o sign)
0	0	1	DEC (with sign −)
0	1	0	DEC (with sign +−)
0	1	1	HEX
1	0	0	OCT
1	0	1	BIN
1	1	0	Text	
	Write format — Specify the format for writing data to [Information Output Device] "n + 2" and later. Note that when BCD is chosen, "0" is entered for negative values.
	Clear — This bit is used for clearing the data from the data display part (Function: Entry Target). 0: The data indicated on the entry display part remains. 1: When numerical data is entered, entering "0" clears the data. When character data is entered, entering a space (ANK 20H) clears the data. Entry is prohibited.
n + 1	MSB ... LSB | 15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0	0	0	0													 Decimal Point (bits 11–08) DEC: 0 to 9 BCD: 0 to 7 Digits (bits 07–00) BCD: 1 to 8 DEC: 1 to 10 HEX: 1 to 8 OCT: 1 to 11 BIN: 1 to 32 TEXT: 1 to 80
	Digits — Specify the number of digits for entry. A range from "0" to "80" can be specified. The number of required bits depends on the code (DEC or BCD). DEC: 0 to 6 bits BCD: 0 to 7 bits
	Decimal Point — Specify the number of decimal places. Up to 10 digits can be displayed in DEC. Therefore "0" to "9" can be specified.

6

Information Output Device

Device Memory	Description
n	MSB ... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0 0 0 0 0 Entry operation 0: Disabled 1: Enabled Write format 0: DEC 1: BCD Display format Write status 0: Not written 1: Write completed
	Display format / **Write format** — Data specified in [Control Device] "n" (page 6-41) is written.
	Entry operation — This bit is valid when multiple entry mode parts are placed on the screen. An entry mode part can be placed on the base screen or an overlap window, respectively. If multiple entry mode parts are displayed at the same time, the one shown at the forefront becomes active. This bit is set to "1" when the entry mode part is at the forefront. (If there is only one entry mode part displayed, the bit is always "1".)

	Write status — This bit indicates whether the [Write] key has been pressed or not.
	
	0: Not written
	    This bit indicates that the [Write] key has not been pressed.
	1: Write completed
	    This bit is set to "1" when the [Write] key is pressed and data is written to the device memory ("n + 2" onwards). The entry display part disappears when the clear bit (bit 15) of [Control Device] "n" turns ON.

n + 1	MSB ... LSB n + 1 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 Decimal Point DEC: 0 to 7 BCD: 0 to 9 Digits BCD: 1 to 8 DEC: 1 to 10 HEX: 1 to 8 OCT: 1 to 11 BIN: 1 to 32 TEXT: 1 to 127
	Digits / **Decimal Point** — Data specified in [Control Device] "n" (page 6-41) is written.
n+2 :	MSB ... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 Entry data
	Entry data — Entry data is written when the [Write] key is pressed.

Entry Procedure

1. Specify the display format, number of digits, number of decimal places, etc. in [Control Device] "n" and "n + 1".
   The configured entry display part is displayed.
2. Check that bit 14 (entry operation) of [Information Output Device] "n" is set (ON).
3. Enter any numerical value or characters using the entry keys and then press the [ENT] key.
   Check that bit 15 (write completed) of [Information Output Device] "n" is set (ON) and that the entered data is written to "n + 2" and onwards.
4. Read the data in [Information Output Device] "n", "n + 2" and "n+3".
5. Set (ON) bit 15 (clear) of [Control Device] "n". Check that the entry display part disappears.
6. Reset (OFF) bit 15 (clear) of [Control Device] "n". Check that the data is shown on the entry display part again.

7   Trends

7.1 Overview

There are two types of trend sampling: historical display (logging server) and real time display.

Historical Display

- The values of device memory addresses registered to the buffering area can be saved as history data. Data acquisition can be performed at a fixed cycle or using a trigger bit (0 → 1).

Buffering area

History data

	(D200)	(D201)
16:15:40	300	80
16:15:45	250	40
16:15:50	360	290
16:15:55	340	120
16:16:00	360	190
16:16:05	310	75
16:16:10	310	200
16:16:15	320	120
16:16:20	380	280
16:16:25	320	120
16:16:30	360	115
16:16:35	350	120

PLC

☞ For details, refer to .

- History data saved to the buffering area can be displayed as a line graph or as data using trend sampling parts.

Graph display

Data display

☞ For details, refer to the following references.
-
-

Real Time Display

Values in consecutive device memory addresses can be expressed on a line graph.

Example: Graph display of data in addresses D100 to D110

D102 D103 D104 D105 D106 D107 D108

D101   D109

D100   D110

PLC

0
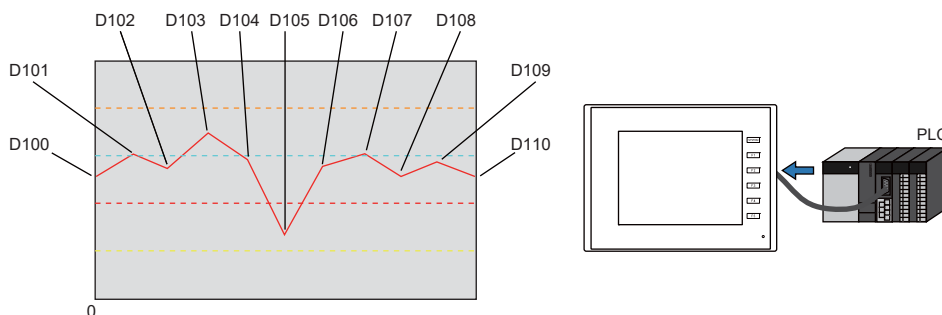
☞ For details, refer to .

7.2 Historical Display

7.2.1 Buffering Area

- The area for saving acquired data which is to be used for historical display is called the buffering area. Including alarm history data, a maximum of 12 buffering area numbers can be registered. Logging is performed at a fixed cycle or by using a trigger bit (0 → 1) and device memory can be freely configured.
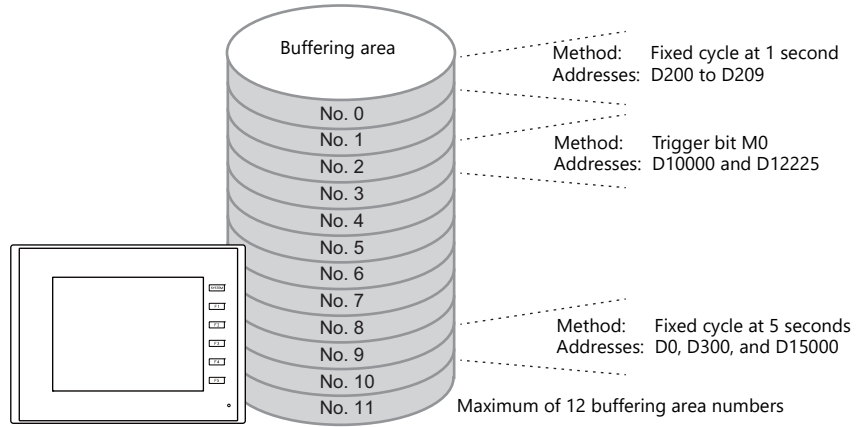
- Buffering area storage destination
  History data can be saved to DRAM and SRAM.
  Data saved to DRAM and SRAM can also be output to an SD card or USB flash drive as a CSV or backup file. (not available for TS2060)
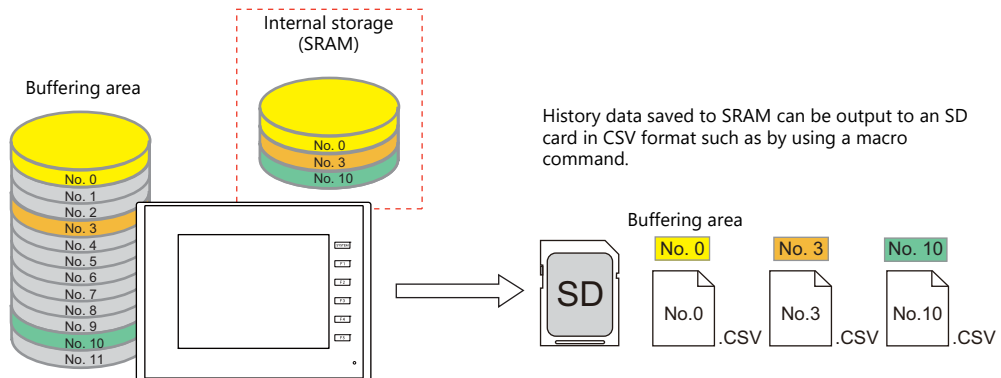
☞ For details, refer to "CSV Output" page 7-9.

- History data saved to the buffering area can be displayed on a graph or as data using trend sampling parts.

☞ For details, refer to the following references.
  - "7.2.2 Graph Display" page 7-12
  - "7.2.3 Data Display" page 7-21

Detailed Settings
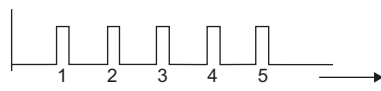
Location of settings: [System Setting] → [Buffering Area Setting]

List View

Item	Description
Add Alarm	Create a new buffering area number for registering alarm history data. A maximum of 12 buffering area numbers can be registered including area numbers for trend sampling parts.
Add Trend	Create a new buffering area number for registering trend history data. A maximum of 12 buffering area numbers can be registered including area numbers for alarm parts. This section describes the setting procedure for this item.
Delete	Delete the selected number.
Copy	The following dialog box is displayed. | Item	Description
Copy source	The specified block is copied.
Copy and paste simultaneously	When selected, copying and pasting are done simultaneously. The paste destination is specified at [Destination]. * Be sure to deselect this checkbox when copying and pasting to a different file.
Destination	This setting is valid when [Copy and paste simultaneously] is selected. Specify the block number of the destination for pasting the copied content.	
Paste	The following dialog box is displayed. The content copied using the [Copy] button is pasted to the specified number.

Basic Settings

Item	Description

Sampling	Set the sampling method.
	
	Bit Synchronization
	    Perform sampling when the [Trigger Bit] device memory changes from 0 to 1.
	    Location of settings:"Control Device Setting" page 7-6
	
	1 : ON
	0 : OFF
	
	Constant Sampling
	    Perform sampling at the interval specified at [Acquisition Intervals].

Acquisition Intervals	Set the sampling frequency. 0 to 65535 (0 means every cycle) Units: Seconds or 100 milliseconds
Number of data to acquire	Set the total number of sampling data. Max. 256

Device to acquire	Set the sampling device memory.
	    Use Read Area: Device memory is specified automatically and consecutively from the read area.
	    Specify consecutively: Specify the desired top device memory.
	    Specify individually: All device memory can be specified with the desired individual device memory.

Type	Set the data type. DEC (w/o sign), DEC (w/ -sign), HEX, OCT, BIN (binary), CHAR, BCD, FLOAT (real number)
Decimal Point	Set the number of decimal places.
Data Length	Set the data length of the set device memory. 1-Word/2-Word
Characters	Set the number of characters (1 character = 1 byte).
Text Process	Set the order of the first and second bytes within one word. LSB → MSB, MSB → LSB
Import[*1]	This setting is valid when [Device to acquire: Specify individually] is selected. Import sampling device memory of the selected and subsequent numbers from a CSV file. If the number of lines in the CSV file exceeds the number of logging entries, the device memory is not extended.
Export[*1]	This setting is valid when [Device to acquire: Specify consecutively/Specify individually] is selected. Export all sampling device memory to a CSV file.

*1   CSV Format

* Do not change the header information enclosed in a red frame in the first and second lines. If changed, settings cannot be imported correctly.

PLC device memory   PLC x [xxxxx]
    Device memory + address
    PLC No.1 to 8

Internal device memory $u/$T/$s/$L/$LD xxxxx
    Device memory + address

Data Output Settings

Primary Storage Target

Configure the settings for storing to SRAM (DRAM).

Item	Description

Device Type	Set the save destination for sampled data.
	
	SRAM
	    Back up history data when power to the unit is OFF (on battery power) and when changing between RUN and Local mode.
	    The amount of free space and total used space can be checked via [SRAM/Clock Setting].
	
	DRAM
	    All history data is cleared when power to the unit is turned OFF or when changing between RUN and Local mode.

Number of Data to Save	Set the number of sampling data to save. (1 to 65535)
After Full Capacity	Set the operation to perform when the value of [Number of Data to Save] is exceeded. Clear old data and continue sampling, Stop sampling

Secondary Storage Target

Configure the settings for outputting to a storage device.

Item	Description

Device Type	Set the secondary storage destination for sampled data.
	
	Unselected
	    The secondary storage destination is not used.
	
	Storage (not available for TS2060)
	    Save to an SD card or USB flash drive.
	    Back up history data when power to the unit is OFF and when changing between RUN and Local mode.
	
	Memory Card (not available for TS1000 Smart)
	    Store sampled data in the SRAM memory card (with card recorder used).
	    Back up history data when power to the unit is OFF and when changing between RUN and Local mode.

Output File No.	When [Memory Card] is selected as the storage destination, file numbers are automatically given according to this setting. For details on the memory card function, refer to "13.2 Memory Card".
Number of Data to Save	Set the number of sampling data to save. (1 to 86400)
CSV Output	For details, refer to "CSV Output" page 7-9.
Create Backup File	For details, refer to "Create Backup File" page 7-10.

Control Device Setting

Item	Description
Sampling Control Device	**Common Setting** Device memory addresses are allocated for each buffering area number consecutively from read area "n + 3". Sampling Control Device **Individual Setting** A device memory address can be specified as the exclusive sampling control device memory for a buffering area number. Sampling Control Device

Start Bit	Control starting and stopping of sampling.
	  0: Stop
	  1: Start

Trigger Bit	Configure when [Bit Synchronization] is selected as the sampling method. Sampling is performed when the trigger bit is set to "1". 0 → 1: Perform sampling once.
Reset Bit	Clear the history data. 1: Reset (sampling is stopped while set to "1")
Information Output Device	This is the area where the status of each area number in the buffering area is indicated. The input trigger status is output. Buffer Data Bit: Indicates that the specified buffering area number contains data. Bit for over 90% full capacity: Indicates that the capacity of the specified buffering area number is over 90% full. Bit for buffer full: Indicates that the specified buffering area number is full.

CSV Format Setting

Specify the CSV file format on this tab window, when specifying [Storage] as the [Secondary storage target] or when outputting data to a CSV file using macro commands.

Item	Description
Date Display	Select the format for dates.
Display month/date with zero suppress	Select this checkbox to display the month and date with zero suppression.
Time Display	Select the format for time.
Output Order	Set the order for outputting to a CSV file. (Ascending Order, Descending Order)

Titles in CSV Files

When data is output to a CSV file on a storage device, the data is saved as shown below.

By default, only the buffering area number is output and there are no titles.
To add titles to data, save a CSV file with titles in the "SAMPLE" folder on the storage device in advance.

- CSV file for titles

CSV filename	SMHxxxx.CSV (xxxx= 0000 to 0011: Buffering area number)
CSV file size	Max. 239 KB
Number of title rows and columns	Unlimited
Storage location	"SAMPLE" folder inside the access folder

```
SD card ─────────┐ DAT0000   (Access folder)
                 ├──┐ BITMAP
                 ├──┐ CARD
                 ├──┐ DSP
                 ├──┐ FONT
                 ├──┐ HDCOPY
                 ├──┐ JPEG
                 ├──┐ MEMO
                 ├──┐ MSG
                 ├──┐ RECIPE
                 ├──┐ SAMPLE
                 │     └──┐ SMH0000.CSV
                 ├──┐ SCRN
                 ├──┐ SNAP
                 ├──┐ SRAM
                 ├──┐ WAV
                 └──┐ WEBSERV
```

   * Match the CSV filename with the buffering area number to which titles are to be added.
      If the buffering area number specified in the filename does not exist, the file has no effect.

Others
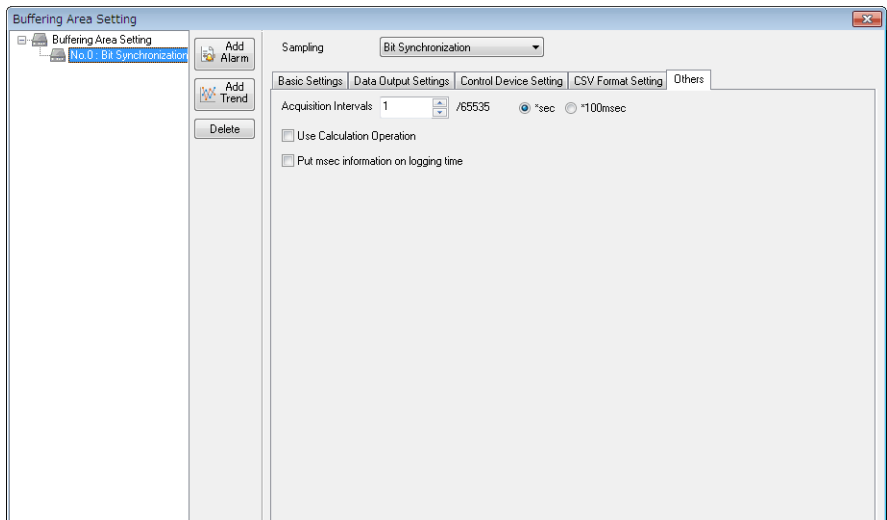
Item	Description
Acquisition Intervals	This setting is valid when [Bit Synchronization] is selected as the sampling method. Set the monitoring frequency of the trigger bit. 0 to 65535 (0 means every cycle) Units: Seconds or 100 milliseconds
Use Calculation Operation	Select this checkbox to display [Mean Value Display/Max. Display/Min. Display/Total Display] for a numerical data display for which [Function] is set to "Sample".
Put msec information on logging time	With this box checked, the [Acquisition Intervals] stored together with sampling data is saved in units of "msec". With this box unchecked, it is saved in units of "sec".

Timing of Data Storage

Primary Storage Destination: DRAM/SRAM

Sampled data is stored constantly during sampling.

Secondary Storage Destination: Storage Device/Memory Card

Data in the primary storage destination will be output to the secondary storage destination at the times shown below:

- When the mode is switched from RUN to STOP
- When the [Function: Storage Removal] switch is pressed
- When the primary storage destination becomes full
- When the macro command "SMPL_SAVE", "SMPL_CSV", "SMPL_CSV2", "SMPLCSV_BAK", "SMPLCSV_BAK2" or "SMPL_BAK" is executed
- When the power to MONITOUCH is turned ON with [Primary storage target: SRAM]
- When the [Function: Reset] switch is pressed in sampling mode
- When the "R: Reset" bit of the sampling control device memory is ON

* When [Secondary storage target: Storage] is selected, a BIN file is created on the storage device and data is stored in this file.

CSV Output

Data in the primary storage destination is output to the secondary storage destination as a BIN file, and data in the BIN file in the secondary storage destination is saved in CSV format to the storage device.

Timing of Saving

- When the mode is switched from RUN to STOP *
- When the [Function: Storage Removal] switch is pressed *
- When the macro command "SMPL_CSV, "SMPL_CSV2", "SMPLCSV_BAK" or "SMPLCSV_BAK2" is executed

* With [CSV Output] checked

Storage Destination

\ (Access folder) \SAMPLE

- Filename: SMPxxxx.CSV
  xxxx = 0000 to 0011: Buffering area number

* It is also possible to use the macro command "SMPL_CSV" instead of selecting [CSV Output].
For details on macro commands, refer to the Macro Reference Manual.

Create Backup File

Data in the primary storage destination is output to the secondary storage destination as a BIN file, and data in the file is copied to the storage device as backup.

Timing of Saving

- When the power is turned on *
- When the date changes (00:00:00 AM) *
- When the secondary storage destination becomes full *
- When the macro command "SMPL_BAK" is executed
- * With [Create Backup File] checked

Storage Destination

\(access folder)\SAMPLE\YYYYMM\YYYYMMDD

YYYY: Year
MM: Month
DD: Day

- Filename: SMPxx_yy.BIN
  xx = 00 to 11: Buffering area number
  yy = 00 to 99: Index number

- Example: When saving data on July 11, 2016:
  Data is saved in the \SAMPLE\201607\20160711 folder.
  When files have been created up to "SMP00_99.BIN", the "SMP00_99.BIN" file will be overwritten for all subsequently sampled data.
- * It is also possible to use the macro command "SMPL_BAK" instead of selecting [Create Backup File].
  For details on macro commands, refer to the Macro Reference Manual.

CSV Output & Creating Backup Files

When [CSV Output] is selected, "SMPxxxx.CSV" is created from "SMPxxxx.BIN" in the "SAMPLE" folder. Consequently, when [Create Backup File] is also selected, "SMPxxxx.BIN" and "SMPxxxx.CSV" are both saved in the backup folder.
(The same operation as when macro commands "SMPL_BAK" and "SMPLCSV_BAK" are executed at the same time.)

Timing of Saving

- At power-on
- When the date changes (00:00:00 AM)
- When the secondary storage destination becomes full
- When the macro commands "SMPL_BAK" and "SMPLCSV_BAK" or "SMPL_BAK" and "SMPLCSV_BAK2" are executed

Storage Destination

\(access folder)\SAMPLE\YYYYMM\YYYYMMDD

YYYY: Year
MM: Month
DD: Day

- Filename: SMPxx_yy.BIN
  xx = 00 to 11: Buffering area number
  yy = 00 to 99: Index number

```
SD card
  └─ (Access folder)
       ├─ SAMPLE  folder ──┬─ SMP0000.BIN
       ├─ BITMAP  folder    ├─ SMP0000.CSV
       └─ CARD    folder    │
                            └─ 201607  folder
                                 ├─ 20160711  folder ──┬─ SMP00_00.BIN
                                 │                      ├─ SMP00_00.CSV
                                 │                      ├─ SMP00_01.BIN
                                 │                      └─ SMP00_01.CSV
                                 └─ 20160712  folder ──┬─ SMP00_00.BIN
                                                        ├─ SMP00_00.CSV
                                                        ├─ SMP00_01.BIN
                                                        ├─ SMP00_01.CSV
                                                        ├─ SMP00_02.BIN
                                                        └─ SMP00_02.CSV
```

- It is also possible to use the macro commands "SMPL_BAK" and "SMPLCSV_BAK" instead of selecting [CSV Output] and [Create Backup File]. For details, refer to the Macro Reference Manual. The use of macros is recommended for making backup files when the date changes.
- It is possible to automatically delete old backup files when the backup file size exceeds the capacity of an SD card.
  (In this case, select [System Setting] → [Unit Setting] → [General Settings] and select the [Delete folders from the oldest if Storage is lacking in space for backup] checkbox.)

7

7.2.2   Graph Display

- History data saved to the buffering area can be displayed as a line graph or rectangular waves.

- A maximum of 16 graph lines can be displayed in one graph area.

History data

- Each graph line can be shown or hidden. Showing or hiding graphs can be easily changed as necessary, according to operating conditions.
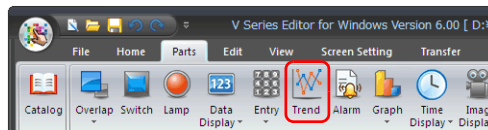
Trend sampling screen

Trend sampling screen

Location of Setting

Click [Parts] → [Trend] and place a graph on the screen.

Detailed Settings

Operation Select
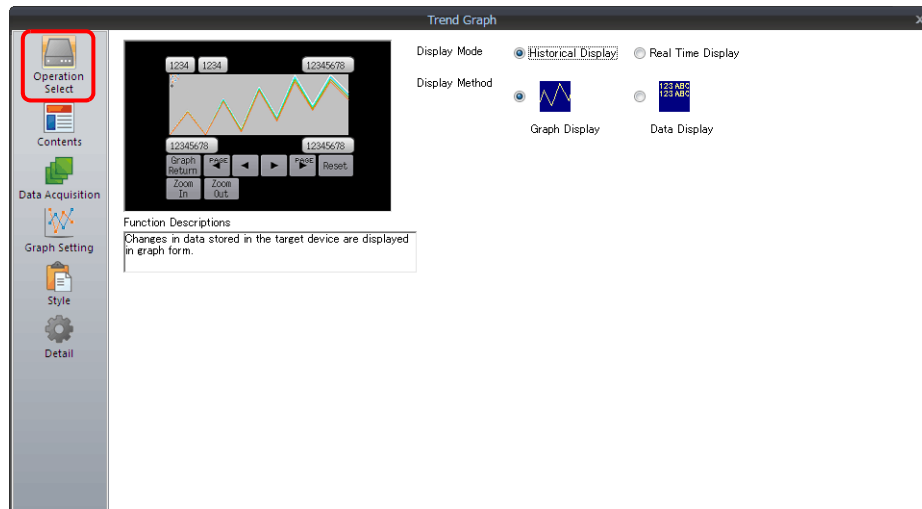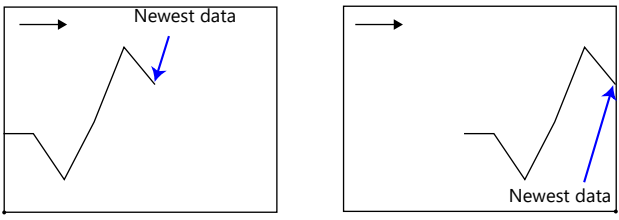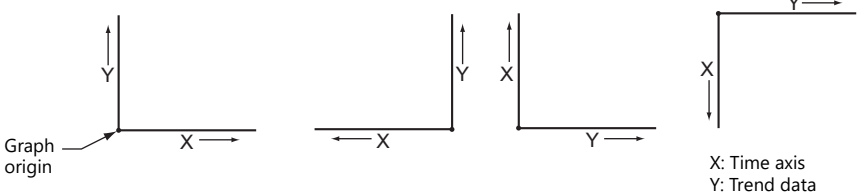
Item	Description
Display Mode	Select [Historical Display].
Display Method	Select [Graph].
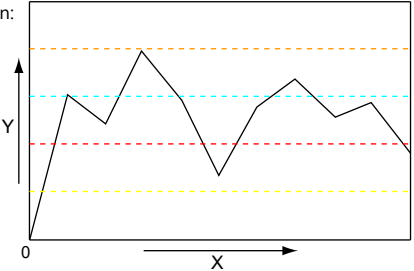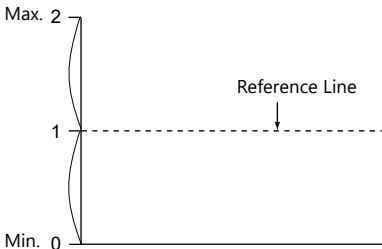
Contents

Graph

Item	Description
Shape	Set the graph shape. Line/Rectangular

Display Mode	Sequential
	    Draw the graph in the direction of movement.
	
	Pen Recorder
	    Display a pen recorder type graph. Newest data is always on the right.
	
	[Direction]: RGT, [Display Mode]: Sequential [Direction]: RGT, [Display Mode]: Pen Recorder
	
	Newest data Newest data

Direction	Set the direction of graph lines. • RGT (right) • LFT (left) • UP (upward) • DW (downward) Graph origin X: Time axis Y: Trend data

Reference line

Item	Description
Reference Line 1 Reference Line 2 Reference Line 3 Reference Line 4	A maximum of four reference lines can be displayed at once. The line type is fixed to a dotted line. [1] The line color and the value where to display each reference line can be specified. Direction: RGT Reference Line 4 Reference Line 3 Reference Line 2 Reference Line 1

Min. Scale Value
Max. Scale Value [2]
	Set the scale values for calculating the position where the reference line should be drawn in the graph area. Negative values can also be specified.
	
	To draw a reference line in the center of a trend graph:
	
	Reference Line 1
	    - Min. Scale Value: 0
	    - Max. Scale Value: 2
	
	Specifying "1" for reference line 1 will display a line at the center.
	
	Max. 2 Reference Line
	1
	Min. 0

Data Length	Set a data length when specifying device memory (other than [Constant]) for reference lines or the minimum and maximum scale values. Set data length for the device memory. 1-Word/2-Word
Input Type	Set the data type of the scale values. DEC-/BCD [3]/FLOAT [4]

*1   When device memory is specified for a [Reference Line], the reference line is updated at the [High Speed] process cycle setting. However, if the [Show/hide graph data] checkbox is selected in the [Detail] settings, updating is dependent on the specified process cycle.

*2   When device memory is specified for the minimum and maximum scale values and the values in the device memory is changed in RUN mode, the change will be updated to the graph when the graph is displayed or when the "TREND_REFRESH" macro command is executed.

☞   For details on the "TREND_REFRESH" macro command, refer to the Macro Reference Manual.

*3   When [DEC-/BCD] is selected, the setting at [System Setting] → [Hardware Setting] → [PLC Properties] → [Code] takes effect.
*4   If any specified value (non-numeric inclusive) is outside the range usable on the TS unit, the line cannot be displayed.

☞   For details on the allowable range, refer to "5.1.4 Real Numbers (Floating Point Numbers)".

Data Acquisition
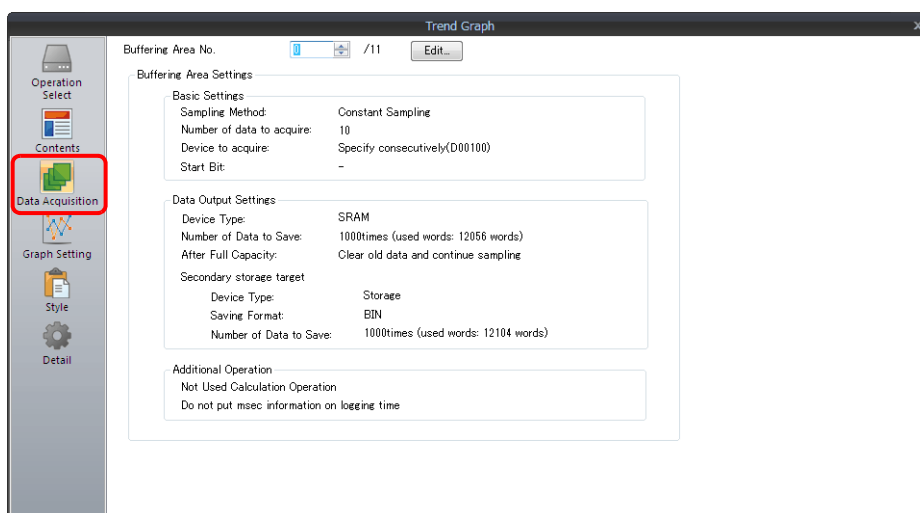
Item	Description
No.	Set registered buffering area number. The registration details are shown below.
Edit	Edit the buffering area. For details, refer to "Detailed Settings" page 7-3.

Graph Setting
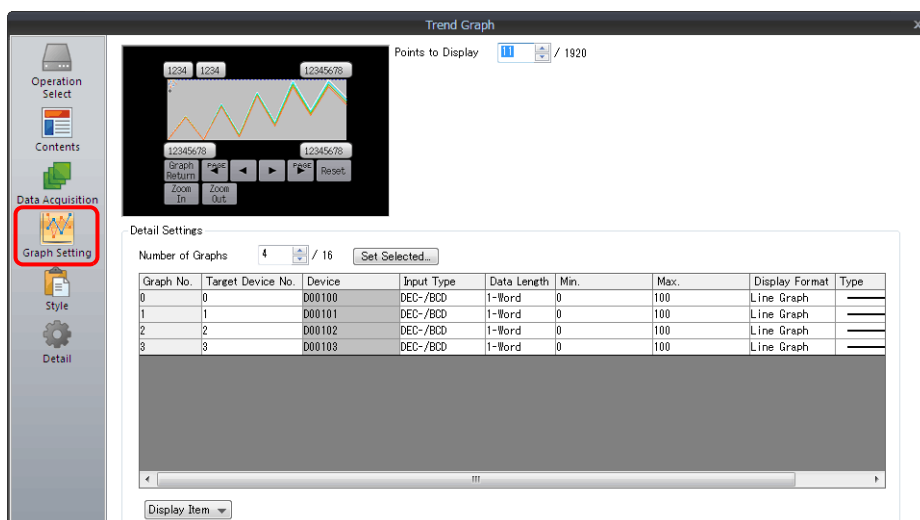
Item	Description
Points to Display *1	Set the number of plot points along the horizontal axis. - For 320 × 240 dots: 3 to 320 - For 800 × 480 dots: 3 to 800
Number of Graphs	Set the number of graph lines. Max. 16
Set Selected	Use this button to configure settings for all displayed graph lines at once when the data length, data type, minimum value, and maximum value are all the same.
Target Device No. *2	Specify which word the data corresponds to in the number of data to acquire specified for the buffering area.

Item	Description
Device	Displays the sampling device memory. The device memory can be changed in the settings of the buffering area number set in the [Data Acquisition] settings.

Input Format	Select the format for display on the screen. DEC-/BCD, Actual Number
	
	DEC-/BCD
	    This is determined by the setting at [System Setting] → [Hardware Setting] → [PLC Properties] → [Code].
	
	Actual Number
	    If any value (non-numeric inclusive) specified is outside the range usable on MONITOUCH, the value cannot be displayed.
	    For details on the allowable range, refer to "5.1.4 Real Numbers (Floating Point Numbers)".

Data Length	Set data length for the device memory. 1-Word/2-Word
Max., Min. *3	Set the minimum and maximum values of the graph. * An error will occur if the same value is set. Make sure to set valid values.
Display Format	Set the graph type. Line Graph/Marker
Type	Set the line type.
Color	Set the line color.
Display Item	Select the items to display in the [Detail Settings].

*1   Number of display points
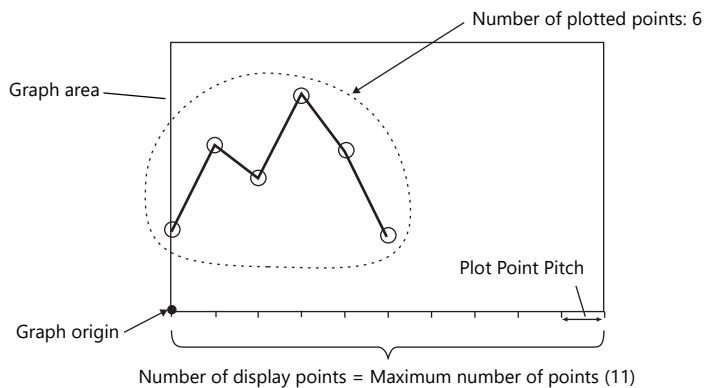
Direction: RGT

Number of plotted points: 6

Graph area

Plot Point Pitch

Graph origin

Number of display points = Maximum number of points (11)

⚠️ If a value larger than the X size (dots) of the graph area is specified for [Points to Display], the graph will not be drawn correctly.

*2   Example: When set to [Buffering Area Setting]→[Number of data to acquire: 8]
To display the logging data of the 3rd word in the buffering area, specify "2" for [Target Device No.].
Even if [Data Length] is different, the corresponding device memory is the same.

[Data Length]: 1-Word

	Target Device No.
1st word	0
2nd word	1
3rd word	2
4th word	3
5th word	4
6th word	5
7th word	6
8th word	7

[Data Length]: 2-Word

	Target Device No.
1st word	0
2nd word	0
3rd word	2
4th word	2
5th word	4
6th word	4
7th word	6
8th word	6

*3   When device memory is specified for the minimum and maximum graph values and the values at the device memory are changed in RUN mode, the changes will be updated to the graph when the graph is displayed or when the "TREND_REFRESH" macro command is executed.

☞   For details on the "TREND_REFRESH" macro command, refer to the Macro Reference Manual.

Style
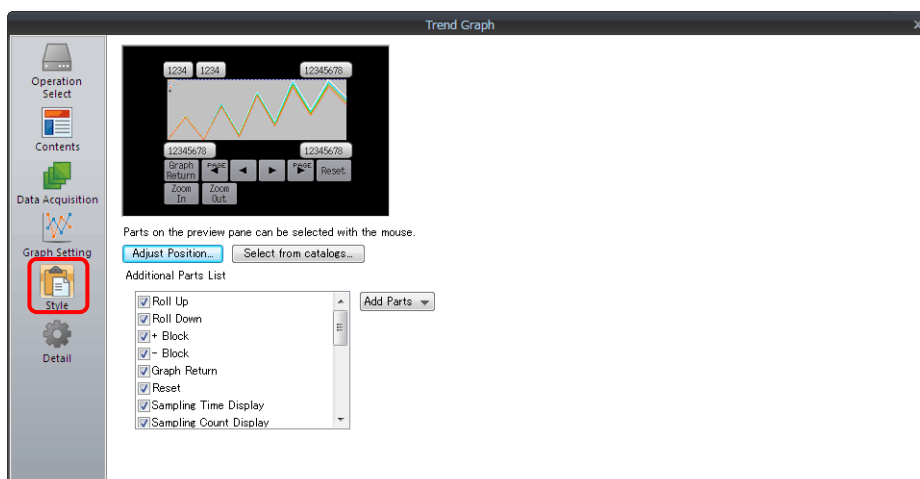
Item	Description
Adjust Position	Change the layout of parts.
Select from catalogs	Change the trend sampling parts.
Add Parts	Add new parts. New parts are added to the [Addition Parts List].

- The additional parts are listed below.

Function	Description
Roll Up	Move the cursor to the next point.
Roll Down	Move the cursor to the previous point.
+ Block	Display the next page.
− Block	Display the previous page.
Graph Return	Blinks while the cursor is displayed when a switch such as [+ Block] or [− Block] is pressed. Press this switch when it is blinking to stop it from blinking and return to the latest display.
Reset	Press once and the switch blinks. Press again within two seconds to clear the history and resume sampling. If not pressed again within 2 seconds, the switch is turned off and resetting is nullified.
Sampling Time Display [*1]	Display the last sampling time or selected sampling time.
Sampling Count Display	Display the current history number or the count value of the selected history data.
Zooming in	Enlarge the display magnification of the currently displayed graph in order from actual size → 2 times → 4 times → 8 times.
Zooming out	Reduce the display magnification of the currently displayed graph in order from 8 times → 4 times → 2 times → actual size.
Display start time [*1]	Display the sampling time of the oldest history data on the currently displayed graph.
Display end time [*1]	Display the sampling time of the newest history data on the currently displayed graph.
Currently Selected Value Display [*2]	Display the latest history data or the selected history data.
Mean Value Display	Display the average value of the history data of each graph.
Total Display	Display the total value of the history data of each graph.
Max. Display	Display the maximum value of the history data of each graph.
Min. Display	Display the minimum value of the history data of each graph.
Scroll Bar (Horizontal)	Scroll the graph. The scroll direction depends on the [Direction] setting of the trend sampling part. [UP] [DW]: Vertical, [RGT] [LFT]: Horizontal
Scroll Bar (Vertical)	

*1   Up to the year, month, and day can be displayed if enough digits are specified.

Less than 8 digits	No display
8 to 11 digits	Hour, minutes, and seconds
12 to 17 digits	Hour, minutes, seconds, and milliseconds
18 to 22 digits	Month, day, hour, minutes, seconds, and milliseconds
23 digits or more	Year, month, day, hour, minutes, seconds, and milliseconds

*2   Only for monitoring. To store these values in device memory, use the "SAMPLE" macro command.

☞   For details, refer to the Macro Reference Manual.

Scale Display

Item	Description
Axis Color	Select the color of the major and minor tick marks, and axis lines of the scale.
Back Color	This setting is common to all left, right, bottom, and top sides.
Display Minor scale	Set the length of the minor tick marks of the scale. Range: 1 to 16 This setting is common to all left, right, bottom, and top sides. The thickness of the markings is fixed.
[Scale] in [Left], [Right], [Bottom], and [Top] tab windows	Displays the scale, grid line, and reference value settings for each side. Default: Selected on [Left] and [Bottom] tab windows
Small scale alignment	Equal divide (unit based on [No. of divisions]) 　Minor tick marks are equally spaced according to the specified number of divisions along the axis line. Equal interval (unit based on [Interval]) 　Minor tick marks are equally spaced according to the specified interval from the zero point along the axis line within the following range.

Graph Direction	Side	Range
LFT/RGT	Top/Bottom	Number of horizontal axis points or scale of [Range Setting]
DW/UP	Left/Right	
LFT/RGT	Left/Right	Scale of [Range Setting]
DW/UP	Top/Bottom	

Item	Description
Display major tick marks	Display major tick marks on the scale. (Unit: [Interval]) Length: Twice the minor tick marks Thickness: Fixed
Grid Line	Grid lines are drawn at the major and minor tick marks of the scale.
Color, Line Type	Set the color and line type of grid lines.
Also apply to minor tick marks	This can be set when the [Display major tick marks] checkbox is selected. Set whether to display grid lines. Selected:　　　Display at both major and minor tick marks Unselected:　　Only display at major tick marks
Reference Value	Select this checkbox to display reference values at major and minor tick marks on the scale.
Property	Set the number of digits or the color of reference values shown at tick marks.
Also apply to minor tick marks	This can be set when the [Display major tick marks] checkbox is selected. Set whether to display reference values. Selected:　　　Display at both major and minor tick marks Unselected:　　Only display at major tick marks
Range Setting	Use when [Small scale alignment] is set to [Equal divide] or when the [Reference Value] checkbox is selected. Match with the specified graph 　The range changes according to the following combinations.

Graph Direction	Side	Range
LFT/RGT	Top/Bottom	Number of horizontal axis points
DW/UP	Left/Right	
LFT/RGT	Left/Right	Maximum and minimum values specified for the selected graph number *
DW/UP	Top/Bottom	

Set Value
　Specify the minimum and maximum values using constants or device memory addresses. *

* If the minimum and maximum values are specified with device memory addresses (other than [Constant]) in the [Range Setting] window and these values are changed in RUN mode, the changes are updated at the following timings:
- When the screen is redrawn
- Upon execution of the "TREND_REFRESH" macro command

Detail

Item		Description
Show/hide graph data		Set the device memory used to show/hide graph line numbers 0 to 15. *
	Device (word designation)	These bits control whether each graph is shown or hidden. MSB ... LSB 15 .. .. 04 03 02 01 00 Graph number 15 Graph number 3 Graph number 2 Graph number 1 Graph number 0 1: Show 0: Hide
	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle". High Speed/Low Speed/Refresh
Zoom In/Out		Set the method for enlarging and reducing graphs. Switch Zoom in: actual size → 2 times → 4 times → 8 times Zoom out: 8 times → 4 times → 2 times → actual size Device The graph will be zoomed in to a magnification of the following. 0: Actual size 1: 2 times 2: 4 times 3: 8 times
Coordinates		Select a display position and size.
ID		Set an ID number.

* Notes on the [Show/hide graph data] setting

- This is counted as one of the number of device memory locations that is permitted for one screen.

- Even if all the graph lines are hidden, the switches for [Roll Up], [Roll Down], [+ Block], [– Block] and [Graph Return] still work. The moved cursor point is also retained. (But the cursor is hidden.)

- When graph lines are shown or hidden, flickering associated with graph redrawing will occur momentarily.

Notes

Relationship Between Area and Plot Points

The TS automatically calculates the plot point pitches for drawing graph lines as follows:

Formula: Point pitch (dots) = X size (dots) ÷ ([Points to Display] − 1)

Number of display points = Maximum number of points (11)
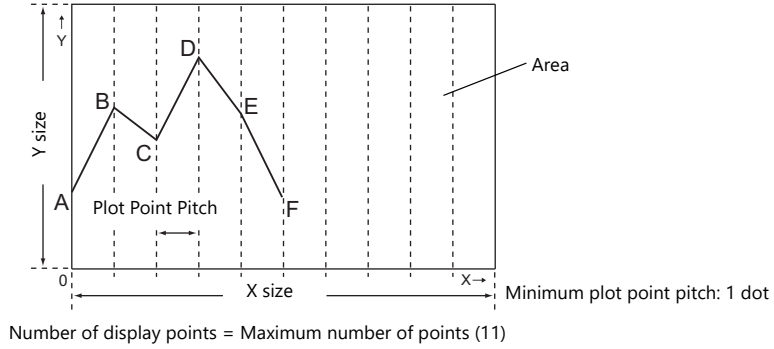
Example: X size: 270 (dots), [Points to Display]: 10

270 ÷ (10 − 1) = 30

The plot point pitch is "30".

When adjusting the size of an area after setting [Points to Display], it is automatically enlarged or reduced so that there will be no remainder left.
However, if the value for [Points to Display] is changed after the part is placed and adjusted in size, a remainder may result. The remainder dots will be shown as a blank area.

Example: X size: 278 (dots), [Points to Display]: 50

278 ÷ (50 − 1) = 5, remainder 33

The plot point pitch is 5 dots and the remainder (33 dots) becomes a blank area.
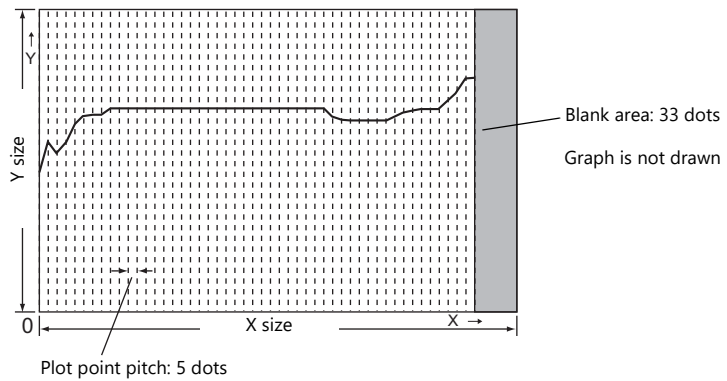
After setting the number of points for display, correct the X size of the display area to eliminate the blank area.

7.2.3 Data Display

- History data saved to the buffering area can be displayed as numerical data or character data.

- A maximum of 16 entries of data can be displayed in a single display area.

History data

- History data saved to the buffering area can be printed. (Sample print)
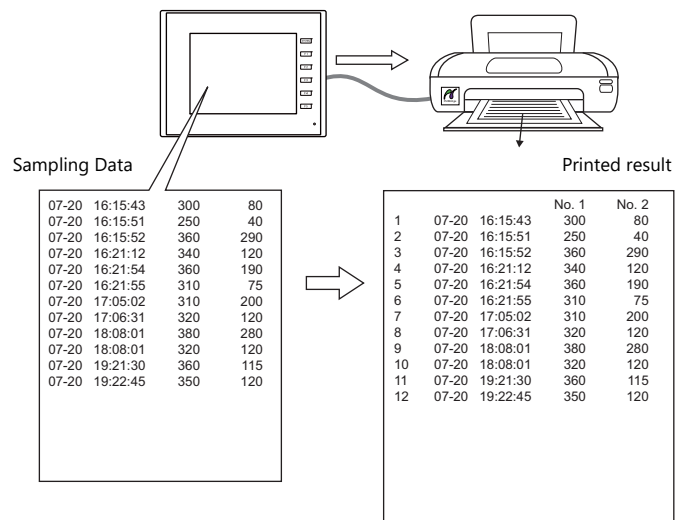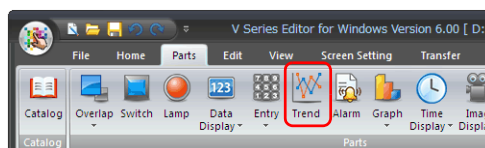
Sampling Data

07-20	16:15:43	300	80
07-20	16:15:51	250	40
07-20	16:15:52	360	290
07-20	16:21:12	340	120
07-20	16:21:54	360	190
07-20	16:21:55	310	75
07-20	17:05:02	310	200
07-20	17:06:31	320	120
07-20	18:08:01	380	280
07-20	18:08:01	320	120
07-20	19:21:30	360	115
07-20	19:22:45	350	120

Printed result

			No. 1	No. 2
1	07-20	16:15:43	300	80
2	07-20	16:15:51	250	40
3	07-20	16:15:52	360	290
4	07-20	16:21:12	340	120
5	07-20	16:21:54	360	190
6	07-20	16:21:55	310	75
7	07-20	17:05:02	310	200
8	07-20	17:06:31	320	120
9	07-20	18:08:01	380	280
10	07-20	18:08:01	320	120
11	07-20	19:21:30	360	115
12	07-20	19:22:45	350	120

Location of Setting

Click [Parts] → [Trend] and place a graph on the screen.

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Detailed Settings

Operation Select
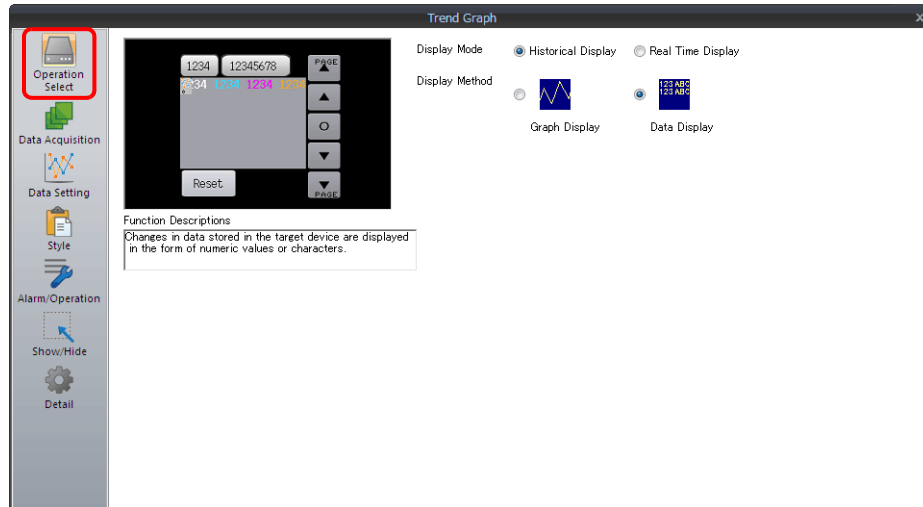
Item	Description
Display Mode	Select [Historical Display].
Display Method	Select [Data].

Data Acquisition
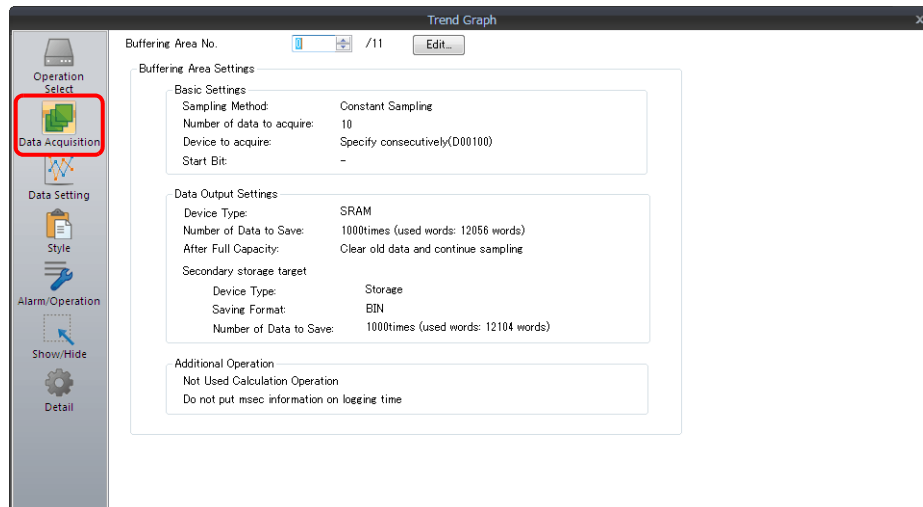
Item	Description
No.	Set registered buffering area number. The registration details are shown below.
Edit	Edit the buffering area. For details, refer to "Detailed Settings" page 7-3.

Data Setting

Item	Description
Use Windows fonts	Display history data using a Windows font. Register all text to display via [Windows Font Registration].
Number of Columns	Set the number of data entries to display. Max. 16
Target Device No. *1	Specify which word the data corresponds to in the number of data to acquire specified for the logging server.
Device	Displays the sampling device memory. The device memory can be changed in the settings of the buffering area number set in the [Data Acquisition] settings.
Input Format	Select the code type to use when reading data from the PLC device. The selection here also applies to [Alarm], [Operation], and [Scaling]. DEC/BCD/Actual Number *2
Data Length	Set the data length.

Code Format	1-word Display Range	2-word Display Range
DEC (w/o sign)	0 - 65535	0 - 4294967295
DEC (with sign –)	–32768 - 32767	–2147483648 - 2147483647
DEC (with sign +–)	–32768 - +32767	–2147483648 - +2147483647
HEX	0 - FFFF	0 - FFFFFFFF
OCT	0 - 177777	0 - 37777777777
BIN	0 - 1111111111111111	0 - 11111111111111111111111111111111

Item	Description
Display Method	Select the data display method. Numerical Display/Char. Display
Display Function	No function Display the logged data. Logging No. Display This display type is compatible with earlier MONITOUCH models. For details, refer to the File Conversion manual.
Display Format	Select the format for display on the screen. DEC (w/o sign), DEC (with sign –), DEC (with sign +–), HEX, OCT, BIN (Binary)
Digits *3	Set the number of digits for numerical data display.

Display Format	Digits	Decimal Point
DEC	1 - 10	0 - 9
HEX	1 - 8	–
OCT	1 - 11	–
BIN	1 - 32	–

Item	Description
Decimal Point	Set the number of decimal places. When no decimal point is required, set "0".

Item	Description
Char. Color	Set the text properties.
Back Color	
Bold	
Shadow	
1/4	
Italic	
Transparent	
Character Size	
Zero Suppress	Set the display method for numerical values that do not satisfy the specified digits condition. Selected: Do not display zeros in front of the value Unselected: Display zeros in front of the value
Char. Place	Select either flush-left or flush-right for character display.
Text Process	Set the order of the first and second bytes in words.

*1   Example: When set to [Buffering Area Setting]→[Number of data to acquire: 8]
To display the logging data of the 3rd word in the buffering area, specify "2" for [Target Device No.].
Even if [Data Length] is different, the corresponding device memory is the same.

[Data Length]: 1-Word

	Target Device No.
1st word	0
2nd word	1
3rd word	2
4th word	3
5th word	4
6th word	5
7th word	6
8th word	7

[Data Length]: 2-Word

	Target Device No.
1st word	0
2nd word	
3rd word	2
4th word	
5th word	4
6th word	
7th word	6
8th word	

*2   If any value (non-numeric inclusive) specified is outside the range usable on MONITOUCH, the value cannot be displayed.

☞   For details on the allowable range, refer to "5.1.4 Real Numbers (Floating Point Numbers)".

*3   Values entered that exceed the set number of digits are displayed as shown in the following table.

Display Format	DEC	HEX/OCT/BIN
Display	Overflow display	Numbers from the right
[Data Length]: 1-Word [Digits]: 3 Entered value: 1010	– – –	010

Style

Same as graph history display.

☞   For details, refer to "Style" page 7-17.

Alarm/Operation
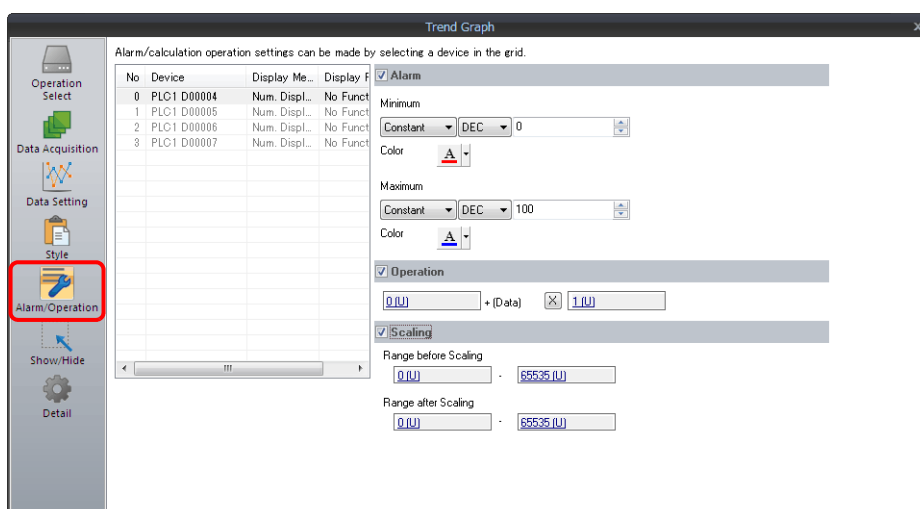
Item	Description
Alarm	If a value is outside the range of the maximum and minimum values, the color for display can be changed.
Operation	Perform an operation on the value of the device memory.
Scaling	Data (Range before Scaling) that the PLC has read is converted into the set range (Range after Scaling) that is set.

Detail

Item	Description
Print Command Device	Print the logged data. Set one word.
Print Message	Specify the top number of the message registered with the layout and titles (text) for printing. Click [Edit] to display the [Message Edit] window. For details, refer to "Sample Print" page 7-26.
Preview	Check a preview of the data for printing.
Coordinates	Set the coordinates.
ID	Set an ID number.

For Print Command Device:

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Not used (always set to "0")

0 → 1: Execute

Sample Print

Overview

History data saved to the buffering area can be printed.

Buffering area

Printed result

07-20	16:15:43	300	80
07-20	16:15:51	250	40
07-20	16:15:52	360	290
07-20	16:21:12	340	120
07-20	16:21:54	360	190
07-20	16:21:55	310	75
07-20	17:05:02	310	200

			No. 1	No. 2
1	07-20	16:15:43	300	80
2	07-20	16:15:51	250	40
3	07-20	16:15:52	360	290
4	07-20	16:21:12	340	120
5	07-20	16:21:54	360	190
6	07-20	16:21:55	310	75
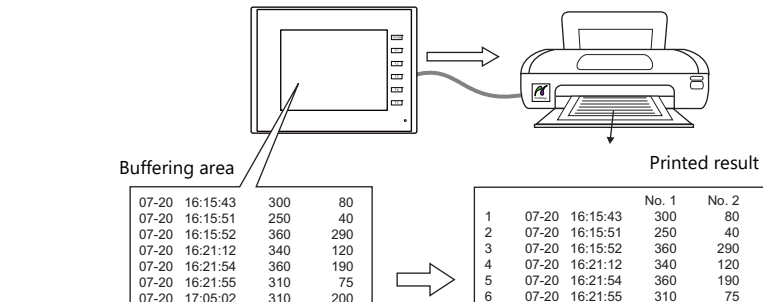
☞ For details, such as printer compatibility and print setting procedures, refer to "16 Print".

Registering Print Messages

Location of registration

[Trend Graph] settings window → [Detail] → [Print Message]
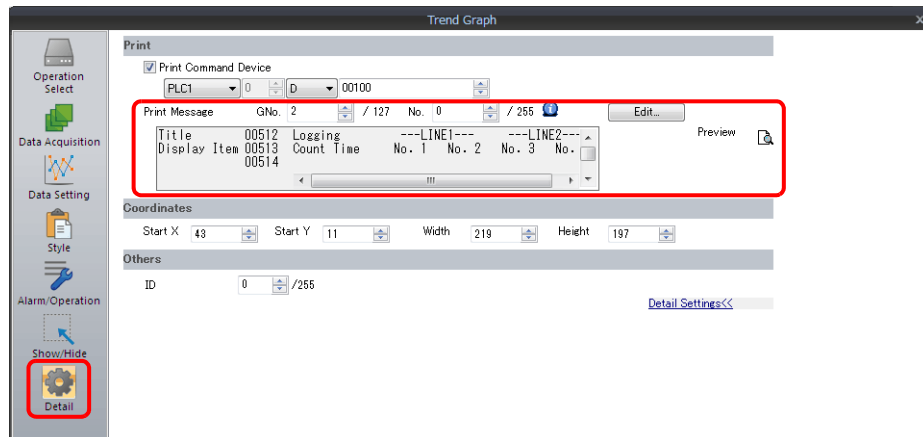
Registration details

- The top line in the specified print message contains the title for printing.
  To use two or more lines for titles, insert a one-byte "\" character at the end of the line. The next line will be recognized as a part of the title. Note that the "\" on the end of the line is not printed.

- On the line following the titles, specify the positions to indicate count, time, and data.
  Use one-byte characters "C", "T", and "0" to "15".

C:	Sampling count print position
T:	Sampling time print position
0 - 15:	Print positions of data numbers 0 to 15

  Alignment of C, T and 0 to 15 depends on the formats set for [Sampling Count Display], [Sampling Time Display] and [Trend] parts place on the screen.

- If [Zero Suppress] and [Flush Right] are selected for these parts, the values are printed with the lowest digit in alignment. If [Zero Suppress] and [Flush Left] are selected for these parts, the values are printed with the highest digit in alignment. If [Zero Suppress] is not checked, the values are printed without zero suppression.

[Zero Suppress] checked [Flush Left]	C	T	0	1
	↓	↓	↓	↓
	0	0	12345	12345
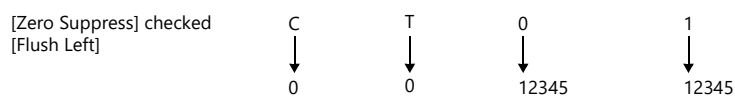
- The registered message is printed as the header at the top of each page.

⚠ Even when "C" (count) and "T" (time) are registered in the print message, the count and time are not printed if [Sampling Count Display] and [Sampling Time Display] parts are not placed on a screen.

Registration example

[Print Message] Message GNo. 2 : No. 0
[Zero Suppress] unselected
[Flush Left]

Message GNo. 2 editing   Printed result

Title

Print position

Execution Method

There are two methods for printing logging data.

- Switch function: [Sample] → [Print]

Switch   Trend [Style]

or

- Print Command Device

Item	Description
Print Command Device	Print the logged data. Set one word.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	

Not used (always set to "0")

0 → 1: Execute

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7.3 Real Time Display

- Values in consecutive device memory addresses can be expressed on a line graph.
  Subsidiary lines can be drawn for easier recognition of data changes.

Example: Graph display of data in addresses D100 to D110
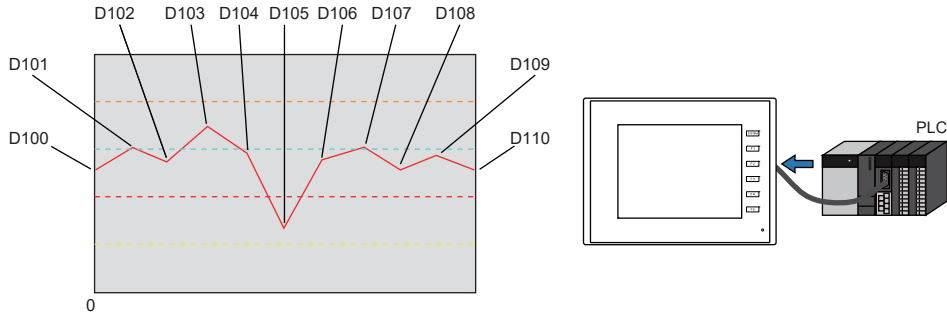
☞ Refer to "7.3.1 Location of Settings" page 7-29.

☞ Refer to "7.3.4 Display Method" page 7-38.

- A maximum of 16 trends (lines) can be displayed.
- Negative values can also be displayed on graphs.
- The interval between each point (point pitch) can be changed between equal pitch or an arbitrary pitch.

Example: When specifying the number of dots or the scale
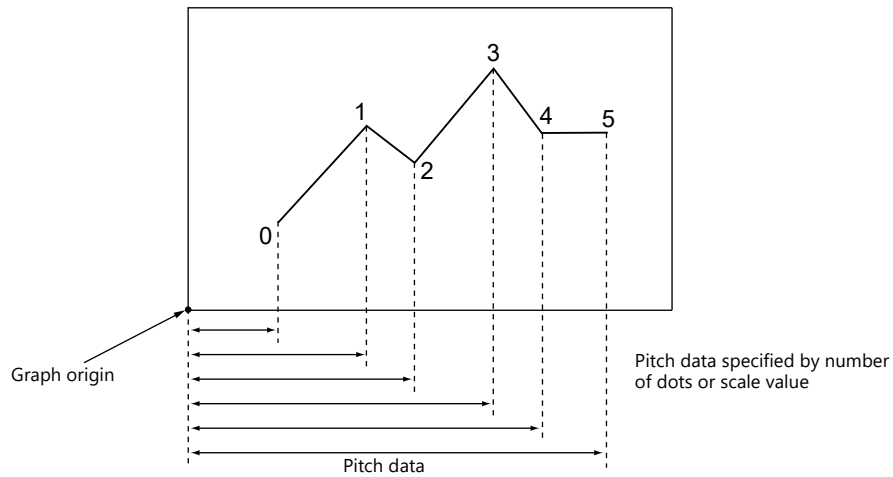
☞ For details, refer to "Plot Point Pitch" page 7-34.

- Parent/child trends (overlay)
  Asynchronous graphs can be displayed in the same graph area.
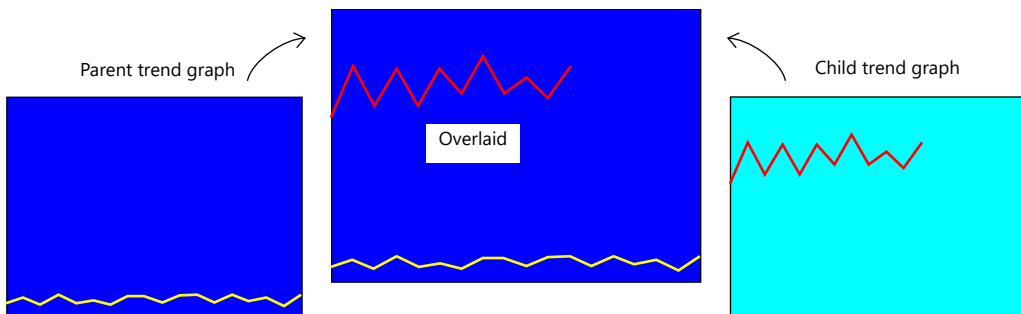
☞ For details, refer to "Asynchronous Display of Multiple Trend Graphs" page 7-39.

7.3.1   Location of Settings

Click [Parts] → [Trend] and place a graph on the screen.
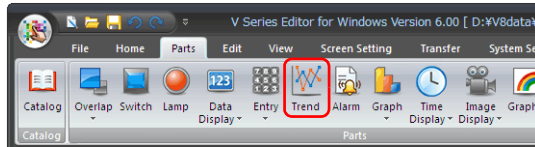
☞   For details on the display method, refer to "7.3.4 Display Method" page 7-38.

7.3.2   Detailed Settings

Operation Select
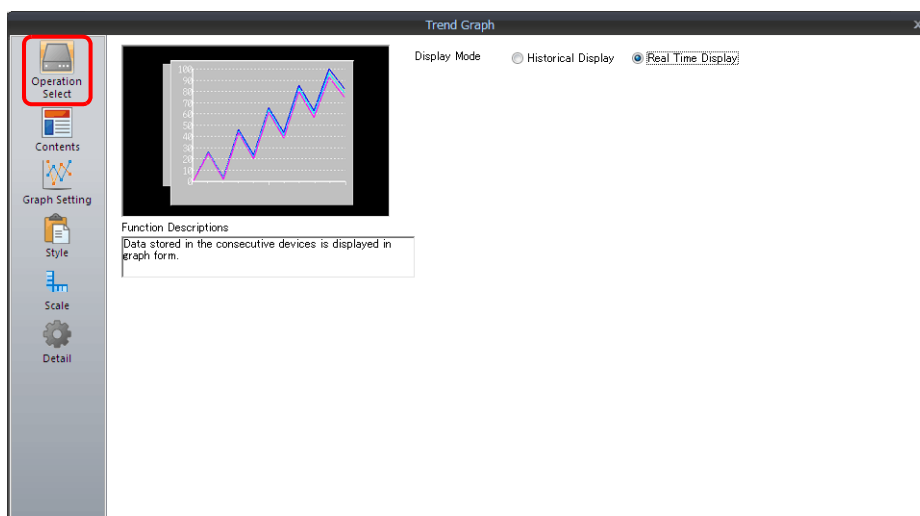
Item	Description
Display Mode	Select [Real Time Display].

Contents
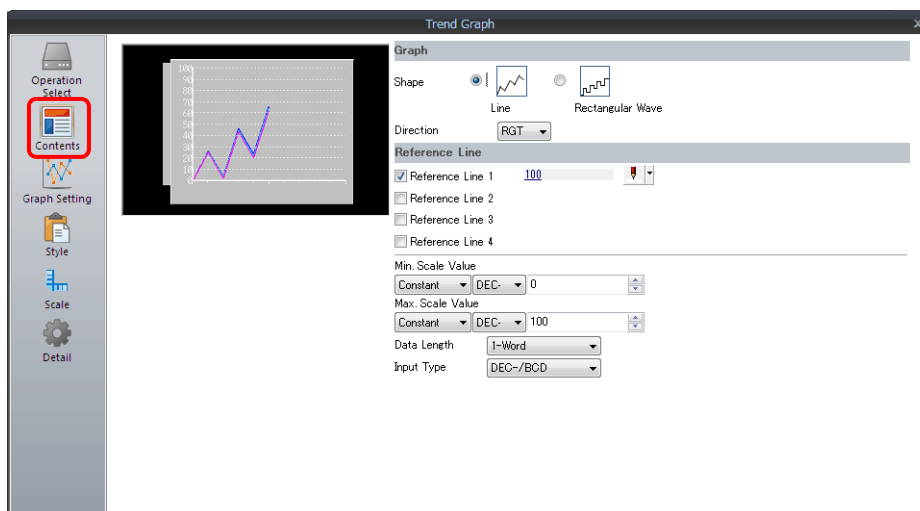
Graph

Item	Description
Shape	Set the graph shape. Line/Rectangular
Direction	Set the direction of graph lines. • RGT (right) • LFT (left) • UP (upward) • DW (downward) Graph origin X: Time axis Y: Trend data

Reference line

Item	Description
Reference Line	Display a maximum of four horizontal reference lines on a graph. Set the display position and color of each reference line. The line type is fixed to a dotted line. Direction: RGT (Reference Line 4) (Reference Line 3) (Reference Line 2) (Reference Line 1) 0 X X: Time axis Y: Trend data When a device memory address (other than [Constant]) is set, reference lines are updated when the graph is displayed or when a "redraw" or a "redraw after clear" is commanded by the control device memory.
Min. Scale Value Max. Scale Value	Set the scale values for calculating the position where the reference line should be drawn in the graph area. Negative values can also be specified. To draw a reference line in the center of a trend graph: Reference Line 1 - Min. Scale Value: 0 - Max. Scale Value: 2 Specifying "1" for reference line 1 will display a line at the center. Max. 2 Reference Line 1 Min. 0
Data Length	Set a data length when specifying device memory (other than [Constant]) for reference lines or the minimum and maximum scale values. Set data length for the device memory. 1-Word/2-Word
Input Type	Set the data type of the scale values. DEC-/BCD [*1]/FLOAT [*2]

*1 When [DEC-/BCD] is selected, the setting at [System Setting] → [Hardware Setting] → [PLC Properties] → [Code] takes effect.
*2 If any specified value (non-numeric inclusive) is outside the range usable on the TS unit, the line cannot be displayed.

☞ For details on the allowable range, refer to "5.1.4 Real Numbers (Floating Point Numbers)".

Graph Setting

Item	Description
Points to Display [*1]	Set the number of plot points along the horizontal axis. - 320 × 240 dots: 3 to 320 - 800 × 480 dots: 3 to 800
Control Device	
	Number of plotted points [*1]: 0 to 1024 Set the number of points to display. The content of the device memory addresses set for numbers 0 to 15 is read for the specified number of points.
	Redraw [*2] The number of points to display are redrawn. 0 → 1 Drawing is performed over the previous graph without clearing the graph area. The previously displayed image remains.
	Redraw after clear [*2] The number of points to display are redrawn. 0 → 1 Drawing is performed after clearing the graph area. Only the latest graph is displayed.

Plot Point Pitch	Equal pitch
	    Space all points equally.
	
	Specify the scale range
	    Specify the interval between points using the scale range.
	
	Specify the number of dots
	    Specify the interval between points with the number of dots.
	
	For details, refer to "7.3.3 Plot Point Pitch" page 7-34.

Detailed Settings — Number of Graphs	Set the number of graph lines. Max. 16
Detailed Settings — Device	The contents of this device memory address is read and displayed on the graph. The required number of addresses varies depending on the setting for [Points to Display] and [Data Length]. For details, refer to "7.3.3 Plot Point Pitch" page 7-34.
Detailed Settings — Use Range	Point pitch: when specified with the number of dots
Detailed Settings — Input Format	Set data format of device memory values. DEC- / BCD [*3] / Actual Number [*4] The selection here also applies to minimum, maximum, and X axis scale values.
Detailed Settings — Data Length	Select the data length for one plot point. 1-Word/2-Word
Detailed Settings — Min. [*5]	Set the graph display area. (PLC device memory [*6] / internal device memory [*6] / constant)
Detailed Settings — Max. [*5]	
Detailed Settings — Min. Scale [*5]	Set when [Graph Setting] → [Plot Point Pitch] is set to [Specify the scale range]. For details, refer to "7.3.3 Plot Point Pitch" page 7-34.
Detailed Settings — Max. Scale [*5]	
Detailed Settings — Display Format	Set the graph type (line or marker) and color.
Detailed Settings — Type	
Detailed Settings — Color	

Item	Description
Item to Display	Change the items displayed in the [Detail Settings] area.

*1   Number of display points
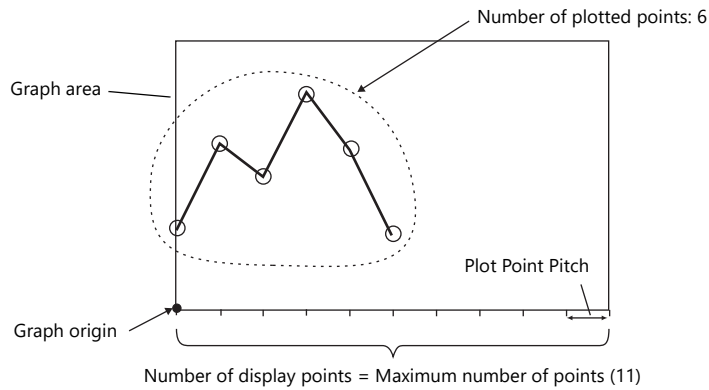
Direction: RGT

Number of plotted points: 6

Graph area

Plot Point Pitch

Graph origin

Number of display points = Maximum number of points (11)

⚠ If a value larger than the X size (dots) of the graph area is specified for [Points to Display], the graph will not be drawn correctly.

*2   "Redraw" and "redraw after clear"

When redrawing, select the "Redraw" or "Redraw after clear" bit.
If the interval between redrawing is too short, the graph may not be redrawn even at the leading edge.
Once displayed, data on the graph cannot be changed unless the redrawing command is given.

*3   When [DEC-/BCD] is selected, the setting for [System Setting] → [Hardware Setting] → [PLC Properties] → [Code] → [DEC/BCD] takes effect.

*4   If any value (non-numeric inclusive) specified is outside the range usable on MONITOUCH, the value cannot be displayed.

☞   For details on the allowable range, refer to "5.1.4 Real Numbers (Floating Point Numbers)".

*5   Max., Min., Max. Scale, Min. Scale

Do not specify the same value for both maximum and minimum values. Doing so will result in an error when transferring data to the unit. Make sure to set valid values.

*6   When minimum and maximum values are set with a device memory address (other than [Constant]), these values are updated when the graph is displayed or when a "redraw" or a "redraw after clear" is commanded by the control device memory.

Style
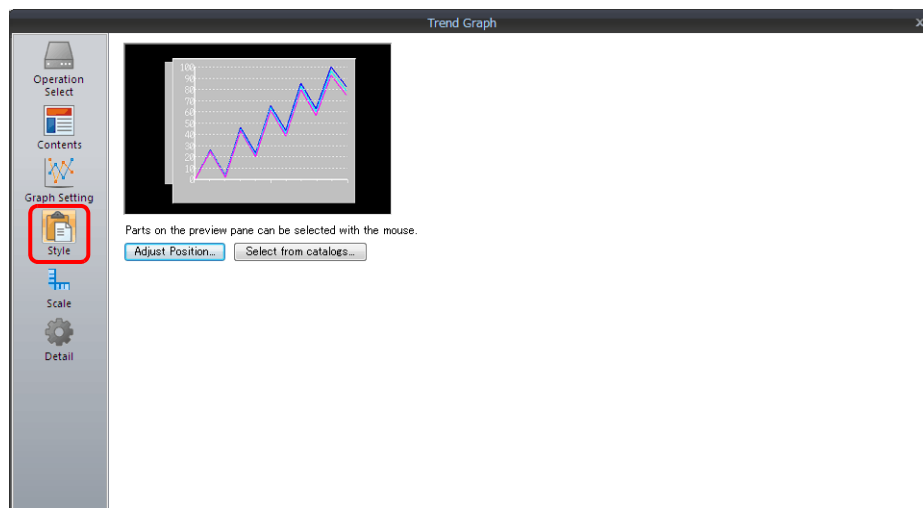
Item	Description
Adjust Position	Adjust the placement position.
Select from catalogs	Change parts.

Scale Display

Item	Description
Axis Color	Select the color of the major and minor tick marks, and axis lines of the scale. This setting is common to all left, right, bottom, and top sides.
Back Color	
Display Minor scale	Set the length of the minor tick marks of the scale. Range: 1 to 16 This setting is common to all left, right, bottom, and top sides. The thickness of the markings is fixed.
[Scale] in [Left], [Right], [Bottom], and [Top] tab windows	Displays the scale, grid line, and reference value settings for each side. Default: Selected on [Left] and [Bottom] tab windows
Small scale alignment	Equal divide (unit based on [No. of divisions]) Minor tick marks are equally spaced according to the specified number of divisions along the axis line. Equal interval (unit based on [Interval]) Minor tick marks are equally spaced according to the specified interval from the zero point along the axis line within the following range.
Display major tick marks	Display major tick marks on the scale. (Unit: [Interval]) Length: Twice the minor tick marks Thickness: Fixed
Grid Line	Grid lines are drawn at the major and minor tick marks of the scale.
Color, Line Type	Set the color and line type of grid lines.
Also apply to minor tick marks	This can be set when the [Display major tick marks] checkbox is selected. Set whether to display grid lines. Selected: Display at both major and minor tick marks Unselected: Only display at major tick marks
Reference Value	Select this checkbox to display reference values at major and minor tick marks on the scale.
Style Setting	Set the number of digits or the color of reference values shown at tick marks.
Also apply to minor tick marks	This can be set when the [Display major tick marks] checkbox is selected. Set whether to display reference values. Selected: Display at both major and minor tick marks Unselected: Only display at major tick marks
Range Setting	Use when [Small scale alignment] is set to [Equal divide] or when the [Reference Value] checkbox is selected. Match with the specified graph The range changes according to the following combinations.

Within "Small scale alignment" description:

Graph Direction	Side	Range
LFT/RGT	Top/Bottom	Number of horizontal axis points or scale of [Range Setting]
UP/DW	Left/Right	
LFT/RGT	Left/Right	Scale of [Range Setting]
UP/DW	Top/Bottom	

Within "Range Setting" description:

Graph Direction	Side	Range
LFT/RGT	Top/Bottom	Number of X-axis data points [1]
UP/DW	Left/Right	
LFT/RGT	Left/Right	Minimum and maximum values specified for the selected graph number [2]
UP/DW	Top/Bottom	

Set Value
Specify the minimum and maximum values using constants or devices. [2]

[1] If [Plot Point Pitch] is set to [Specify the scale range], use the minimum and maximum scale values.

[2] If the minimum and maximum values are specified with device memory addresses (other than [Constant]) in the [Range Setting] window and these values are changed in RUN mode, the changes are updated at the following timings:
- When the screen is redrawn
- The bit for "redraw" or "redraw after clear" in the control device memory is set to ON.

Detail
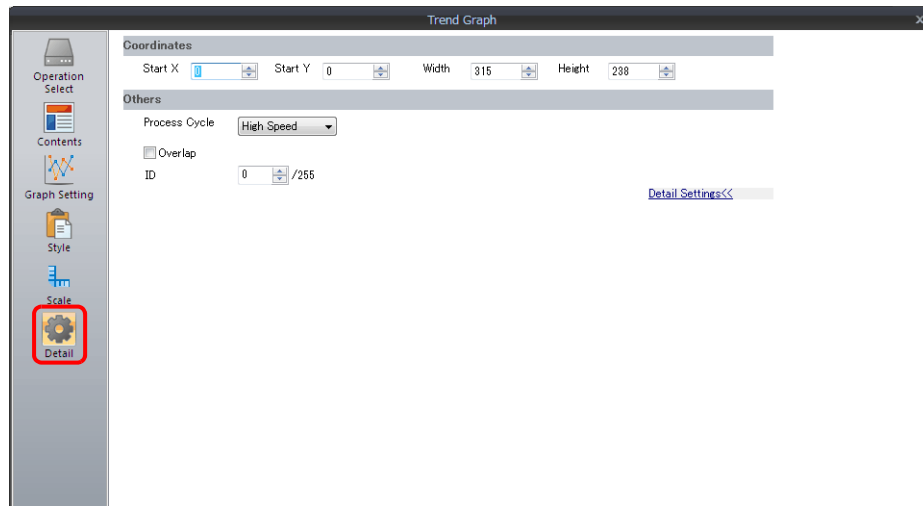
Item	Description
Coordinates	Set a display position and size.
Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle". High Speed/Low Speed/Refresh
Overlap	Select this checkbox to display multiple graphs asynchronously or 17 or more lines in one graph area. For details, refer to "7.3.5 Asynchronous Display of Multiple Trend Graphs" page 7-39.
ID	Set an ID number.

7.3.3 Plot Point Pitch

Select whether to place plot points along the X-axis of graphs at equal pitches (intervals) or at variable pitches.

Location of setting: [Graph Setting] → [Plot Point Pitch]
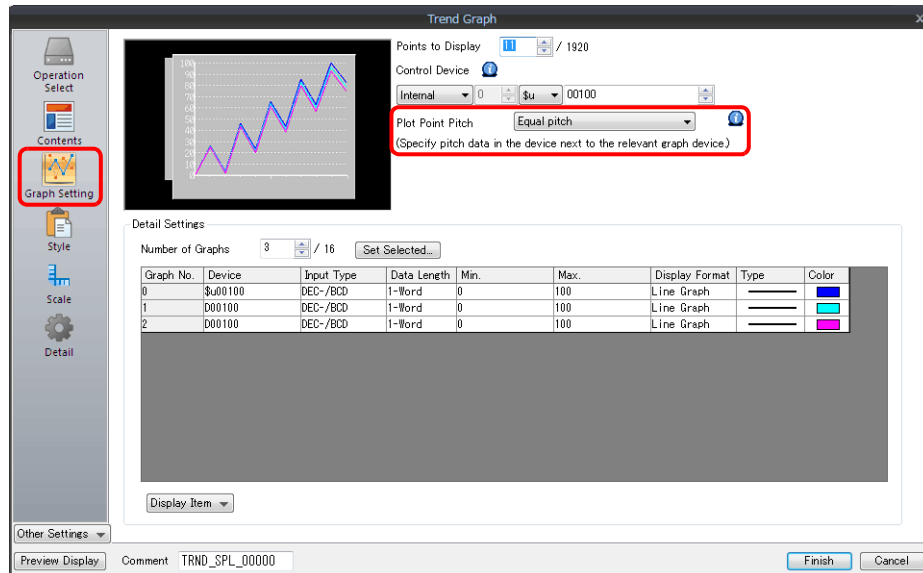
Type

Equal pitch

Plot points are automatically set at an equal pitch. MONITOUCH calculates a pitch between plot points as shown below. (MONITOUCH adjusts the data so that no remainder will result.)

Formula: Point pitch (dots) = X size of graph (dots) ÷ ([Points to Display] - 1)
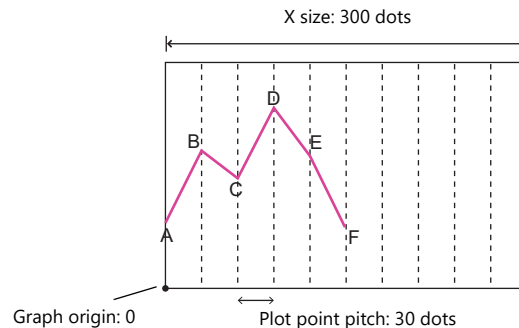
☞ For details on device memory allocation, refer to "Equal pitch" page 7-36.

Specify the number of dots

Pitch data (distance from the graph origin to each plot point) can be specified in units of dots.
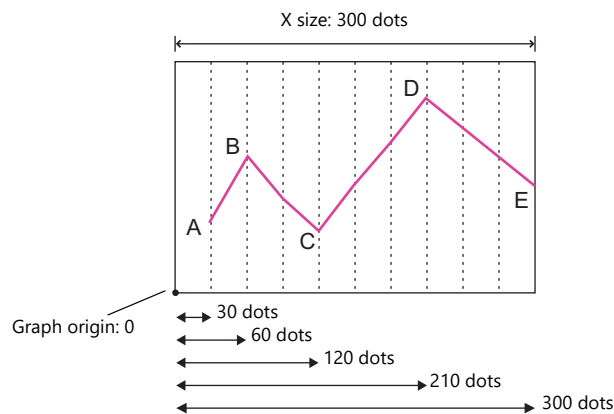
☞ For details on device memory allocation, refer to "Specify the scale range, specify the number of dots" page 7-37.

Specify the scale range

Pitch data (distance from the graph origin to each plot point) can be specified using a scale value. The scale value is specified as the range in the [Graph Setting] settings. ([Max. Scale], [Min. Scale])

[Specify the scale range]
- [Min. Scale]: 0
- [Max. Scale]: 10
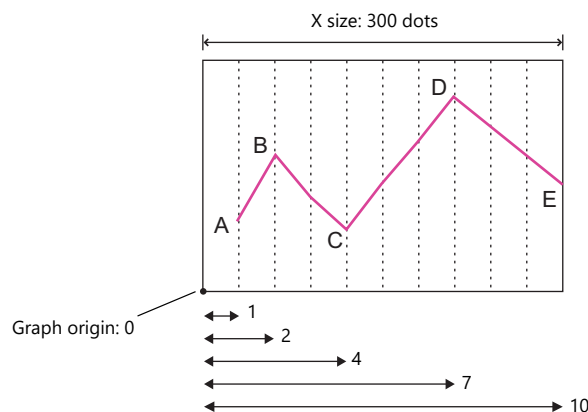
☞ For details on device memory allocation, refer to "Specify the scale range, specify the number of dots" page 7-37.

Device Memory Allocation

The allocation of device memory addresses differs depending on the [Points to Display] setting and the data length of each graph.
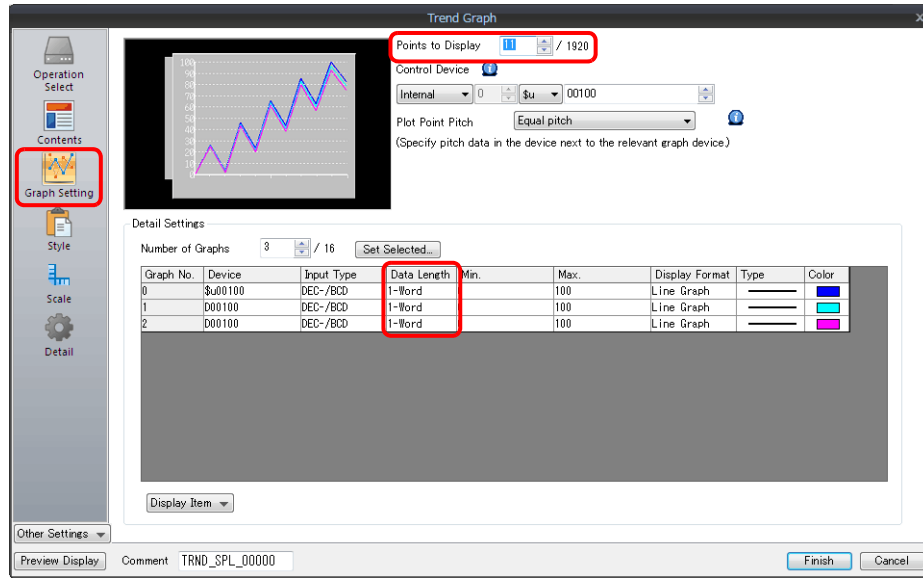
Equal pitch

Point data is stored consecutively from the set device memory address.

Device memory address setting: n
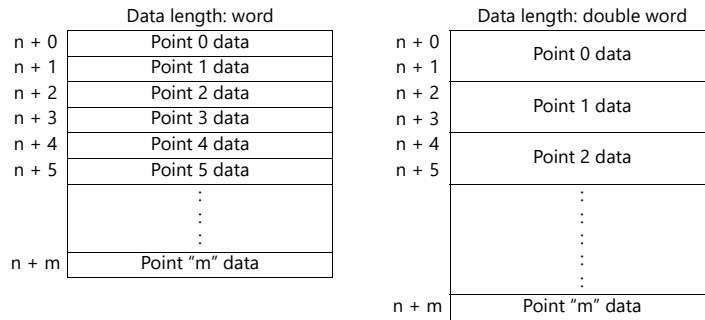
For example, allocation is performed as follows when 11 points are plotted on the X-axis and [Device] is D100.
- If the data length is 1 word, devices D100 to D110 are used.
- If the data length is 2 words, devices D100 to D121 are used.

Device memory address setting: D100
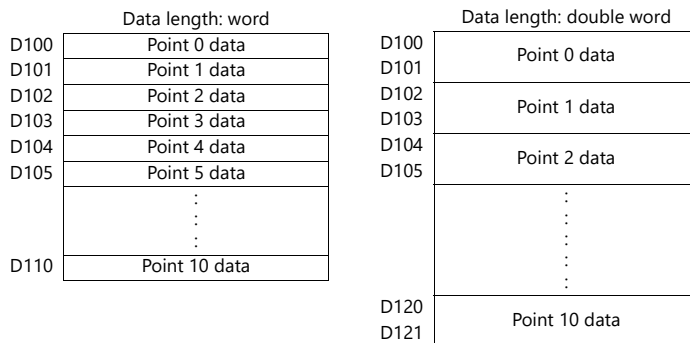
Specify the scale range, specify the number of dots

Point data and pitch data (dot or scale value) from the set device memory address are stored one after the other.
A device for pitch data is allocated following the device memory for each point.

Device memory address setting: n

	Data length: word			Data length: double word
n + 0	Point 0 data		n + 0	Point 0 data
n + 1	Point 0 pitch data		n + 1	
n + 2	Point 1 data		n + 2	Point 0 pitch data
n + 3	Point 1 pitch data		n + 3	
n + 4	Point 2 data		n + 4	Point 1 data
n + 5	Point 2 pitch data		n + 5	
	⋮		n + 6	Point 1 pitch data
	⋮		n + 7	
n + m	Point "m" data			⋮
	Point "m" pitch data			⋮
			n + m	Point "m" data
				Point "m" pitch data

For example, allocation is performed as follows when 11 points are plotted on the X-axis and [Device] is D100.
- If the data length is 1 word, device memory addresses D100 to D121 are used.
- If the data length is 2 words, device memory addresses D100 to D141 are used.

Device memory address setting: D100

	Data length: word			Data length: double word
D100	Point 0 data		D100	Point 0 data
D101	Point 0 pitch data		D101	
D102	Point 1 data		D102	Point 0 pitch data
D103	Point 1 pitch data		D103	
D104	Point 2 data		D104	Point 1 data
D105	Point 2 pitch data		D105	
	⋮		D106	Point 1 pitch data
	⋮		D107	
D120	Point "m" data			⋮
D121	Point "m" pitch data			⋮
			D140	Point 10 data
			D141	Point 10 pitch data

7.3.4   Display Method

This section explains the display method using an example of graph control device memory D1000.

1. Check the graph control device (e.g. D1000).
   Location of setting: [Trend] settings → [Graph Setting] → [Control Device]

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
		0	0	0											

└─ 0 → 1: Redraw   └─ 0 to 1024: Points to Display

└─ 0 → 1: Redraw after clear
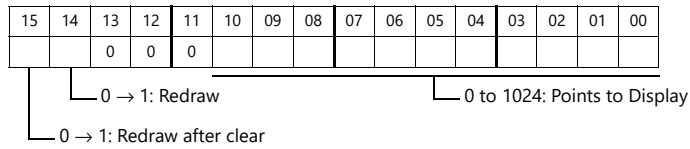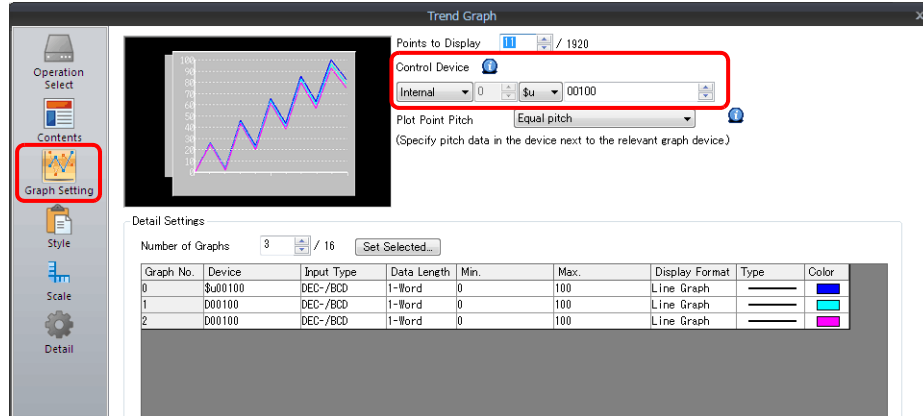
2. Set the control device to "11" (number of plotted points).

3. Change "redraw after clear" (bit 15) or "redraw" (bit 14) of the control device memory from 0 to 1.

   - Redraw after clear (bit 15)
     The previous graphs are cleared before displaying the latest graph.
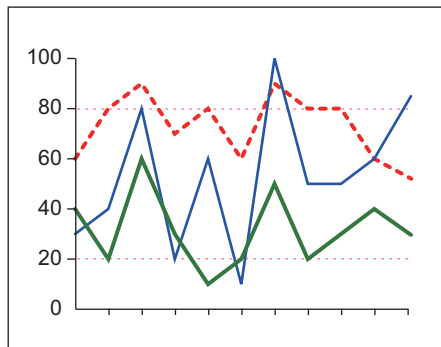
The graphs are displayed with the 11 most recent points.

   - Redraw (bit 14)
     The previous graphs are not cleared and the latest graph is displayed.
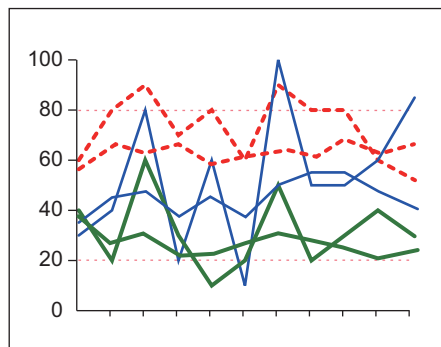
The latest graph with the 11 most recent points is displayed over the previous graph.

This completes the necessary settings.

7.3.5   Asynchronous Display of Multiple Trend Graphs

All the trend lines in the graph area are drawn at the same points and at the same timing because trend graphs have one word of control device memory. To draw multiple trend lines at different timings, two or more graphs must be overlaid and linked, thereby assigning priorities to respective control device memory.

Parent trend graph

Overlaying graphs

Child trend graph
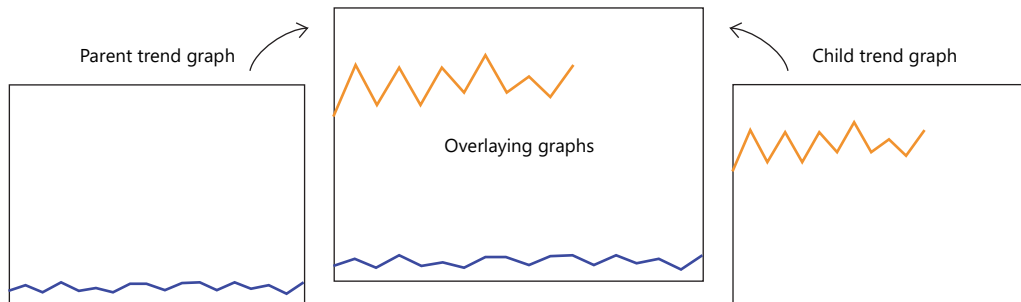
Setting Procedure

This section explains drawing multiple graphs with an example of displaying two trend graphs asynchronously.

1. Place two trend graphs.

    ☞   Refer to "7.3.1 Location of Settings" page 7-29.

2. Set D120 to [Graph Setting] → [Control Device] in the [Trend] settings window.
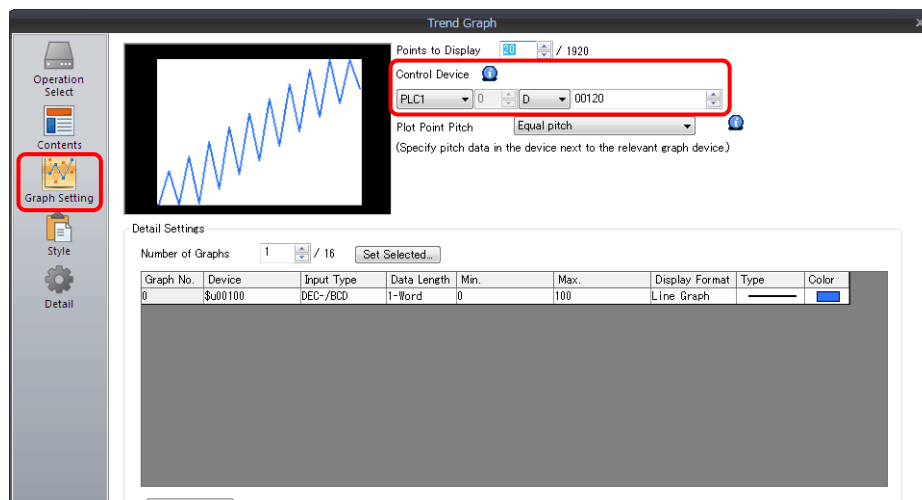
3. Set "High Speed" for [Detail] → [Process Cycle] and "0" for [ID] (parent trend graph).
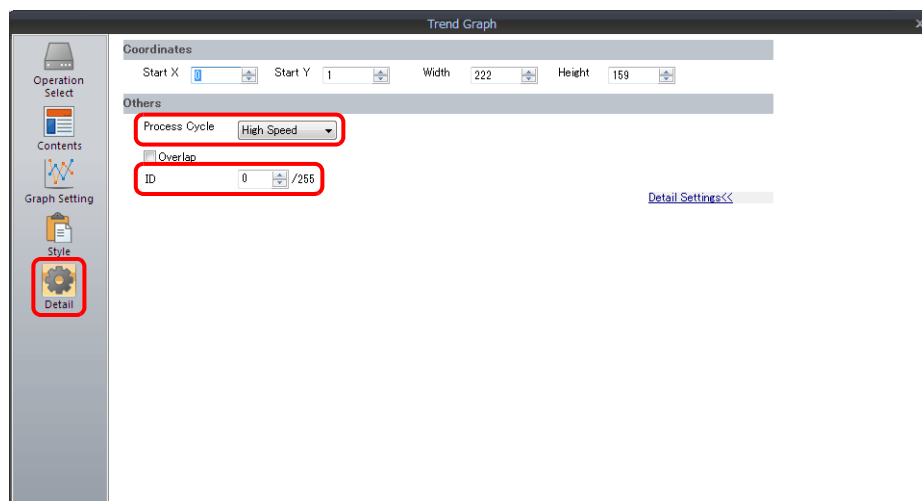
4. In the [Trend] settings window of the other graph, set D140 to [Graph Setting] → [Control Device].
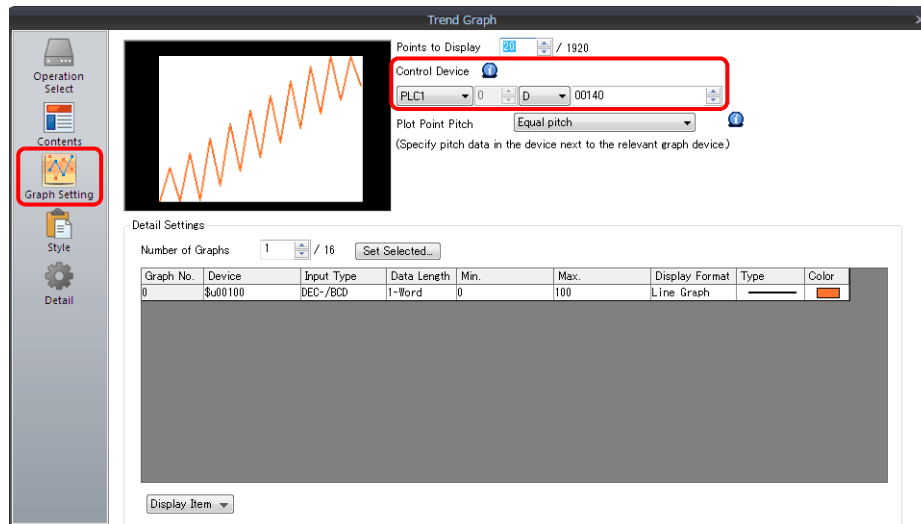
5. Set "High Speed" for [Detail] → [Process Cycle] and "0" for [Overlap] (child trend graph).
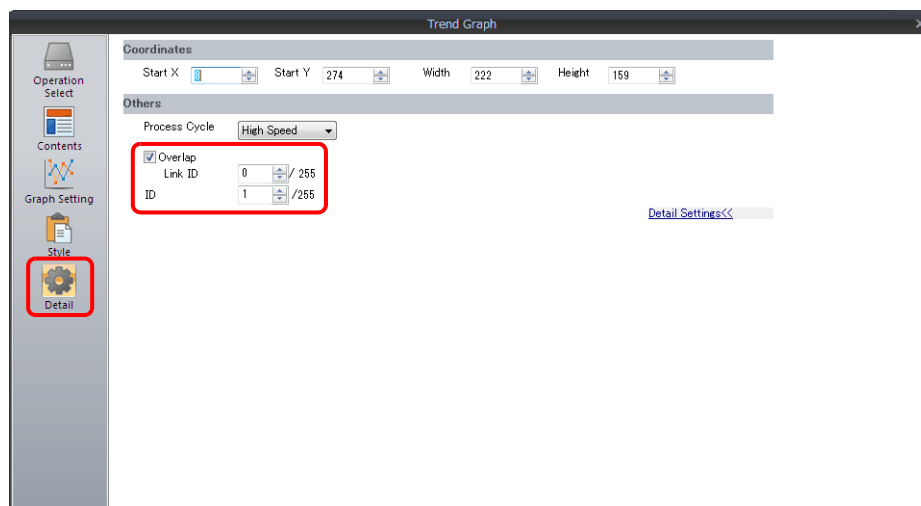
6. Place the parent trend graph under the child trend graph to overlap the two graphs.

This completes the necessary settings.
The graphs are drawn using the D120 control device memory (parent trend graph).

☞   For details on display, refer to "7.3.4 Display Method" page 7-38.

Display Method

This section explains how to draw two trend graphs based on the example in "Setting Procedure" page 7-39.

1. Set D120 to 9H (number of plotted points).
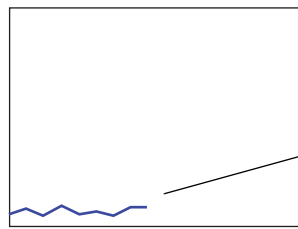
The parent trend graph is drawn with up to 9 plot points.

2. Set D140 to 9H (number of plotted points).
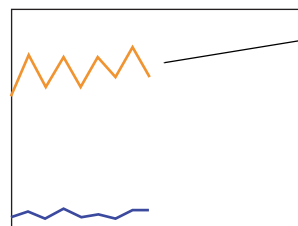
The child trend graph is drawn with up to 9 plot points.

3. Set the D140 to 5H (number of plotted points) and set D120 to 8007H ("redraw after clear" and number of plotted points).
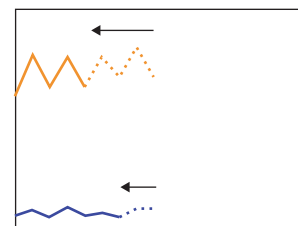
Change the number of plotted points to 5 points in the child trend graph and send the "change" and "redraw after clear" commands from the parent trend graph at the same time.
The 5 points of the child trend graph are drawn for the first time.

Notes on Setting

- When linking two or more trend graphs, regard one trend graph as a "parent" and the other trend graph as a "child."
  Select the [Detail] → [Overlap] checkbox for the child trend graph and set the ID of the parent trend graph.
  Both the "redraw" and "redraw after clear" commands issued at the child trend graph are ignored and only the commands from the control device memory of the parent trend graph are accepted.
- Set [Process Cycle] to "High Speed" for all the trend graphs that are linked.
- Only the area property settings of the parent trend graph are available. The area property settings of the child trend graph are not displayed.
  In addition, the reference lines set for the child trend graph area ignored.
- Place the child trend graph over the parent trend graph using the [Bring to Top] or [Send to Bottom] icon. If the parent trend graph is placed over the child trend graph, these two graphs will not be linked correctly.

Area property: Blue
(parent trend graph)

Area property: Light blue
(child trend graph)

When the graphs are overlaid, the graph area is displayed in blue.

MEMO

MONITOUCH
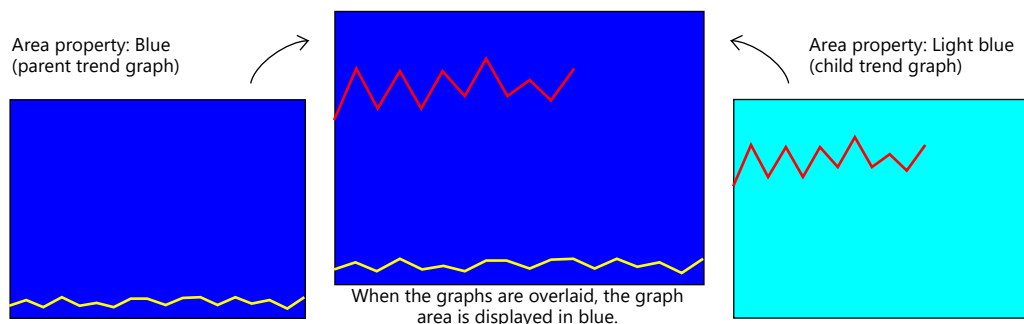
8 Alarm

8.1   Overview

There are two methods for displaying alarms: historical display and real time display.

Historical Display

- The states of device memory registered to the buffering area can be saved as alarm history. History data can be output to a CSV file on a storage device by turning the relevant bit ON for checking on a PC.

Buffering area

Save error messages and alarm information as history data.
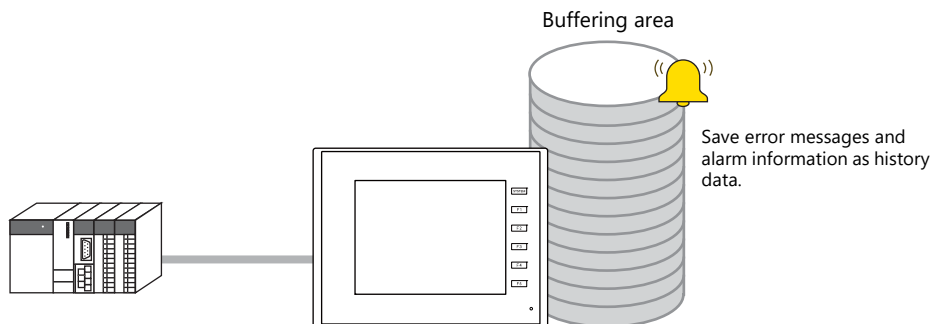
☞   For details, refer to "8.2 Historical Display" page 8-3.

- Placing alarm parts on the screen allows history data saved to the buffering area to be displayed in conjunction with times and messages. There are two alarm types to alarm parts.
  - Alarm tracking
    Alarm occurrence, reset, and acknowledged times are displayed on one line. The state of each alarm can be checked at a glance.

  - Alarm logging
    Alarm occurrence, reset, and acknowledged times are each displayed on one line.
- History data saved to the buffering area can be displaying using alarm parts.

Alarm Tracking   Alarm Logging

☞   For details, refer to the following references.

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- Parameter display
  When an alarm occurs, the data (parameters) associated with the alarm can be saved/displayed together with an alarm message. Logging the history of such alarm-relevant parameters will make it easier to locate and investigate the causes of alarms.

☞ For details, refer to "8.2.4 Parameter Display Function" page 8-29.

- Alarm acknowledge function
  MONITOUCH supports the alarm acknowledge function which allows for clear distinction between alarms that have been acknowledged or not.

Press the [Acknowledge All] switch.

All messages turn to the colors for acknowledgment, showing the alarm acknowledged times.

☞ For details, refer to "8.2.5 Alarm Acknowledge Function" page 8-32.

Real Time Display

- Currently occurring alarms are displayed. There are two types to real time display.
  - Bit order alarming
    Currently occurring alarms are displayed in order of bits.
  - Time order alarming
    Currently occurring alarms are displayed in order of occurrence. Buffering area configurations are necessary.

Bit Order Alarming

Time Order Alarming

☞ For details, refer to the following references.
  - "8.3.1 Bit Order Alarming" page 8-36
  - "8.3.2 Time Order Alarming" page 8-47

8.2   Historical Display

8.2.1   Buffering Area

- The area for saving acquired data which is to be used for historical display is called the buffering area. Including those for trend history data, a maximum of 12 buffering area numbers can be registered.
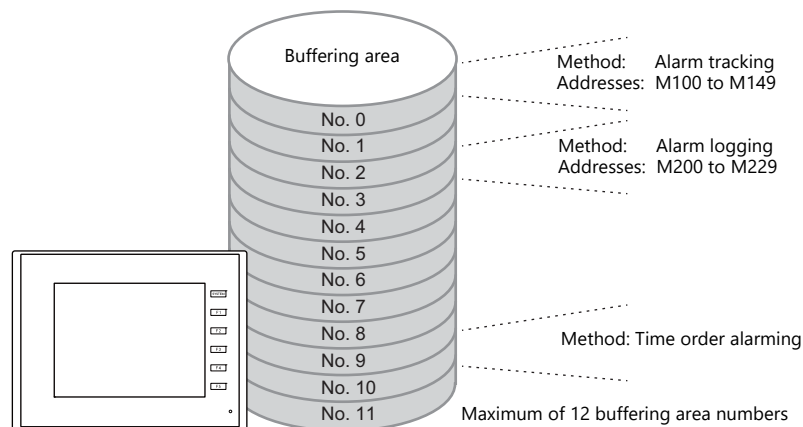
- Buffering area storage destination
  History data can be saved to DRAM and SRAM.
  Data saved to DRAM and SRAM can also be output to an SD card or USB flash drive as a CSV or backup file.
  (not available for TS2060)

History data saved to SRAM can be output to an SD card in CSV format such as by using a macro command.
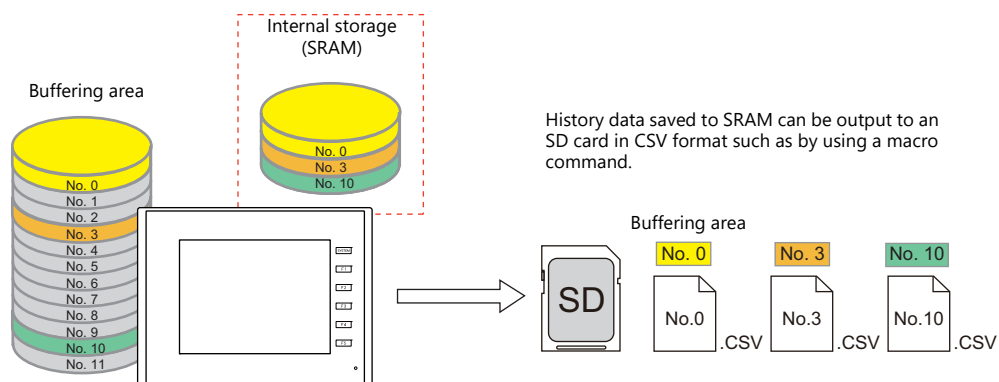
☞   For details, refer to "CSV Output & Creating Backup Files" page 8-13.

- History data saved to the buffering area can be displayed as messages using alarm parts.
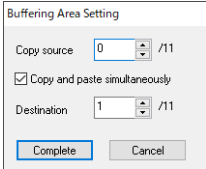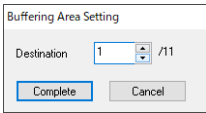
☞   For details, refer to the following references.
  - "8.2.2 Alarm Tracking" page 8-14
  - "8.2.3 Alarm Logging" page 8-20

8

Detailed Settings

Location of settings: [System Setting] → [Buffering Area Setting]

List View

Item	Description
Add Alarm	Create a new buffering area number for registering alarm history data. A maximum of 12 buffering area numbers can be registered including area numbers for trend sampling parts. This section describes the setting procedure for this item.
Add Trend	Create a new buffering area number for registering trend history data. A maximum of 12 buffering area numbers can be registered including area numbers for alarms.
Delete	Delete the selected number.
Copy	The following dialog box is displayed. <table><tr><th>Item</th><th>Description</th></tr><tr><td>Copy source</td><td>The specified block is copied.</td></tr><tr><td>Copy and paste simultaneously</td><td>When selected, copying and pasting are done simultaneously. The paste destination is specified at [Destination]. * Be sure to deselect this checkbox when copying and pasting to a different file.</td></tr><tr><td>Destination</td><td>This setting is valid when [Copy and paste simultaneously] is selected. Specify the block number of the destination for pasting the copied content.</td></tr></table>
Paste	The following dialog box is displayed. The content copied using the [Copy] button is pasted to the specified number.

Basic Settings

Item	Description
Sampling	Set the sampling method. Alarm Logging 　Data is sampled at the ON/OFF edge of each bit. 　Applicable sampling mode: Alarm logging Time Order Alarming 　A message is displayed at the ON edge of each bit. When the bit is reset (OFF), the message disappears. This function uses the buffering area temporarily to show the messages in chronological order or reverse chronological order. 　Applicable sampling mode: Time order alarming Alarm Tracking 　Data is sampled at the ON/OFF edge of each bit. 　Applicable sampling mode: Alarm tracking, alarm logging, time order alarming
Number of Monitoring Alarms	Set the total number of sampling data (bits).　Max. 4096
Monitoring Device	Set the sampling device memory. 　Use Read Area: Device memory is specified automatically and consecutively from the read area. 　Specify consecutively: Specify the desired top device memory. 　Specify individually: All device memory can be specified with the desired individual device memory.
Message Lines	This setting is valid when [Time Order Alarming] is selected as the sampling method. Set the number of message lines to allocate to a single alarm bit.
Start Message	Specify the group number and message (line) number of the top message for displaying on the alarm part from among the messages registered on the [Message Edit] window.
Display a parameter with the message	Check this box when you wish to display the current value for the parameter with the error message. For details on the parameter functions, refer to "8.2.4 Parameter Display Function" page 8-29.
Send e-mail	This setting is available when [Detail Settings] is clicked. For details, refer to "4 Ethernet Communication" in TS Reference Manual 2.
Import[*1]	This setting is valid when [Device to acquire: Specify individually] is selected. Import sampling device memory of the selected and subsequent numbers from a CSV file. If the number of lines in the CSV file exceeds the number of logging entries, the device memory is not extended.
Export[*1]	This setting is valid when [Device to acquire: Specify consecutively/Specify individually] is selected. Export all sampling device memory to a CSV file.

*1 CSV Format

* Do not change the header information enclosed in a red frame in the first and second lines. If changed, settings cannot be imported correctly.

PLC device memory　PLC x　[xxxxx]
　Device memory + address
　PLC No.1 to 8

Internal device memory　$u/$T/$s/$L/$LD xxxxx
　Device memory + address

Data Output Settings

Primary Storage Target

Configure the settings for storing to SRAM (DRAM).

Item	Description
Device Type	Set the save destination for sampled data. SRAM 　　Back up history data when power to the unit is OFF (on battery power) and when changing between RUN and Local mode. 　　The amount of free space and total used space can be checked via [SRAM/Clock Setting]. DRAM 　　All history data is cleared when power to the unit is turned OFF or when changing between RUN and Local mode.
Memorize initial value	This is valid only when [Alarm Tracking] is selected as the sampling method and [SRAM] is selected as the [Primary storage target]. With this box unchecked, the bit ON state is read again when the power is turned on with the alarm bit ON, or when the mode is switched from STOP to RUN. With this box checked, the bit ON state is not read again when the power is turned on with the alarm bit ON, or when the mode is switched from STOP to RUN because its status is saved.
Number of Data to Save	Set the number of sampling data to save. (1 to 65535)
After Full Capacity	Set the operation to perform when the value of [Number of Data to Save] is exceeded. 　　Clear old data and continue sampling, Stop sampling

Secondary Storage Target

Configure the settings for outputting to a storage device.

Item	Description
Device Type	Set the secondary storage destination for sampled data. Unselected 　　The secondary storage destination is not used. Storage (not available for TS2060) 　　Save history data to an SD card or USB flash drive. 　　Back up history data when power to the unit is OFF and when changing between RUN and Local mode. Memory Card (not available for TS1000 Smart) 　　Store history data in the SRAM memory card (with card recorder used). 　　Back up history data when power to the unit is OFF and when changing between RUN and Local mode.
Output File No.	When [Memory Card] is selected as the storage destination, file numbers are automatically given according to this setting. For details on the memory card function, refer to "13.2 Memory Card".
Number of Data to Save	Set the number of sampling data to save. (1 to 86400)
CSV Output	For details, refer to "CSV Output" page 8-11.
Create Backup File	For details, refer to "Create Backup File" page 8-12.

Control Device Setting

Item	Description
Sampling Control Device	Common Setting 　Device memory addresses are allocated for each buffering area number consecutively from read area "n + 3". Sampling Control Device = Read area n+3　Buff. area No. 3　Buff. area No. 2　Buff. area No. 1　Buff. area No. 0 n+4　Buff. area No. 7　Buff. area No. 6　Buff. area No. 5　Buff. area No. 4 n+5　Buff. area No. 11　Buff. area No. 10　Buff. area No. 9　Buff. area No. 8 Individual Setting 　A device memory address can be specified as the exclusive sampling control device memory for a buffering area number. Sampling Control Device n　Not used　Buff. area No. n
Start Bit	This is valid only when other than [Alarm Tracking] is selected as the sampling method. Control starting and stopping of sampling with this bit. 　0: Stop 　1: Start
Start Bit	This is valid only when [Alarm Tracking] is selected as the sampling method. You can control the start and stop of monitoring bits for sampling. Unselected 　Alarm tracking is always active because the alarm monitor is always working. Selected 　Alarm tracking is not performed even if the alarm bit is set (ON) or reset (OFF) unless the bit specified for [Start Bit] (bit 03, 07, 11, 15 of the sampling control device memory) is set (ON).
Reset Bit	Clear the history data. 　1: Reset (sampling is stopped while set to "1")
Normal Operation Bit	This is valid only when [Alarm Tracking] is selected as the sampling method. This bit controls alarm tracking. This bit is set (ON), while an error bit is reset (OFF). When an error bit is set, this bit is reset. The first error bit that is set while this bit is reset is recognized as the "primary cause" error, and is distinguished from the other errors. For details on the alarm function, refer to "8.2.2 Alarm Tracking".
Info Output Device	This is the area where the status of each area number in the buffering area is indicated. 　Input Trigger Bit:　　　　　　The input trigger bit status is output. 　Buffer Data Bit:　　　　　　　Indicates that the specified buffering area number contains data. 　Bit for over 90% full capacity:　Indicates that the capacity of the specified buffering area number is over 90% full. 　Bit for buffer full:　　　　　　Indicates that the specified buffering area number is full.

CSV Format Setting

Specify the CSV file format on this tab window, when specifying [Storage] as the [Secondary storage target] or when outputting data to a CSV file using macro commands.

Item	Description
Output Time [*1]	Set the display format for the time information that is attached to alarm messages. • Time of Occurrence • Occurrence/Cancellation Time • Time Lag Display • Total Frequency of Occurrence Display • Total Time of Occurrence Display • Time of Occurrence Display
Date Display	Select the format for dates.
Display month/date with zero suppress	Select this checkbox to display the month and date with zero suppression.
Time Display	Select the format for time.
Output Order	Set the order for outputting to a CSV file. (Ascending Order, Descending Order)
Status Display [*2]	Set the display format for the status. Display ON/OFF, Specify Message No.
Output Information [*2]	Set the message output format. ON–OFF/ON/OFF
Output the primary cause only [*1]	Select this checkbox to output only primary causes.
Output the primary cause with a (*) mark added [*1]	Select this checkbox to mark primary causes with asterisks.

*1   This is valid only when [Alarm Tracking] is selected as the sampling method.
*2   This is valid only when [Alarm Logging] is selected as the sampling method.

Titles in CSV Files

When data is output to a CSV file on a storage device, the data is saved as shown below.

By default, only the buffering area number is output and there are no titles.
To add titles to data, save a CSV file with titles in the "SAMPLE" folder on the storage device in advance.

Title

SMP0000.CSV							
	A	B	C	D	E	F	G	H
1	Error	Occurrence Time	Cancellation Time				
2	Temp.C Up	2016/5/9 17:18	2016/5/9 17:18				
3	TankC Err	2016/5/9 17:18	2016/5/9 17:19				
4	Sensor1 Err	2016/5/9 17:18	2016/5/9 17:19				
5	Temp.A Up	2016/5/9 17:18	******************				
6	TankA Err	2016/5/9 17:19	2016/5/9 17:19				
7	TankC Err	2016/5/9 17:19	******************				
8	Sensor1 Err	2016/5/9 17:19	2016/5/9 17:19				
9	Temp.B Up	2016/5/9 17:19	******************				
10	TankD Err	2016/5/9 17:19	******************				

- CSV file for titles

CSV filename	SMHxxxx.CSV (xxxx= 0000 to 0011: Buffering area number)
CSV file size	Max. 239 KB
Number of title rows and columns	Unlimited

Storage location	"SAMPLE" folder inside the access folder
	
	SD card ──□──☐ DAT0000 (Access folder)
	          ├─☐ BITMAP
	          ├─☐ CARD
	          ├─☐ DSP
	          ├─☐ FONT
	          ├─☐ HDCOPY
	          ├─☐ JPEG
	          ├─☐ MEMO
	          ├─☐ MSG
	          ├─☐ RECIPE
	          ├─☐ SAMPLE
	               └─☐ SMH0000.CSV
	          ├─☐ SCRN
	          ├─☐ SNAP
	          ├─☐ SRAM
	          ├─☐ WAV
	          └─☐ WEBSERV
	
	* Match the CSV filename with the buffering area number to which titles are to be added.
	   If the buffering area number specified in the filename does not exist, the file has no effect.

8

Others

Item	Description
Monitoring Intervals	Set the monitoring frequency of alarm bits. 0 to 65535 (0 means every cycle) Units: Seconds or 100 milliseconds
Use Acknowledge function [*1]	Check this box when using the acknowledge function. (Refer to "8.3.3 Acknowledge Function" page 8-51.)
Use Alarm Acknowledge function [*2]	Check this box when using the alarm acknowledge function. (Refer to "8.2.5 Alarm Acknowledge Function" page 8-32.)
Add Time Order Alarming [*2]	Check this box when using this buffer for time order alarming at the same time.
Read sampling memories per cycle	Check this box when [Others: L-CPU-B] is selected as a device to connect.

*1   This is valid only when [Time Order Alarming] is selected as the sampling method.

*2   This is valid only when [Alarm Tracking] is selected as the sampling method.

Timing of Data Storage

Primary Storage Destination: DRAM/SRAM

Sampled data is stored constantly during sampling.

Secondary Storage Destination: Storage Device/Memory Card

Data in the primary storage destination will be output to the secondary storage destination at the times shown below:

- When the mode is switched from RUN to STOP
- When the [Function: Storage Removal] switch is pressed
- When the primary storage destination becomes full
- When the macro command "SMPL_SAVE", "SMPL_CSV", "SMPL_CSV2", "SMPLCSV_BAK", "SMPLCSV_BAK2" or "SMPL_BAK" is executed
- When the power to MONITOUCH is turned ON with [Primary storage target: SRAM]
- When the [Function: Reset] switch is pressed in sampling mode
- When the "R: Reset" bit of the sampling control device memory is ON

* When [Secondary storage target: Storage] is selected, a BIN file is created on the storage device and data is stored in this file.

CSV Output

Data in the primary storage destination is output to the secondary storage destination as a BIN file, and data in the BIN file in the secondary storage destination is saved in CSV format to the storage device.

Timing of Saving

- When the mode is switched from RUN to STOP *
- When the [Function: Storage Removal] switch is pressed *
- When the macro command "SMPL_CSV", "SMPL_CSV2", "SMPLCSV_BAK" or "SMPLCSV_BAK2" is executed

* With [CSV Output] checked

Storage destination

\ (Access folder) \SAMPLE

- Filename: SMPxxxx.CSV
  xxxx = 0000 to 0011: Buffering area number

* It is also possible to use the macro command "SMPL_CSV" instead of selecting [CSV Output].
  For details on macro commands, refer to the Macro Reference Manual.

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Create Backup File

Data in the primary storage destination is output to the secondary storage destination as a BIN file, and data in the file is copied to the storage device as backup.

Timing of Saving

- When the power is turned on [*]
- When the date changes (00:00:00 AM) *
- When the secondary storage destination becomes full [*]
- When the macro command "SMPL_BAK" is executed

* With [Create Backup File] checked

Storage Destination

\(access folder)\SAMPLE\YYYYMM\YYYYMMDD

YYYY:	Year
MM:	Month
DD:	Day

- Filename: SMPxx_yy.BIN
  xx = 00 to 11: Buffering area number
  yy = 00 to 99: Index number

- Example: When saving data on July 11, 2016:
  Data is saved in the \SAMPLE\201607\20160711 folder.
  When files have been created up to "SMP00_99.BIN", the "SMP00_99.BIN" file will be overwritten for all subsequently sampled data.

* It is also possible to use the macro command "SMPL_BAK" instead of selecting [Create Backup File].
  For details on macro commands, refer to the Macro Reference Manual.

CSV Output & Creating Backup Files

When [CSV Output] is selected, "SMPxxxx.CSV" is created from "SMPxxxx.BIN" in the "SAMPLE" folder. Consequently, when [Create Backup File] is also selected, "SMPxxxx.BIN" and "SMPxxxx.CSV" are both saved in the backup folder.
(The same operation as when macro commands "SMPL_BAK" and "SMPLCSV_BAK" are executed at the same time.)

Timing of Saving

- At power-on
- When the date changes (00:00:00 AM)
- When the secondary storage destination becomes full
- When the macro commands "SMPL_BAK" and "SMPLCSV_BAK" or "SMPL_BAK" and "SMPLCSV_BAK2" are executed

Storage Destination

\(access folder)\SAMPLE\YYYYMM\YYYYMMDD

YYYY: Year
MM: Month
DD: Day

- Filename: SMPxx_yy.BIN
  xx = 00 to 11: Buffering area number
  yy = 00 to 99: Index number

```
SD card
  └─ (Access folder)
        ├─ SAMPLE  folder ──── SMP0000.BIN
        ├─ BITMAP  folder      SMP0000.CSV
        └─ CARD    folder
                          201607  folder
                                20160711  folder ── SMP00_00.BIN
                                                    SMP00_00.CSV
                                                    SMP00_01.BIN
                                                    SMP00_01.CSV

                                20160712  folder ── SMP00_00.BIN
                                                    SMP00_00.CSV
                                                    SMP00_01.BIN
                                                    SMP00_01.CSV
                                                    SMP00_02.BIN
                                                    SMP00_02.CSV
```

- It is also possible to use the macro commands "SMPL_BAK" and "SMPLCSV_BAK" instead of selecting [CSV Output] and [Create Backup File]. For details, refer to the Macro Reference Manual. The use of macros is recommended for making backup files when the date changes.
- It is possible to automatically delete old backup files when the backup file size exceeds the capacity of an SD card. (In this case, select [System Setting] → [Unit Setting] → [General Settings] and select the [Delete folders from the oldest if Storage is lacking in space for backup] checkbox.)

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8.2.2 Alarm Tracking

Place an alarm tracking part to check alarm history saved to the buffering area on MONITOUCH.
An alarm tracking part can be placed by clicking [Parts] → [Alarm].
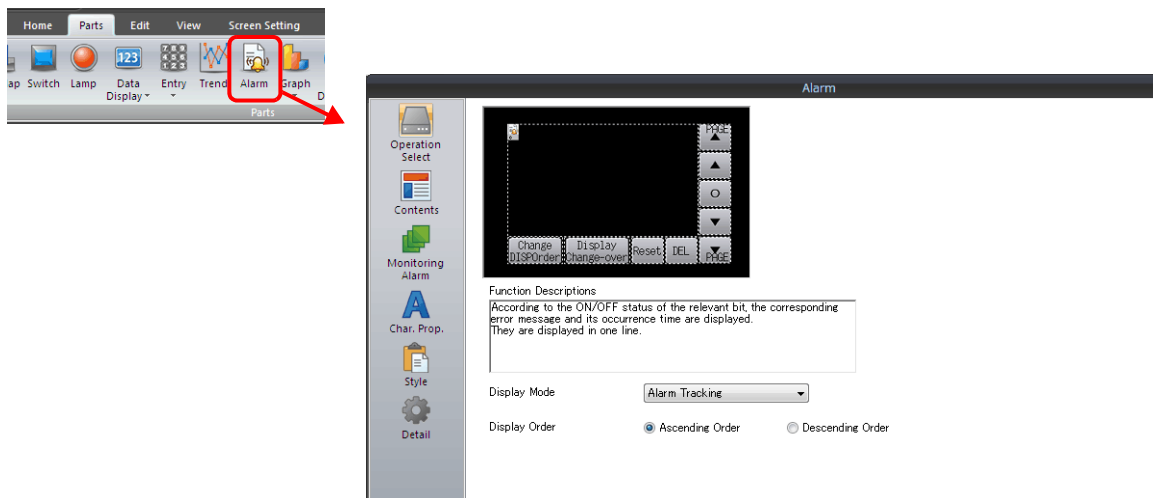
Detailed Settings

Operation Select
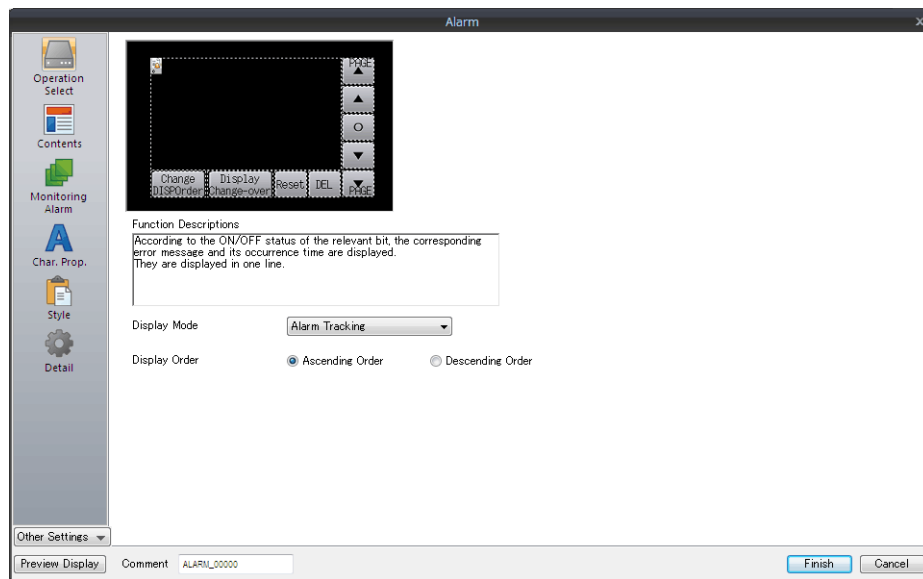
Item	Description
Display Mode	Select [Alarm Tracking].
Display Order	Set the display order of alarm messages. Ascending Order: Display in the order of old errors → new errors. Descending Order: Display in the order of new errors → old errors.

Contents

Item	Description
Time to Display	Set the display format for the time that is displayed with messages. Time information attached to an error message varies depending on the format selected. For [Time Lag Display], [Total Time of Occurrence Display] and [Time of Occurrence Display], the time is displayed in units of hours. • Time of Occurrence • Occurrence/Cancellation Time • Time Lag Display • Total Frequency of Occurrence Display • Total Time of Occurrence Display • Time of Occurrence Display * In addition to the above, [Occurrence/Confirmation Time] and [Occurrence/Cancellation/Confirmation Time] are available when [Add Time Order Alarming] and [Use Alarm Acknowledge function] are checked in the [Others] tab window in the [Buffering Area Setting] window.
Add acknowledgement status (acknowledge function)	Check this box when using the acknowledge function. (Refer to "8.2.5 Alarm Acknowledge Function" page 8-32.)
Date Display	Select the format for dates.
Zero Suppress for Month-Day	Select this checkbox to display the month and date with zero suppression.
Time Display	Select the format for time.

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Monitoring Alarm

Item	Description
Buffering Area No.	Set registered buffering area number. The registration details are shown below.
Edit	Edit the buffering area. For details, refer to "8.2.1 Buffering Area" page 8-3.

Character Properties

Item	Description
Apply the same settings as those set for message (Windows font used)	Select this checkbox to use a Windows font for alarm messages.
Color	Set the text color and area background color.
Style	Set the text style.

Auxiliary Screen
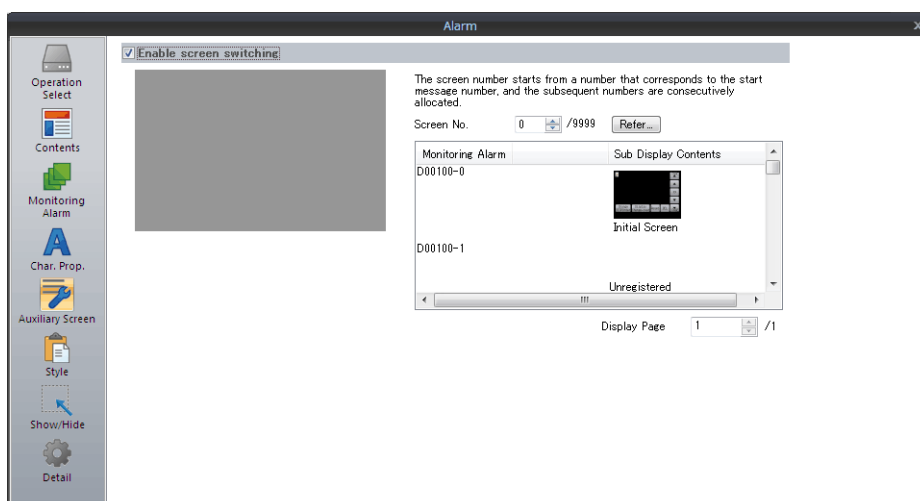
Item		Description
Enable screen switching		The screen can be changed by tapping a displayed alarm message.
	Screen No.	Set a screen number from 0 to 9999.
	Refer	Check the registered screens.

About the auxiliary screen function

Tap the message on the alarm part to changeover the screen. This displays more detailed alarm information.

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Style

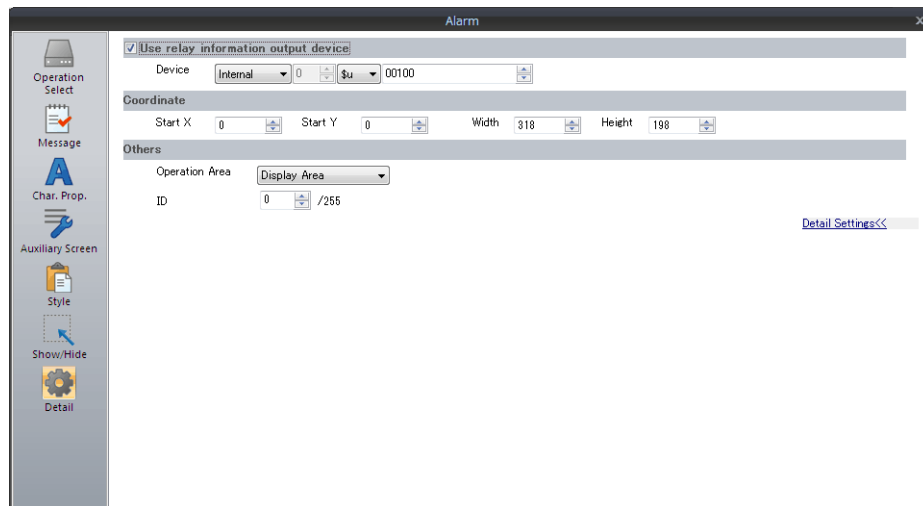| Item	Description
Additional Parts List	Displays a list of alarm-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
Roll Up	Scroll the display up by one page.
Roll Down	Scroll the display down by one page.
+ Block	Move the cursor to the next item.
– Block	Move the cursor to the previous item.
Reset	Clear the history data in the buffering area. Press this switch once to activate it and press it again within 2 seconds to clear the data. If the switch is not pressed again within two seconds, the switch's lamp turns off and resetting is nullified.
Delete	Deletes the selected message. * The message is only cleared from display on MONITOUCH and it remains in the history data.
Graph Return	This switch blinks when a message is selected using [+ Block] or [– Block] buttons. Press the switch when it is blinking to deselect the message and return to the latest alarm display.
Display Change-over	Change the date and time display format between date only and time only.
Change Display Order	Change the message display order between [Ascending Order] and [Descending Order].
Acknowledge	Acknowledge the selected unacknowledged messages.
Acknowledge All	Acknowledge all unacknowledged messages.
Sampling Count Display	Display the number of event history entries or the count value of the selected message.
Sampling Time Display	Display the latest time of the event history or the time of the selected message. | Less than 8 digits	Hide
8 to 11 digits	Hour, minutes, and seconds
12 to 17 digits	Hour, minutes, seconds, and milliseconds
18 to 22 digits	Month, day, hour, minutes, seconds, and milliseconds
23 digits or more	Year, month, day, hour, minutes, seconds, and milliseconds	
Adjust Position	Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs	Set the part design from the catalog.
Parts Design	Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts	Configure the part selected in the [Additional Parts List] or preview pane.

Show/Hide

Set the show and hide settings of alarm parts.

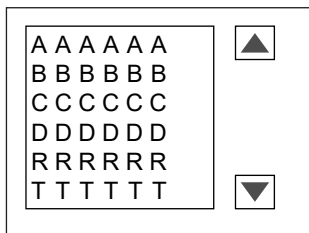☞   For details, refer to "14 Item Show/Hide Function".

Detail

Item		Description
Primary Cause Judgment	Add a (*) mark to the primary cause	Select this checkbox to mark alarm messages which are primary causes with asterisks.
	Output the primary cause only	Select this checkbox to display only alarm messages which are primary causes.
Coordinates	Start X/Start Y	Set the placement position and size of the display area.
	Width/Height	
Others	ID	Set the ID of the alarm part.

8.2.3 Alarm Logging

- Depending on the ON/OFF state of the relevant bit, the corresponding error message and time information are stored in the buffering area and are displayed as historical data on the screen.
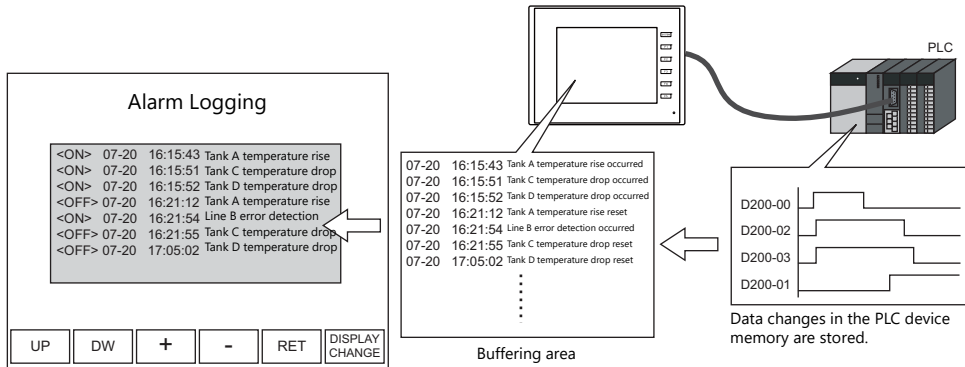
- The occurrence and resetting are displayed on one line each. Occurrences and resets can be displayed in different colors.

- It is also possible to display only occurrence messages or reset messages from those stored as historical data.

Location of Settings

Place an alarm part to check alarm history saved to the buffering area on MONITOUCH.
An alarm part can be placed by clicking [Parts] → [Alarm].

Detailed Settings

Operation Select
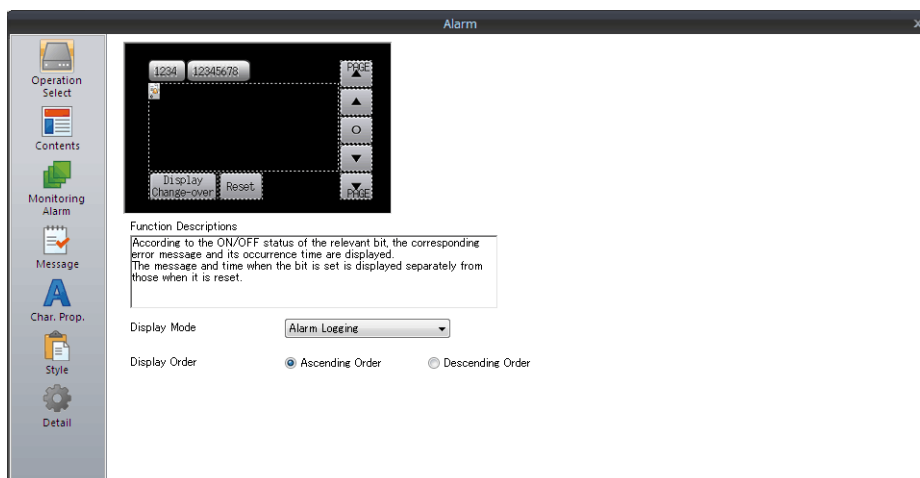
Item	Description
Display Mode	Select [Alarm Logging].
Display Order	Set the display order of alarm messages. 　　Ascending Order: Display in the order of old errors → new errors. 　　Descending Order: Display in the order of new errors → old errors.

Contents

Item		Description
Display Item	Display the time	Select this checkbox to display the sampling time. Time is indicated in the format of "month-day, hour : minute : second." The number of characters is fixed to 15 (one-byte). Unselected: Occurrence　Tank A temperature rise Reset　　　　Tank A temperature rise Occurrence　Tank C temperature drop Reset　　　　Tank C temperature drop Selected:　　　　　　　　　　　　　　　　Fixed to 15 one-byte characters Occurrence　07-20　11:32:10　A tank temperature rise Reset　　　　07-20　11:33:15　A tank temperature rise Occurrence　07-20　11:40:25　C tank temperature drop Reset　　　　07-20　11:50:13　C tank temperature drop 　　　　　　　　　　　　hour : minute : second 　　　　　　　　month-day *　Year display is not available even with [Display the time] checked.

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Item		Description
Display Item	Activate Status Display	Select this checkbox to display the bit ON/OFF status on the display area. Unselected: 07-20 11:32:10 A tank temperature rise 07-20 11:33:15 A tank temperature rise 07-20 11:40:25 C tank temperature drop 07-20 11:50:13 C tank temperature drop Selected: Status Display <ON> 07-20 11:32:10 A tank temperature rise <OFF> 07-20 11:33:15 A tank temperature rise <ON> 07-20 11:40:25 C tank temperature drop <OFF> 07-20 11:50:13 C tank temperature drop
Status Display	In Part Area	This is available when [Activate Status Display] is selected. [Display ON/OFF/CHK] selected: 　　When the bit is ON, "<ON>" is displayed and when OFF, "<OFF>" is displayed. Status Display <ON> 07-20 11:32:10 A tank temperature rise <OFF> 07-20 11:33:15 A tank temperature rise <ON> 07-20 11:40:25 C tank temperature drop <OFF> 07-20 11:50:13 C tank temperature drop [Specify Message No.] selected: 　　Text to be displayed for bit ON operation and bit OFF operation can be specified as desired. 　　Register the text to be used instead of "<ON>" and "<OFF>" on the [Message Edit] window. The registered text is displayed according to bit ON/OFF operation. Register the text on the [Message Edit] window. Occurrence 07-20 11:32:10 A tank temperature rise Reset 07-20 11:33:15 A tank temperature rise Occurrence 07-20 11:40:25 C tank temperature drop Reset 07-20 11:50:13 C tank temperature drop The [GNo.] and [No.] settings for [Start Message] become available. Specify the group and line numbers of the start message as registered on the [Message Edit] window. The start message line is used for bit ON operation, and the next message line is used for bit OFF operation. Example:　　　　　　　　　　Message No. 3 [Start Message] GNo. : 3　　　No. 0 No. 2　　　　 No. 1 　　　　　　 No. 2 Occurrence ↓ Start message 　　　　　　 No. 3 Reset = ON 　　　　　　 No. 4 = OFF 　　　　　　 No. 5 *　Click [Edit] to display the [Message Edit] window for the specified group number. 　Messages can be directly edited on the window.

Item		Description

Status Display	Display on char. display part	Select this checkbox to display the alarm status on a character display part placed outside of the display area of the alarm part.
		The following settings are available when selected.
		
		[Display ON/OFF/CHK] selected:
		   When the bit is ON, "<ON>" is displayed and when OFF, "<OFF>" is displayed.
		
		    <ON/OFF> ———— Status Display
		
		    <ON> 07-20 11:32:10 A tank temperature rise
		    <OFF> 07-20 11:33:15 A tank temperature rise
		    <ON> 07-20 11:40:25 C tank temperature drop
		    <OFF> 07-20 11:50:13 C tank temperature drop
		
		[Specify Message No.] selected:
		   Text to be displayed for bit ON operation and bit OFF operation can be specified as desired.
		   Register the text to be used instead of "<ON>" and "<OFF>" on the [Message Edit] window. The registered text is displayed according to bit ON/OFF operation.
		
		    Occur/Reset ———— Status display: Register the text on the [Message Edit] window.
		
		    Occurrence 07-20 11:32:10 A tank temperature rise
		    Reset 07-20 11:33:15 A tank temperature rise
		    Occurrence 07-20 11:40:25 C tank temperature drop
		    Reset 07-20 11:50:13 C tank temperature drop
		
		   The [GNo.] and [No.] settings for [Start Message] become available. Specify the group and line numbers of the start message as registered on the [Message Edit] window. The start message line is used for bit ON operation, and the next message line is used for bit OFF operation.
		
		   Example: Message No. 3
		   [Start Message]
		   GNo. : 3 No. 0
		   No. 6 No. 1
		                 No. 2 Occurrence
		                 No. 3 Reset
		                 No. 4
		                 No. 5 ↓ Start message
		                 No. 6 Occur/Reset = ON/OFF
		                 No. 7 Occurrence = ON
		                 No. 8 Reset = OFF
		
		  * Click [Edit] to display the [Message Edit] window for the specified group number.
		     Messages can be directly edited on the window.

	Initial status of the ON/OFF display switching function	Select the status display to be shown initially.
		  [ON-OFF]: Displays historical data of both bit ON/OFF operations.
		  [ON]: Displays historical data of bit ON operations only.
		  [OFF]: Indicates historical data of bit OFF operations only.

Monitoring Alarm

Item	Description
Buffering Area No.	Set registered buffering area number. The registration details are shown below.
Edit	Edit the buffering area. For details, refer to "8.2.1 Buffering Area" page 8-3.

Message
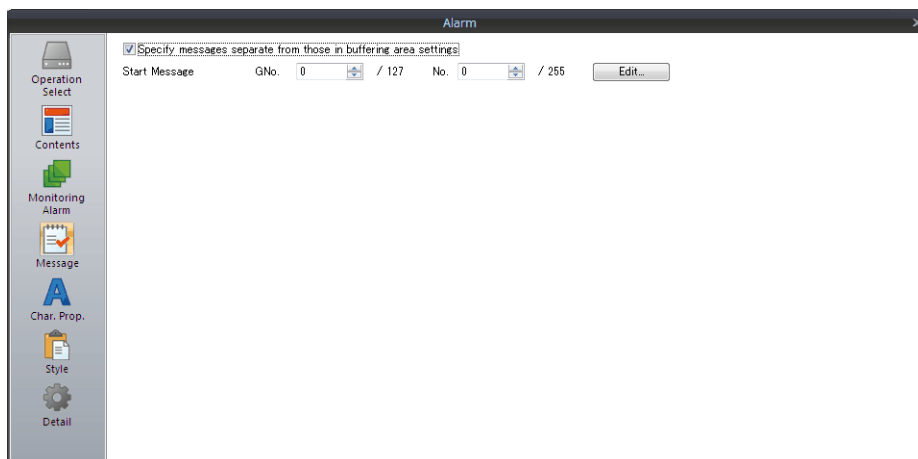
Item	Description
Specify messages separate from those in buffering area settings	Select this checkbox to individually specify messages from the item. When selected, the start message can be specified.

Character Properties
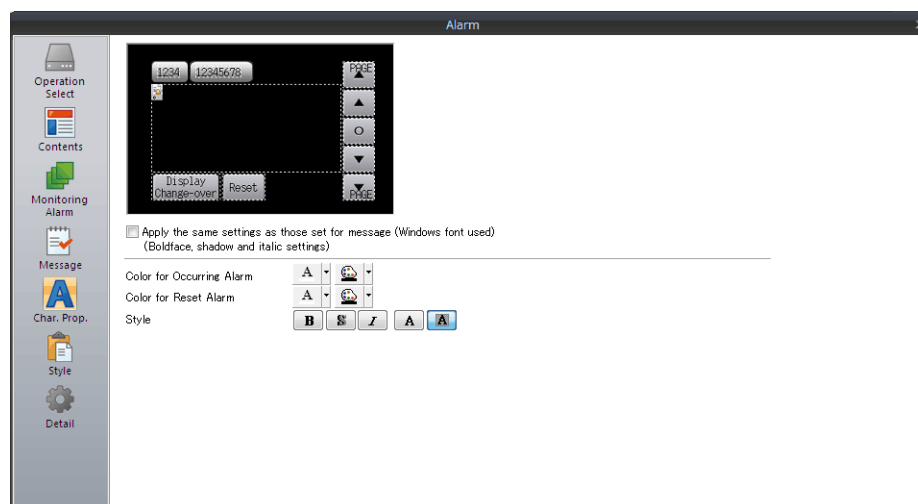
Item	Description
Apply the same settings as those set for message (Windows font used)	Select this checkbox to use a Windows font for alarm messages.
Color for Occurring Alarm	Set the text color and area background color for an occurring alarm.
Color for Reset Alarm	Set the text color and area background color for a reset alarm.
Style	Set the text style.

Style

Item		Description
Additional Parts List		Displays a list of alarm-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
	Roll Up	Scroll the display up by one page.
	Roll Down	Scroll the display down by one page.
	+ Block	Move the cursor to the next item.
	– Block	Move the cursor to the previous item.
	Reset	Clear the history data in the buffering area. Press this switch once to activate it and press it again within 2 seconds to clear the data. If the switch is not pressed again within two seconds, the switch's lamp turns off and resetting is nullified.
	Graph Return	This switch blinks when a message is selected using [+ Block] or [– Block] buttons. Press the switch when it is blinking to deselect the message and return to the latest alarm display.
	Display Change-over	Changes over messages in order of ON/OFF → ON → OFF.
	Change Display Order	Change the message display order between [Ascending Order] and [Descending Order].
	Print	For details, refer to "Sample Print" page 8-27.
	Sampling Count Display	Display the number of event history entries or the count value of the selected message.
	Sampling Time Display	Display the latest time of the event history or the time of the selected message.
		<table><tr><td>Less than 8 digits</td><td>Hide</td></tr><tr><td>8 to 11 digits</td><td>Hour, minutes, and seconds</td></tr><tr><td>12 to 17 digits</td><td>Hour, minutes, seconds, and milliseconds</td></tr><tr><td>18 to 22 digits</td><td>Month, day, hour, minutes, seconds, and milliseconds</td></tr><tr><td>23 digits or more</td><td>Year, month, day, hour, minutes, seconds, and milliseconds</td></tr></table>
	Status Display	Display the event history status. Occurrence/cancellation/acknowledgement/normal
Adjust Position		Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs		Set the part design from the catalog.
Parts Design		Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane.

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Show/Hide

Set the show and hide settings of alarm parts.

☞ For details, refer to "14 Item Show/Hide Function".

Detail

Item		Description
Print	Print command device	Configure when using the sample print function. For details, refer to "Sample Print" page 8-27.
	Use the real-time printing function	
Coordinates	Start X/Start Y	Set the placement position and size of the display area.
	Width/Height	
Others	ID	Set the ID of the alarm part.

Sample Print

Alarm logging data can be printed. All the data in the buffer is printed.

07-20	16:15:43	Tank A temperature rise occurred
07-20	16:15:51	Tank C temperature drop occurred
07-20	16:15:52	Tank D temperature drop occurred
07-20	16:21:12	Tank A temperature rise reset
07-20	16:21:54	Line B error detection occurred
07-20	16:21:55	Tank C temperature drop reset
07-20	17:05:02	Tank D temperature drop reset

Buffering area

Printed result

<ON>	07-20	16:15:43	Tank A temperature rise
<ON>	07-20	16:15:51	Tank C temperature drop
<ON>	07-20	16:15:52	Tank D temperature drop
<OFF>	07-20	16:21:12	Tank A temperature rise
<ON>	07-20	16:21:54	Line B error detection
<OFF>	07-20	16:21:55	Tank C temperature drop
<OFF>	07-20	17:05:02	Tank D temperature drop

* For details, such as printer compatibility and print setting procedures, refer to "16.1.1 Compatible Printers".

Printing Methods

There are two methods for printing data.

- By switch
  When a [Function: Print] switch is pressed, a sample print is carried out.
- By print command device
  This method is available when [Print command device] is selected in the [Detail] settings of the alarm part.

MSB

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LSB

Print command device "n"

Print command (0 → 1)
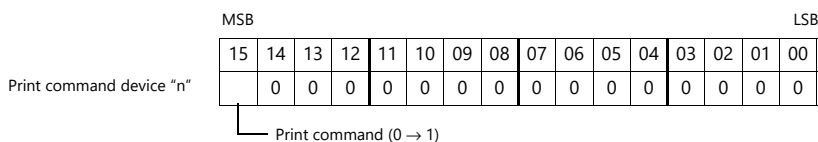
* Be sure to reset all the bits to "0" except bit 15.

Printable Items

Alarm logs can be printed in the same image as currently shown on the screen.

Only <ON> shown

<ON>

| <ON> | 07-20 | 11:32:10 | A tank temperature rise |
| <ON> | 07-20 | 11:40:25 | C tank temperature drop |

Printed result

| <ON> | 07-20 | 11:32:10 | A tank temperature rise |
| <ON> | 07-20 | 11:40:25 | C tank temperature drop |

<ON/OFF> shown

<ON/OFF>

<ON>	07-20	11:32:10	A tank temperature rise
<OFF>	07-20	11:33:15	A tank temperature rise
<ON>	07-20	11:40:25	C tank temperature drop
<OFF>	07-20	11:50:13	C tank temperature drop

Printed result

<ON>	07-20	11:32:10	A tank temperature rise
<OFF>	07-20	11:33:15	A tank temperature rise
<ON>	07-20	11:40:25	C tank temperature drop
<OFF>	07-20	11:50:13	C tank temperature drop

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Location of Settings

[System Setting] → [Unit Setting] → [General Setting] → [Print Alarm Logging Data in the Displayed Format]
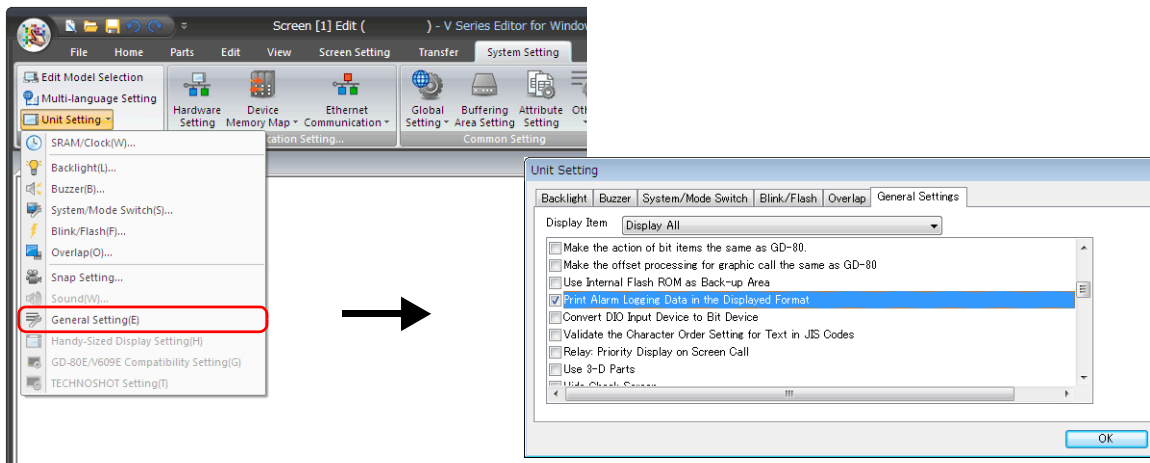
Selected: Print in the same format as shown on the screen
Unselected: Print all ON/OFF operations

Real-Time Printing

Each time a bit status changes, the changed content only can be printed. Messages are continuously printed out.
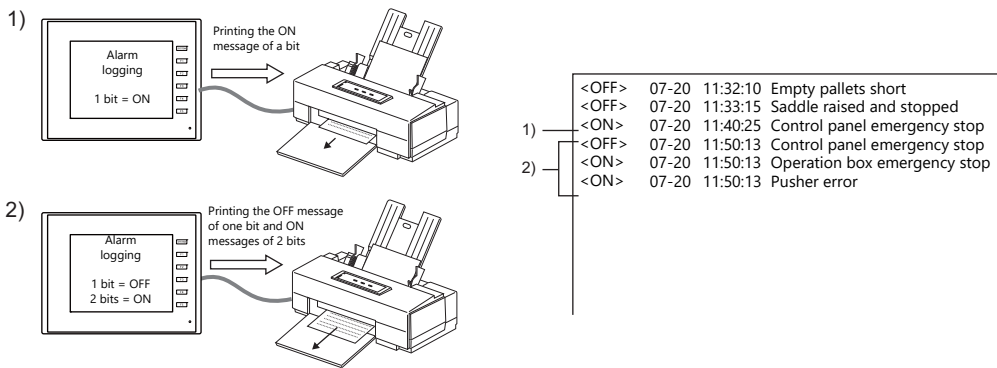
Location of Settings

The following settings are required on the alarm part.

Item		Description
Contents	Display the time	If checked, alarm logs are printed with time data. Time data is not printed if this option is not checked.
	Initial status of the ON/OFF display switching function	Specify the bit for triggering a real time print. When [ON-OFF] is selected, an alarm log is printed each time a bit changes from ON to OFF or from OFF to ON. When [ON] is selected, an alarm log is printed at the ON edge of each bit. When [OFF] is selected, an alarm log is printed at the OFF edge of each bit. Contents of a real time print are not the same as the display format on the screen.
Detail	Use the real-time printing function	Select the checkbox.

Limitations

- Up to four alarm logging parts with [Use the real-time printing function] selected can be used.
- Be sure to set different buffering area numbers.
- When more than four alarm logging parts are placed with [Use the real-time printing function] selected, or the same buffering area number is selected on the alarm part settings window, the error message "Data has some error. Error: 72" will appear on the TS unit.
- Real time printing is possible when alarm logging data is being displayed with [Alarm Tracking] selected as the sampling method. (Any configured settings will be ignored.)

8.2.4 Parameter Display Function

When an alarm occurs, the data (parameters) associated with the alarm can be saved/displayed together with an alarm message. Logging the history of such alarm-relevant parameters will make it easier to locate and investigate the causes of alarms.
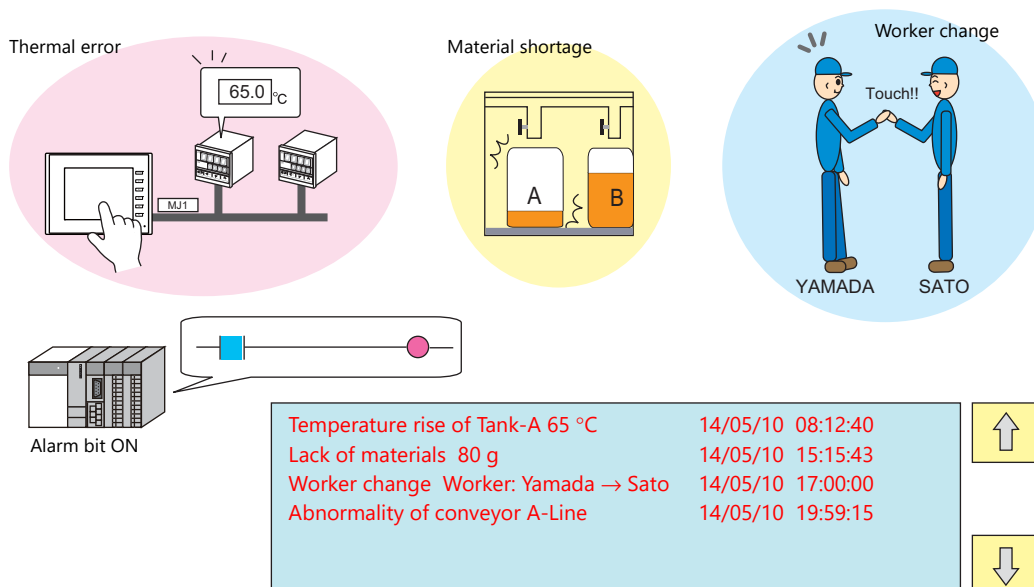
Location of Settings

Select [Display a parameter with the message] on the [Basic Settings] tab window for an alarm part at [System Setting] → [Buffering Area Setting].
Double-click on the relevant cell in the newly displayed [Parameter] column.
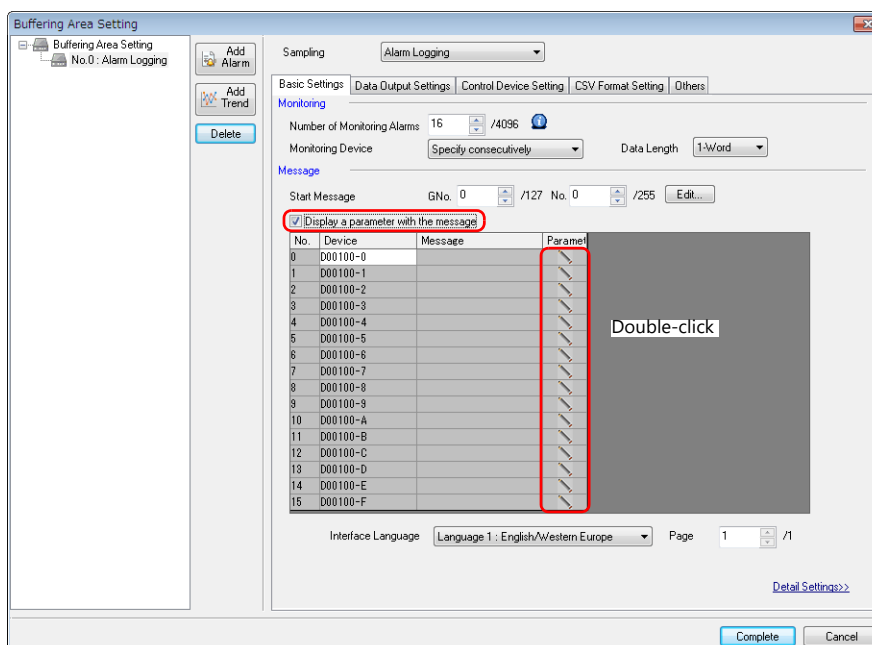
The [Parameter Table] window is displayed.

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Parameter Table

A parameter table can be registered for each alarm device memory address.

Item		Description
Parameter No. (0 to 7)		Create parameters with the [Add] button. Up to 8 parameters can be registered per alarm device memory address.
	Add	Add a new parameter.
	Delete	Delete the selected parameter.
	Up, Down	Change the order of parameters.
Device		Set the parameter device memory address.
Display Type		Set the display type of the parameter and other related items.
	Numerical Data	Save/display the data value of the device memory. The following settings are required.

Item	Settings
Data Length	1-Word / 2-Word
Input Format	DEC/BCD/FLOAT
Display Format	DEC (w/o sign) / DEC (with sign –) DEC (with sign +–) / HEX / OCT / BIN (Binary)
Digits	1 to 32
Decimal Point	0 to 31
Zero Suppress	Yes / None
Char. Place	Flush Right / Flush Left

	Text	Save/display text set at the device memory address. The following settings are required.

Item	Settings
Data Length	1-Word / 2-Word
Characters	1 to 127
Text Process	LSB -> MSB / MSB -> LSB

	Message No.	Specify a message number (absolute address) for the device memory address and save/display the corresponding message. The following settings are required.

Item	Settings
Data Length	1-Word / 2-Word
Input Format	DEC / BCD

	Bit	Save/display messages according to the bit status when an alarm occurred. Bit ON: Save the message of [Message G No.] and [Message No.]. Bit OFF: Save the message of [Message G No.] and [Message No. + 1]. The following settings are required.

Item	Settings
Message G No.	0 to 127
Message No.	0 to 255

Editing Messages

Register parameter numbers into alarm messages.

$$\%P\underline{x}S$$

$\quad\quad\quad\quad$ 0 to 7

$\quad\quad\quad\quad$ Specify parameter numbers registered in the [Parameter Table] window.
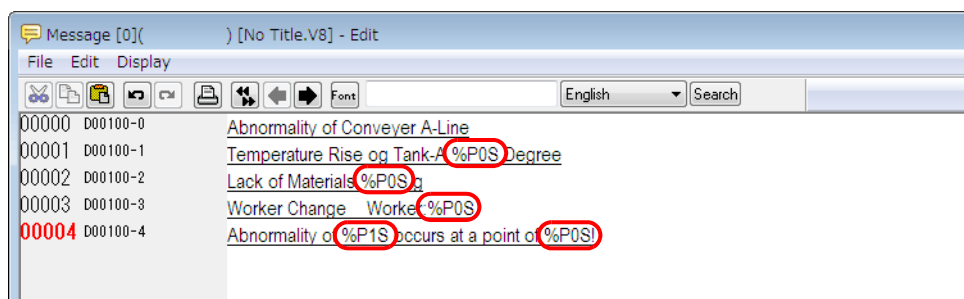
Limitations

- When the parameter settings have been made with Windows fonts, parameter symbols (%PxS) are displayed instead of the relevant parameter.
- The maximum total allowable number of words for all parameters (No. 0 to 7) in the [Parameter Table] window is 128 (automatically calculated*). Be sure not to exceed 128 words.
- In the event of a failure to read parameter device memory, "****" is displayed in place of the parameter in the message.
- If [Message No.] is selected for [Display Type] in the [Parameter Table] window and if the corresponding message includes parameter symbols (%PxS), the parameter symbols are displayed instead of the relevant parameter.
- If [Total Frequency of Occurrence Display] or [Total Time of Occurrence Display] is selected for alarm history display, the parameter symbols in alarm messages are displayed as "****".
- If changes are made on the [Parameter Table] window, such as the number of parameters, the order of parameters, or the assigned device memory addresses, and if the screen program is re-transferred to MONITOUCH, any previously sampled data may not be displayed correctly. Whenever any changes as mentioned above have been made, formatting is required before starting sampling.
- Real-time printing of alarm logging data will show parameters as "****".
- In the case of alarm logging, the parameters will be displayed to indicate alarm bit set (ON) and reset (OFF) conditions.
- When [Occurrence/Cancellation Time] is selected for an alarm tracking part, the parameters will not be displayed when the alarm bit status is OFF.

8.2.5   Alarm Acknowledge Function

- In addition to alarm messages and time of occurrence/reset, an alarm tracking part can also display the time that an alarm was acknowledged by placing an "acknowledge" switch. Acknowledged and unacknowledged messages can also be differentiated by color.
- The [Acknowledge All] switch enables you to acknowledge all alarm messages and show their acknowledged times.

Press the [Acknowledge All] switch.

All messages turn to the colors for acknowledgment, showing the alarm acknowledged times.
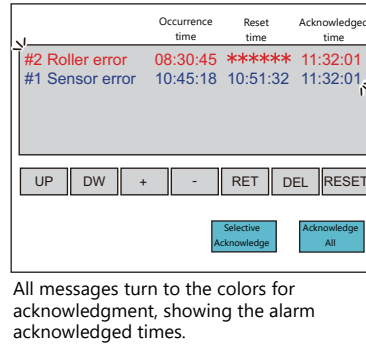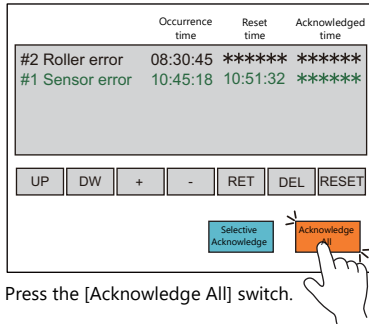
- The [Selective Acknowledge] switch enables you to acknowledge a selected alarm message and show its acknowledged time.

Select a message with the scroll switch and press the [Selective Acknowledge] switch.

The selected message turns to the color for acknowledgement, showing the acknowledged time.
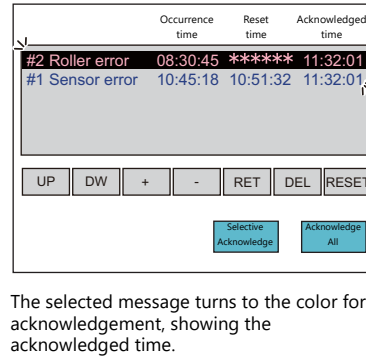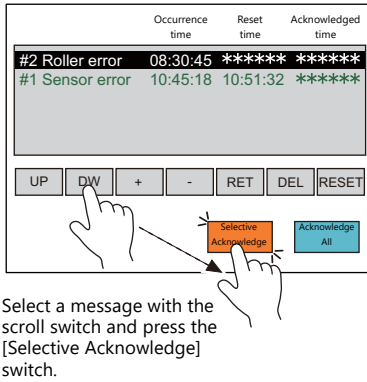
Location of Settings

Buffering Area Setting

Others
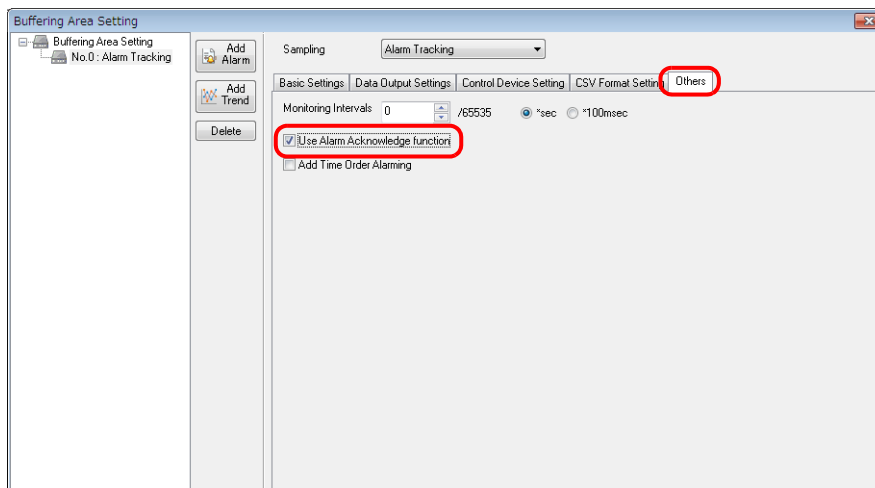
Use Alarm Acknowledge function	Select this box.

Alarm Part

Contents
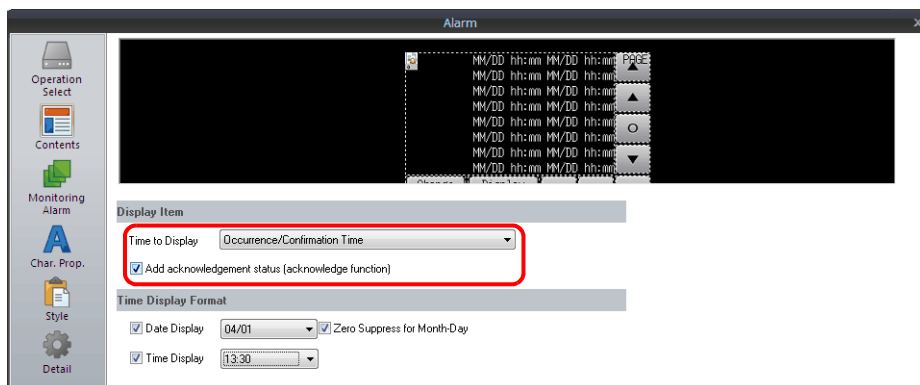
Add acknowledgement status (acknowledge function)	Select this box.
Time to Display *1	Select [Occurrence/Confirmation Time] for [Occurrence/Cancellation/Confirmation Time].

*1   [Time to Display] setting

[Occurrence/Confirmation Time]

[Occurrence/Cancellation/Confirmation Time]

Character Properties

Color settings	Four colors can be set to display alarm messages, depending on their status.
	* Not all statuses can be configured when [Apply the same settings as those set for message (Windows font used)] is selected. (The color specified on the [Message Edit] window is applied.)

Style
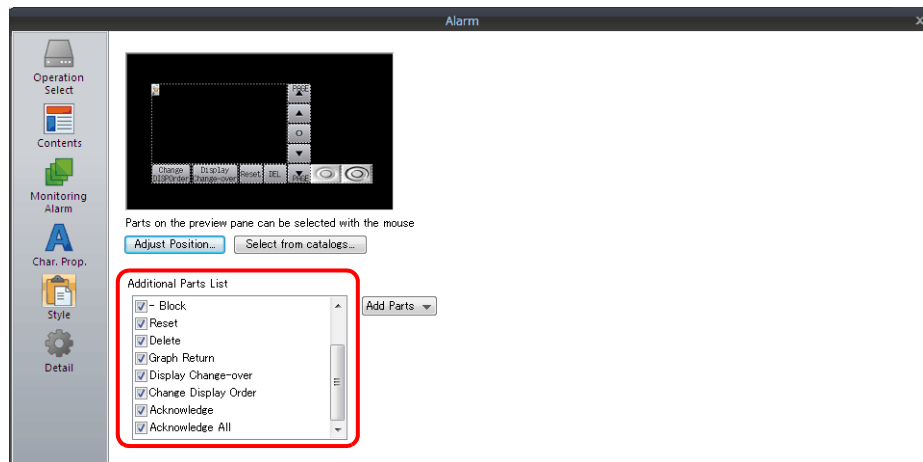
Acknowledge	This switch acknowledges a currently selected unacknowledged alarm message.
Acknowledge All	This switch acknowledges all unacknowledged alarm messages.

Operation Example

When the acknowledge function is used, there are four display statuses for messages and times.
In this example, the following colors are selected for each status.

A: An alarm is occurring but not acknowledged yet: black
B: An alarm is reset but not acknowledged yet: green
C: An alarm is occurring and has been acknowledged: red
D: An alarm is reset and has been acknowledged: blue

If an alarm occurs and the [Acknowledge All] switch is not pressed, the alarm message is displayed in black. When the alarm is reset afterwards, the message turns green.
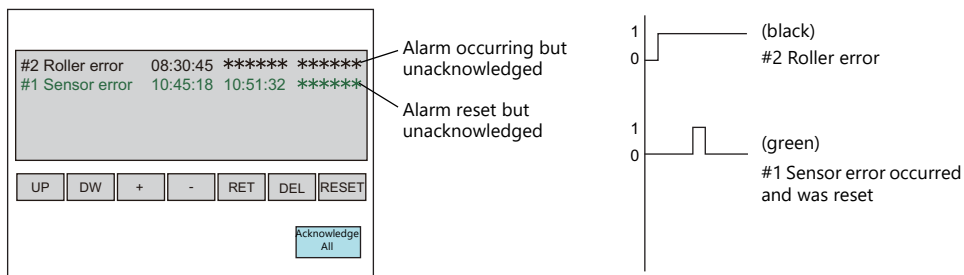
When the [Acknowledge All] switch is pressed, the color of an occurring alarm message changes from black to red.
Once the alarm is reset, the message color changes from green to blue.
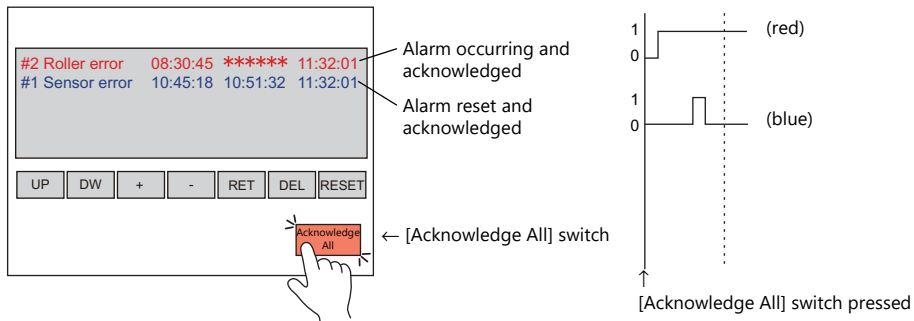
Limitations

- The maximum alarm acknowledgement time is 65,535 seconds (approximately 18 hours) from the time of occurrence. If the acknowledge switch is pressed after 65,535 seconds or more elapse, the displayed acknowledgement time is the time of occurrence plus 65,535 seconds.
- If [Occurrence/Cancellation/Confirmation Time] is selected for [Time to Display] and there is an occurring alarm for which the acknowledge switch is not pressed yet, the alarm reset and acknowledged times will be displayed as "-----" when the TS unit is rebooted or changed to the Main Menu screen. In this state, the acknowledged time is not displayed even if the acknowledge switch is pressed.

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8.3 Real Time Display

8.3.1 Bit Order Alarming

- This is a function for displaying or erasing messages on the screen by setting or resetting bits. When multiple bits are set, messages are displayed in order of precedence (refer to page 8-39).
- If multiple bits are set and messages overflow from the display area, [Roll Up] and [Roll Down] switches can be used to scroll up and down the messages.

Press the [Roll Up] switch.

Overflowed messages come into view.
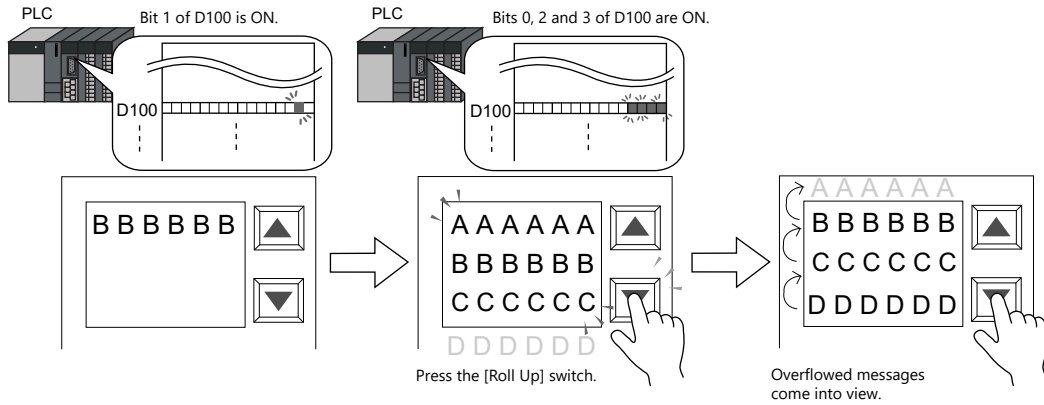
- When a bit is reset, the corresponding message disappears from the screen, and other messages are moved up.
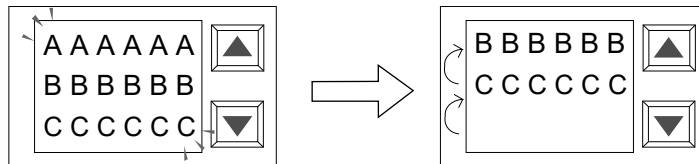
When the bit is OFF, the corresponding message ("AAAAAA" in the example) disappears, and subsequent lines move up.

- A detailed display (alarm sub-display) for a "bit order alarming" message can be displayed at the same time. The alarm sub-display can be either in text or graphics (pictures). For each bit of bit order alarming data, a maximum of four alarm sub-displays can be set. (Refer to "Sub-Display Function" page 8-44.)

Bit order alarming message

Tank A Error !
Tank B Error !
Tank C Error !

An error is detected in tank C.
Stop the machine and check around the tank.

Detailed information for the above message (pictorial)

Detailed information for the above message (textual)
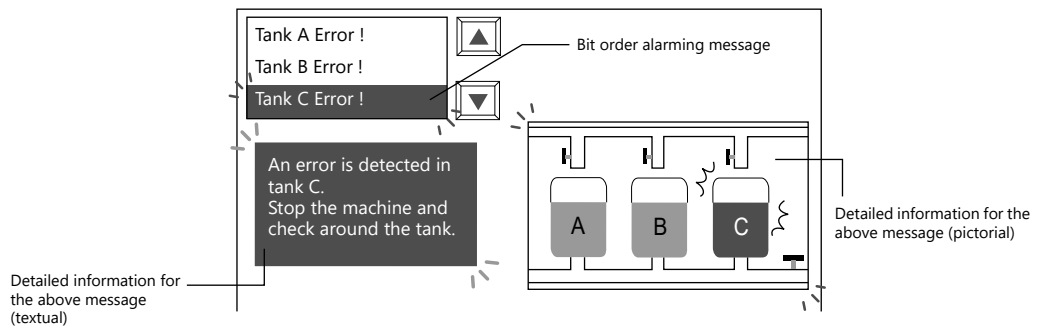
- Also, it is possible to use a screen for alarm sub-display.
  (Refer to "Sub-Display Function" page 8-44.)

Messages are displayed when corresponding bits in the PLC device memory are ON.

Bring up a screen set to the message (example: Line B data).

Line A data
Line B data
Line D data
Line G data

Line B data

No. 1 Servo
No. 2 Servo
No. 3 Servo
No. 1 Motor
No. 2 Motor
No. 3 Motor

Among the displayed messages, press the desired message.
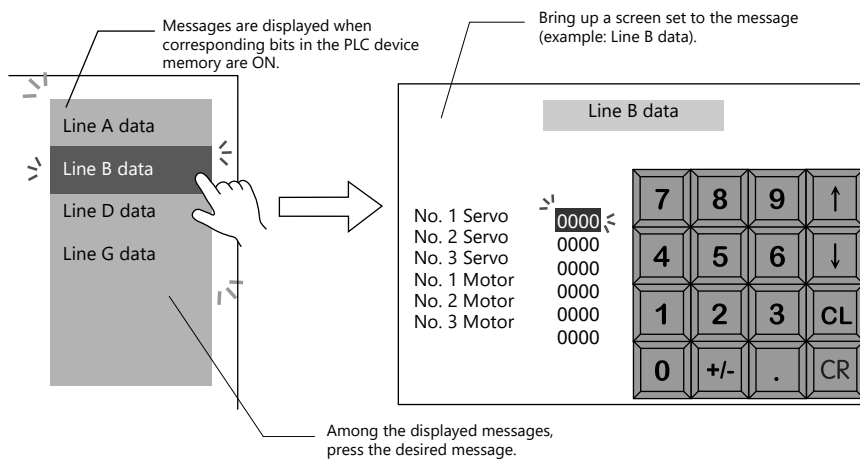
- To display currently occurring errors not in order of precedence, but in order of occurrence, use "time order alarming." For details, refer to "8.3.2 Time Order Alarming" page 8-47.

Location of Settings

To display real-time alarms on MONITOUCH, place an alarm part.
An alarm part can be placed by clicking [Parts] → [Alarm].
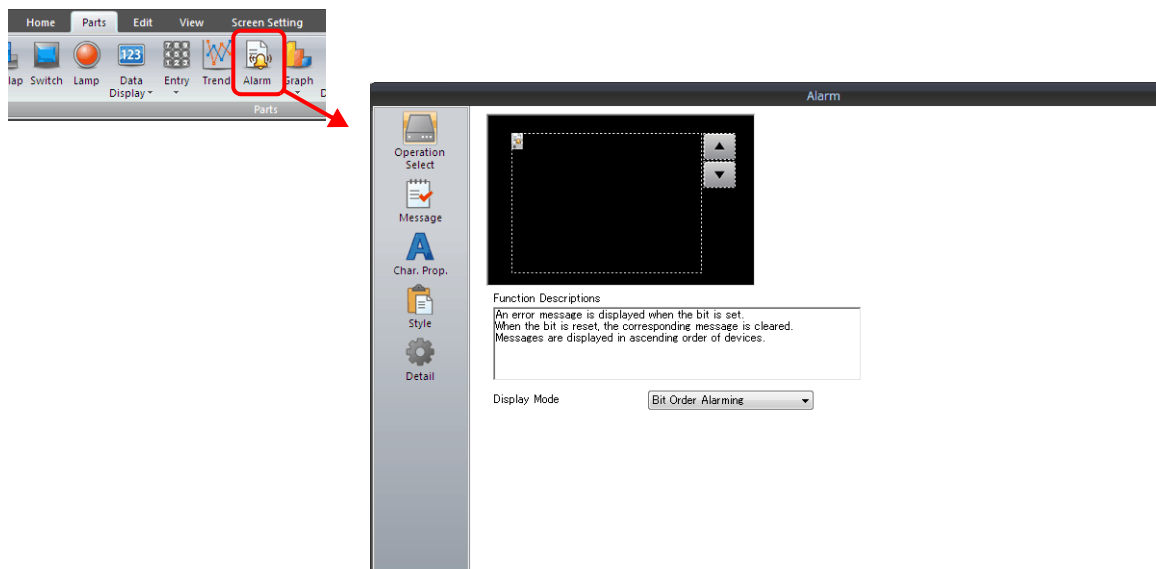
Detailed Settings

Operation Select

Item	Description
Display Mode	Select [Bit Order Alarming].

Message

Item	Description
Top Device [*1]	Specify the command device memory address used to display a registered message on the screen. Device memory addresses are automatically allocated to the messages by bit for the number specified by [Number of Monitoring Alarms] (see below) from the specified top address. Example: [Top Device]: M10, [Number of Monitoring Alarms]: 5 Tank A Error ! ——— M10 Tank B Error ! ——— M11 Tank C Error ! ——— M12 Tank D Error ! ——— M13 Five messages are assigned to device Tank E Error ! ——— M14 memory addresses from M10.
Number of Monitoring Alarms	Specify the number of alarms (total number of bits for assigning messages) to be monitored by bit order alarming.
Message Lines	This setting is available when [Display Area] is chosen for [Operation Area] in the [Detail] settings described later. Specify the number of lines to be displayed per alarm (= bit) on the display area.
Start Message	Specify the group number and message (line) number of the top message for displaying on the bit order alarming part from among the messages registered on the [Message Edit] window. * Click [Edit] to display the [Message Edit] window for the specified group number. Messages for bit order alarming can be directly edited on the window.

*1   Precedence in displaying messages *2
     Precedence is assigned to the messages displayed by bit order alarming. Based on the device memory bits assigned, the smaller the bit number, the higher the precedence given; the larger the bit number, the lower its precedence. When messages are displayed on the screen, those of higher precedence are displayed first.

Example:
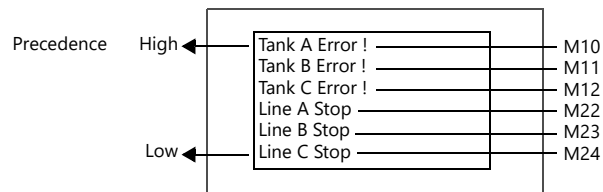
*2   Precedence display
     Instead of order of precedence, messages can also be displayed in order of occurrence by using the "time order alarming" function.
     For details, refer to "8.3.2 Time Order Alarming" page 8-47.

Character Properties

Item	Description
Apply the same settings as those set for message (Windows font used)	Select this checkbox to use a Windows font for alarm messages.
Color	Set the text color and area background color.
Style	Set the text style.
Text Size	Set the text point size.

Auxiliary Screen

Item		Description
Use sub-display function		Select this checkbox to set a supplemental display for one bit order alarming message.
	Display Type	Sub-Display: Select this option when you want to configure a supplemental display for a bit order alarming message. For details, refer to "Sub-Display Function" page 8-44. Screen Call: Select this option when you want to call up a screen (with detailed information, for example) for a bit order alarming message. Select [Registration Item] → [Screen Block] and edit the screen to be called. Specify the top screen block number corresponding to the alarm message. For details, refer to "Sub-Display Function" page 8-44. Ladder Monitor: This option is displayed when the ladder monitor is used. For more information, refer to the V8 Series Ladder Monitor Specifications.
	Contents	Choose a form of sub-display from the following options: Graphic: Use [Graphic Library] to display graphics. Message: • Use Page Block: Use [Page Block] to display messages. • Use Direct Block: Use [Direct Block] to display messages. Specify the top graphic or block number corresponding to the alarm message.

Style

Item		Description
Additional Parts List		Displays a list of alarm-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
	Roll Up	Scroll the display up by one page.
	Roll Down	Scroll the display down by one page.
	Mode (Switch)	Display real-time display messages on a switch.
	Mode (Lamp)	Display real-time display messages on a lamp.
Setting Target		This setting is available when the [Use sub-display function] checkbox is selected in the [Auxiliary Screen] settings. Main Display: Set the items for the bit order alarming part. Sub Display: Set the items for the supplemental display of a bit order alarming part.
Adjust Position		Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs		Set the part design from the catalog.
Parts Design		Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane.

Show/Hide

Set the show and hide settings of alarm parts.

☞   For details, refer to "14 Item Show/Hide Function".

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Detail

Item		Description
Use relay information output device		Choose whether or not to output data of the message displayed or selected for bit order alarming to the PLC. If outputting data, select the checkbox, and specify a top device memory address.
		Relay information output device (top address "n")
		Addresses are allocated as shown below.

Relay Information Output Device Memory	Description
n	Total number of ON alarms
n + 1	Selected alarm number
n + 2	ON alarm number

n: Total number of ON alarms
The number of bits currently set to ON is written.

n + 1: Selected alarm number
[Use sub-display function]: Selected]
The order of precedence of the alarm message among those being displayed (starting from #1 having precedence) is output.

In order of precedence:

1st:	AAAAAA	
2nd:	BBBBBB	
3rd:	GGGGGG	
4th:	OOOOOO	n + 1 = 4
5th:	XXXXXX	

[Use sub-display function]: Unselected
The order of precedence (starting from "1") of the top message among those displayed is output.

n + 2: ON alarm number
[Use sub-display function]: Selected
The ordinal number of the message selected with the cursor among those displayed by bit order alarming (regarding the start message number as "0") is written.

Start Message

	aaaaaa
	bbbbbb
	cccccc
0th:	AAAAAA
1st:	BBBBBB
2nd:	CCCCCC
3rd:	DDDDDD
4th:	EEEEEE
5th:	FFFFFF
6th:	GGGGGG
7th:	HHHHHH
8th:	IIIIII
9th:	JJJJJJ
10th:	KKKKKK
11th:	LLLLLL
12th:	MMMMMM
13th:	NNNNNN
14th:	OOOOOO
	PPPPPP

Target alarms

n + 2 = 13

1st:	BBBBBB	
6th:	GGGGGG	
9th:	JJJJJJ	
13th:	NNNNNN	
14th:	OOOOOO	

[Use sub-display function]: Unselected
The ordinal number (regarding the start message number as "0") of the top message among those displayed is output.

Coordinates	Start X/Start Y	Set the placement position and size of the display area.
	Width/Height	

Item		Description
Others	Operation Area [*1]	Choose from [Display Area], [Switch] or [Lamp] for specifying the place where the message should be displayed on the screen when the corresponding bit is set or reset.
		Display Area:
		Shows messages on display area parts placed on the screen.
		Switch:
		Shows messages on switch parts placed on the screen.
		Place a [Function: Mode] switch. Each switch has [Display Order] as an auxiliary setting where the message to display on each switch can be specified. When [Display Order] settings are all the same, messages are displayed in the same order that switches were placed.
		Lamp:
		Shows messages on lamp parts placed on the screen.
		Place a [Function: Mode] lamp. As with switch parts, each lamp has [Display Order] as an auxiliary setting.
	ID	Set the ID of the alarm part.

*1 Operation Area
The screen image differs as shown below.

[Operation Area: Display Area]

[Operation Area: Switch] or [Operation Area: Lamp]
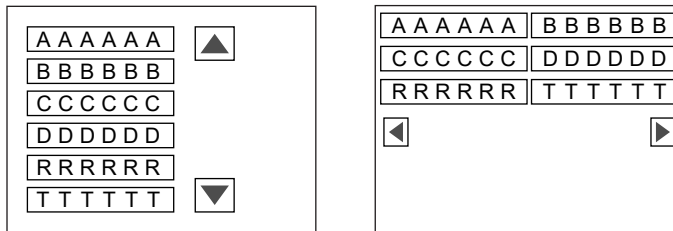
Sub-Display Function

This function is used to display detailed explanations for bit order alarming messages (which are displayed by setting bits).

Sub-Display

- Alarm sub-displays must be used together with bit order alarming.
  Text or graphics can be called up from a bit order alarming message. For example, this function can be used to display a diagram indicating where an alarm is occurring.
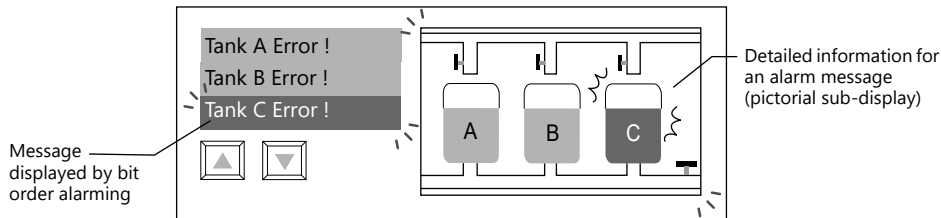
- A maximum of four sub-displays can be set for each bit of bit order alarming data.
  Therefore, supplemental explanations, additional messages or easy-to-see graphics can be displayed all at one time for a single message.
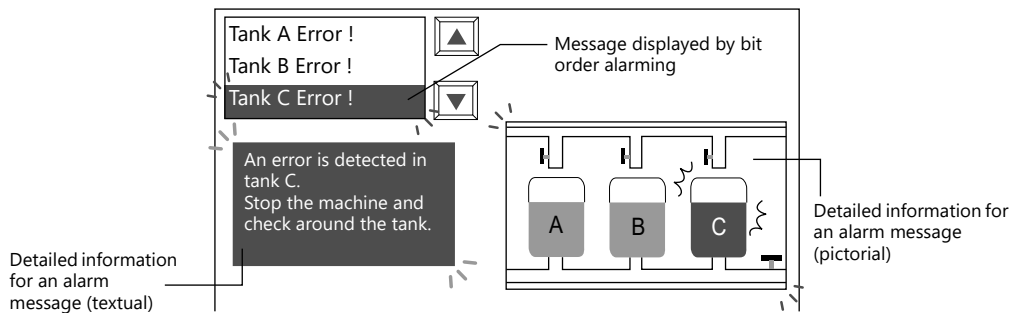
Location of Settings

Configure the [Auxiliary Screen] settings on the alarm part settings window. For details, refer to "Auxiliary Screen" page 8-40.

Notes

- The sub-display function is available when [Operation Area] is set to either [Display Area] or [Switch] in the [Detail] settings on the alarm part settings window.
- Switch function of display area parts
  When an alarm message is shown in a display area, it is necessary to choose a bit order alarming message with the cursor to call up an alarm sub-display. With the TS, the switch function is automatically furnished to the display area part. Therefore, pressing the place where the message is displayed will move the cursor to that location. (Selection is also possible using roll-up/roll-down switches.)
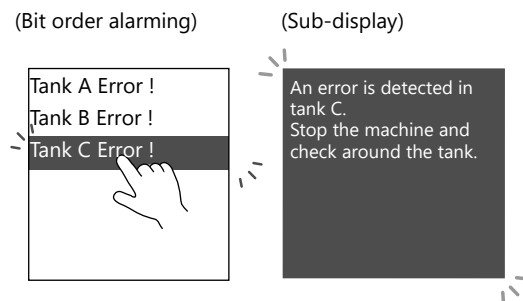
Screen Call

- Register content to be displayed for an alarm message to a separate screen in advance.
  When an alarm message is selected, the separately configured screen is displayed. This function is called the "screen call" function.
  You can create, register, and call up more detailed content on separate screens.
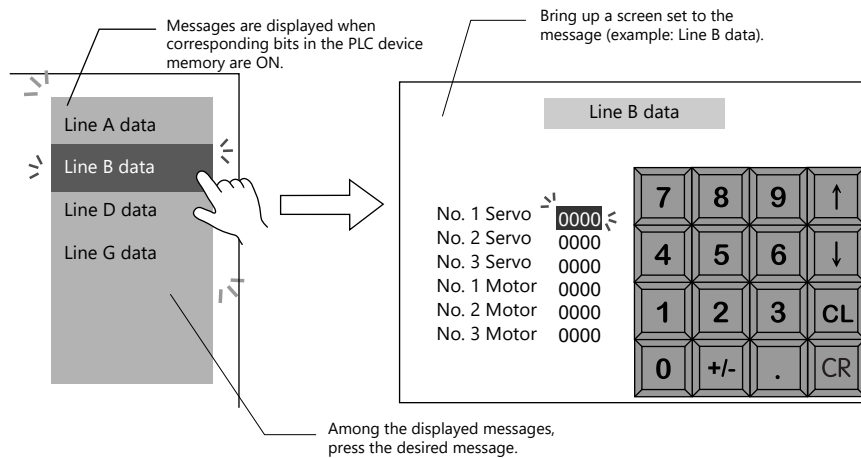
- Screens to be called up can be configured with parts and items in the same way as ordinary screens. Therefore, supplementary information can be displayed using various functions.

Location of Settings

Configure the [Auxiliary Screen] settings on the alarm part settings window. For details, refer to .

Screen Block

- Registrations of screen blocks is required to use the screen call function.
- Prepare supplementary screens for bit order alarming messages. Then re-order the prepared screens so they correspond with the registered order of the alarm messages. These are called "screen blocks." Screen blocks allow ordinal allocation of supplementary screens to alarm messages.
- Screens registered to a screen block can be equipped with the same functions as with ordinary screens.
  However, when placing a message part (using [Page Block] or [Direct Block]), graphics part, or the data block area part, you must set the top number of the corresponding message, graphic, or data block for each alarm message.

Notes

- The sub-display function is available when [Operation Area] is set to either [Display Area] or [Switch] in the [Detail] settings on the alarm part settings window.
- Switch function of display area parts
  When an alarm message is shown in a display area part through the screen call function, the display area part is automatically furnished with the switch function.
  Therefore, pressing the place where the message is displayed triggers the screen call function and the screen changes.
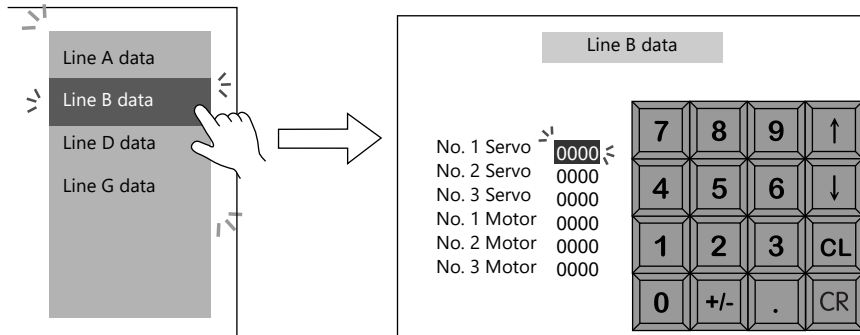
8.3.2   Time Order Alarming

This is a function for displaying or clearing messages on the screen by setting or resetting bits.

Difference from Bit Order Alarming

Message Display

With bit order alarming, messages are displayed in order of precedence when multiple bits are set.
With time order alarming, messages are displayed in order of occurrence (from oldest or newest) (refer to) when multiple bits are set.

Example: When bits are set in order as follows:

D100 Bit 0 = ON
Bit 1 = ON
Bit 5 = ON
Bit 3 = ON
Bit 2 = ON
Bit 4 = ON
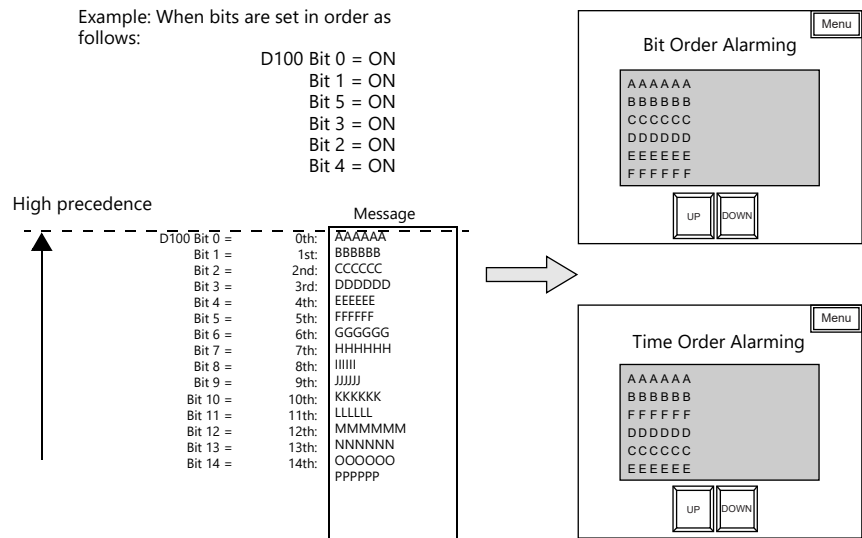
Time Display

With time order alarming, not only messages but the time that the bit was set (ON) can also be displayed.

Settings

Although this function displays alarm messages in real time, configuration of [Buffering Area Setting] is necessary.

Location of Settings

To display real-time alarms on MONITOUCH, place an alarm part.
An alarm part can be placed by clicking [Parts] → [Alarm].

Detailed Settings

Settings which differ from those of bit order alarming only are described.

Operation Select
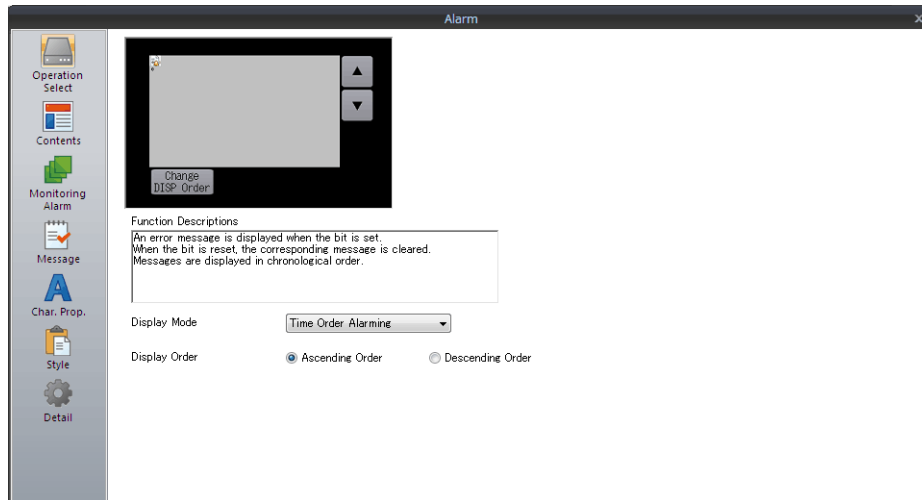
Item	Description
Display Mode	Select [Time Order Alarming].
Display Order	Set the display order of alarm messages. 　Ascending Order:　Display in the order of old errors → new errors. 　Descending Order:　Display in the order of new errors → old errors.

Contents

Item		Description
Display Item	Display the time	Select this checkbox to display the sampling time. Time is indicated in the format of "month-day, hour : minute : second." The number of characters is fixed to 15 (one-byte). 　Unselected: 　Tank A temperature rise 　Tank C temperature drop 　Selected: 　　　　　　　　　　　　　　　　　　Fixed to 15 one-byte characters 　07-20　11:32:10　A tank temperature rise 　07-20　11:40:25　C tank temperature drop 　　　　　　　　└── hour : minute : second 　　　　└── month-day *　Year display is not available even with [Display the time] checked.

Monitoring Alarm
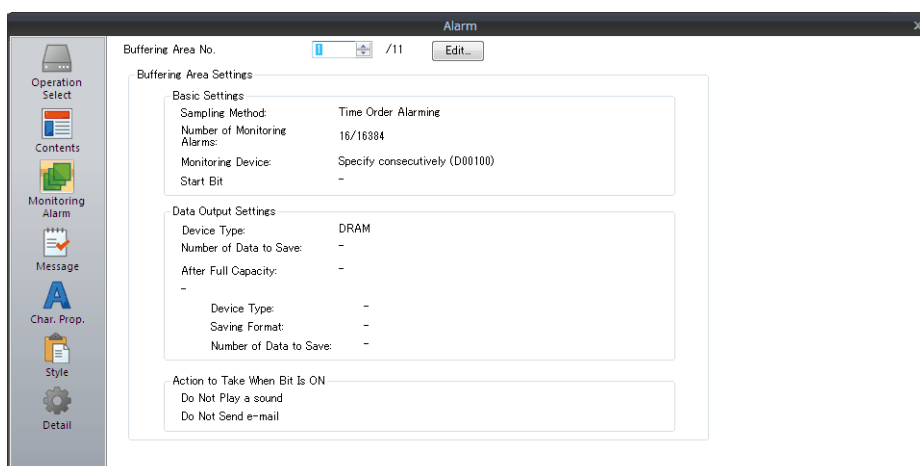
Item	Description
Buffering Area No.	Set registered buffering area number. The registration details are shown below.
Edit	Edit the buffering area. For details, refer to "8.2.1 Buffering Area" page 8-3.

Other Differences from Bit Order Alarming

Error Bit

When assigning registered messages to bits in PLC device memory, the top address as well as the number of bits used must be set as described below.

Bit Order Alarming

Specify the desired address directly for [Device] in the bit order alarming settings.
Device memory bits are allocated automatically from the specified device memory bit for the number specified at [Number of Monitoring Alarms].

Example:
[Device]:   D100-00 (bit designation possible)
[Start Message] [GNo.] and [No.]:   0 & 0
[Number of Monitoring Alarms]:   40
[Message Lines]:   1
With the above setting, messages are assigned to D100, D101, and D102.

MSB ... LSB

D100 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

MSB ... LSB

D101 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

MSB ... LSB

D102 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.									39	38	37	36	35	34	33	32

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Time Order Alarming

The device memory address is determined according to the specified buffering area number and the [Monitoring Device] setting in the [Buffering Area Setting] window.

- When [Use Read Area] is selected:
  The address following the sampling control device memory is used as the start device memory.
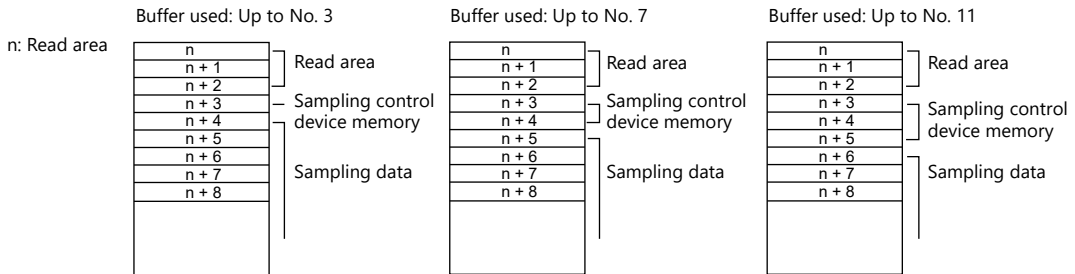
- When [Specify consecutively] is selected:
  The specified device memory is used as the start device memory. (Only word designation is possible.)
  Device memory bits are allocated automatically from the specified device memory bit for the number specified at [Number of Monitoring Alarms].

  Example:
  [Buffering Area Setting] window

[Specify consecutively] selected:	D100 (word designation)
[Number of Monitoring Alarms]:	48

  Time order alarming settings window

[Buffering Area No.]:	0
[Start Message] [GNo.] and [No.]:	0 & 0
[Message Lines]:	1

When the above settings are made, bits in D100, D101, and D102 are allocated, and a total of 48 bits is used.

MSB / LSB

D100 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

MSB / LSB

D101 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16

MSB / LSB

D102 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Message No.	47	46	45	44	43	42	41	40	39	38	37	36	35	34	33	32

Process Cycle

Bit Order Alarming

Choose from [Refresh], [High Speed], or [Low Speed] for [Process Cycle] in the [Detail] settings of the bit order alarming settings window.

Time Order Alarming

Specify the desired cycle time for [Monitoring Intervals] in the [Buffering Area Setting] window. When "0" is specified, the read operation is performed every cycle. When the time is set, it is performed at the specified interval.

8.3.3   Acknowledge Function

- By using an acknowledge bit for time order alarming or bit order alarming, it is possible to indicate whether an alarm message has been acknowledged or not in different colors when an error has occurred.
- * However, note that, in the case of bit order alarming, acknowledged information will be cleared when the screen display is changed.
- If an error occurs while there is no operator attending, the error may be reset automatically before an operator acknowledges it.

| An error occurs without operators in attendance. | The error is reset before it is known to operators. | No one knows that an error occurred. |
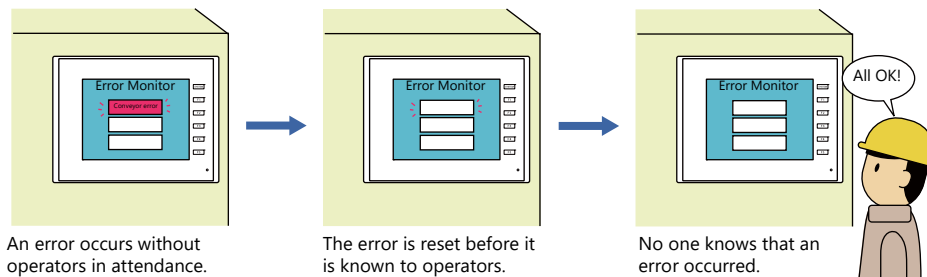
Using the acknowledge function, operators can be informed whether or not any error has occurred or has been reset at a glance.

| An error occurred without operators in attendance and was reset automatically. (The alarm remains displayed.) | Afterward, an operator checks the error information using the acknowledge bit. → The message of an error already reset is displayed in a different color and disappears after a set time. | The occurrence of errors and their current status can be checked. |
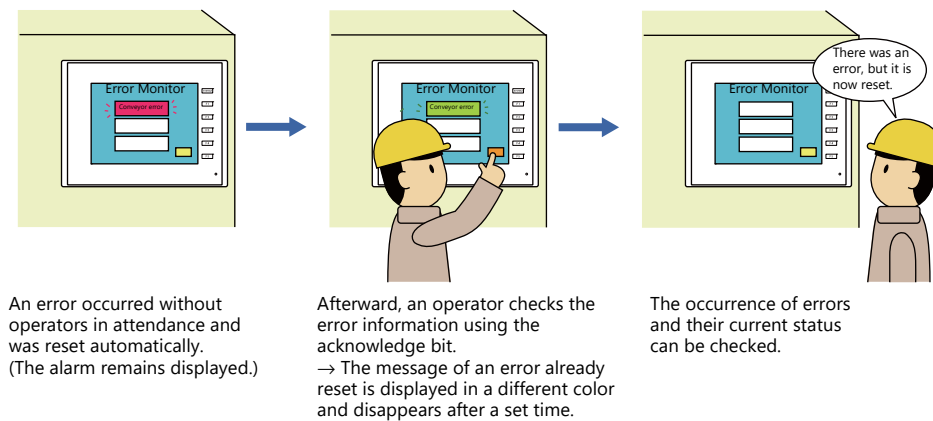
Operation Overview

When the acknowledge function is used, switch or lamp parts are used as message display areas. One switch or lamp part can display one message line. There are four message display statuses.

A: No error
B: Error occurred
C: Error is not reset and acknowledgment bit is ON
D: Error is reset and acknowledgment is bit ON

Different colors of switches or lamps configured with four patterns (OFF, ON, P3, and P4 colors), are used to denote these statuses.
In this example, lamp parts configured with the following four colors each are placed.

OFF color (no error):	white
ON color (error occurred):	red
P3 color (error is not reset yet at acknowledgment bit ON):	yellow
P4 color (error is already reset at acknowledgment bit ON):	blue

If an error occurs, the corresponding message is displayed in red. Errors remain displayed in red even if they are reset.
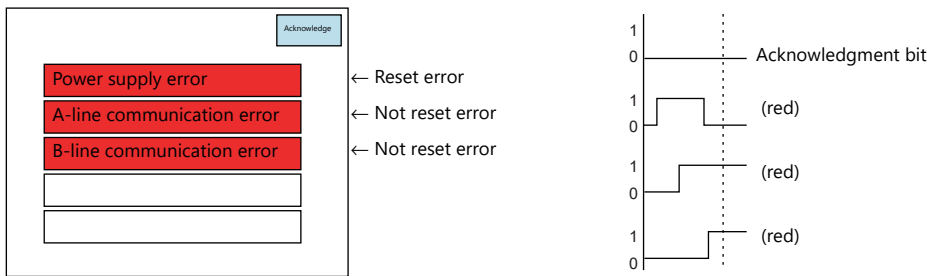
When the acknowledgment bit is set (OFF → ON), the messages of the errors which have not been reset yet turn yellow. Messages of errors that have already been reset turn blue.
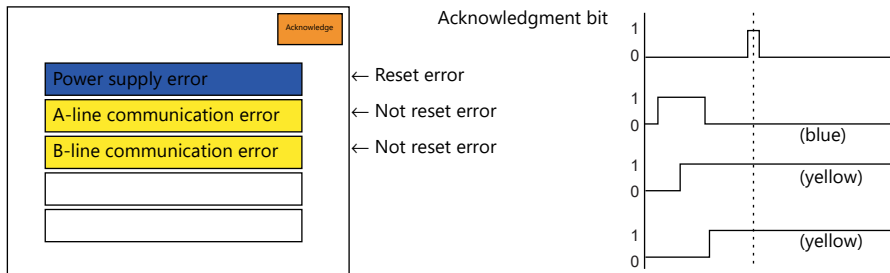
After a set time, blue messages disappear and only the messages of the errors which have not been reset yet remain displayed in yellow.
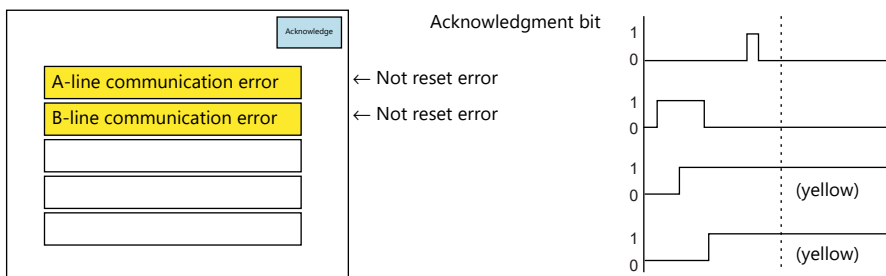
Location of Settings

Alarm Part

Detail
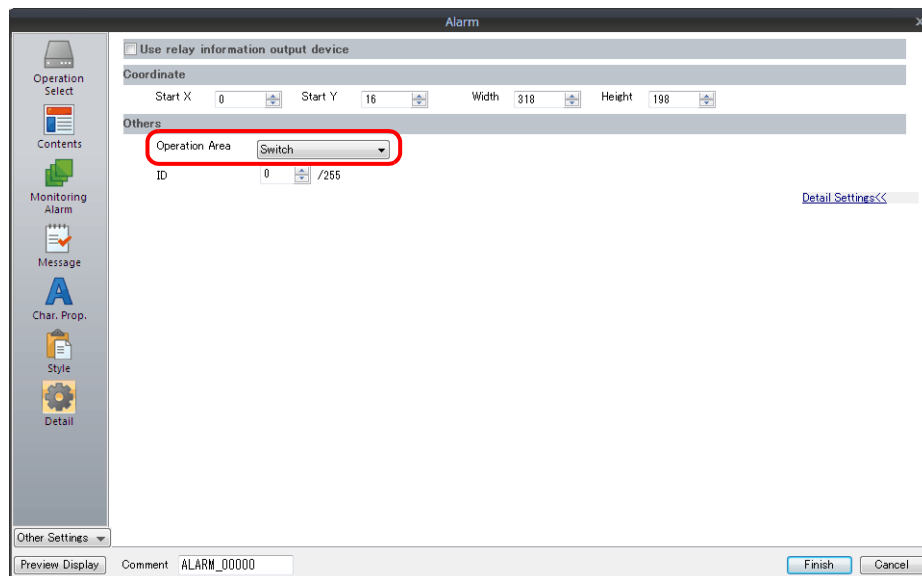
Operation Area	Select either [Switch] or [Lamp].

Contents

Add acknowledgement status (acknowledge function)	Select this box.
Acknowledgment Bit	Error messages can be displayed in different colors according to their status by setting this bit (ON) while errors are displayed. The acknowledge bit is recognized at the edge of OFF to ON. Always reset the bit (OFF) after acknowledgement operation.
Time to Retrieve [*1]	Set the duration for displaying messages that have already been reset when the acknowledgment bit is set (ON), in the "reset" color. The message disappears after the set time elapses.

8

*1 About [Time to Retrieve]

[Time to Retrieve] is the duration that a message is displayed after it is reset. For errors that were already reset when the acknowledgment bit is set (ON), the duration is from the time that the acknowledgment bit was set. For errors that were not reset yet when the acknowledgment bit is set (ON), the duration is from the time that the error is actually reset. Messages are cleared from display after the set duration.

1

Acknowledge

Error 0
Error 1
Error 2

Acknowledgment bit ON

Acknowledgment bit 1 0
Error 0 1 0 — Error 0 OFF — [Time to Retrieve]
Error 1 1 0
Error 2 1 0

2

Acknowledge

Error 1
Error 2

Acknowledgment bit 1 0
Error 0 1 0 — Error 0 time elapsed
Error 1 1 0 — Error 1 OFF — [Time to Retrieve]
Error 2 1 0

3

Acknowledge

Error 2

Acknowledgment bit 1 0
Error 0 1 0
Error 1 1 0 — Error 1 time elapsed
Error 2 1 0
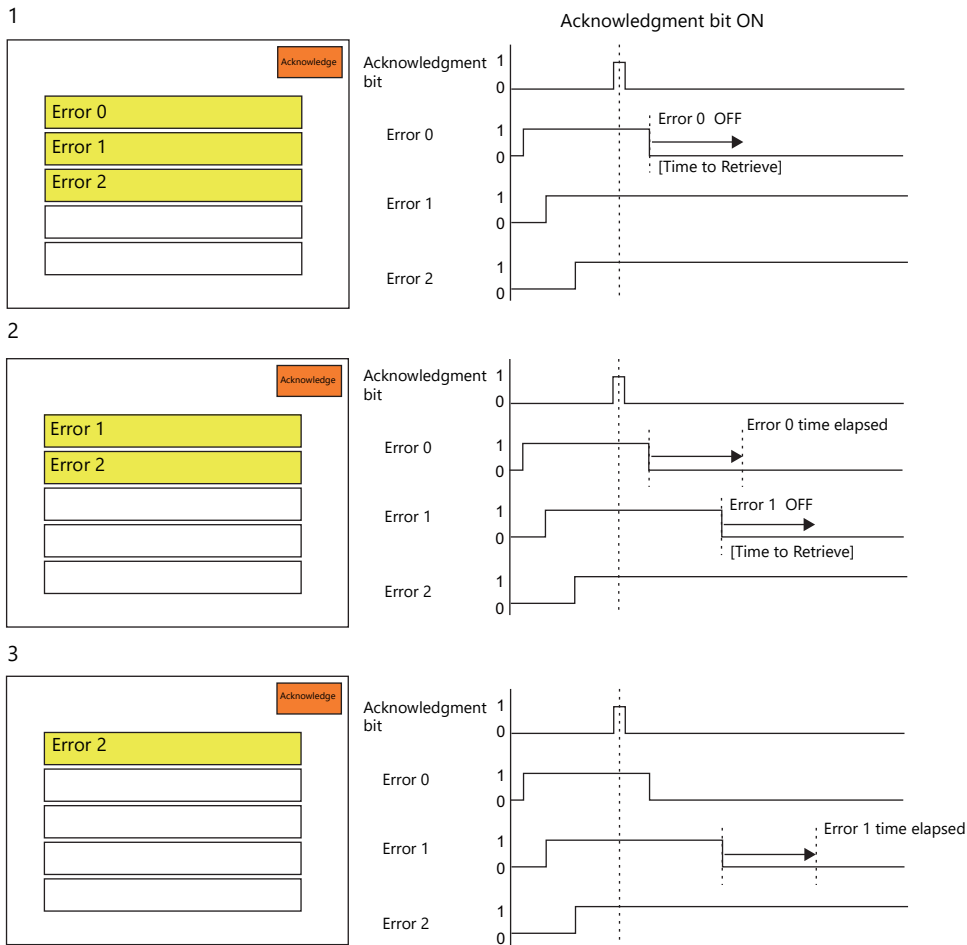
[Time to Retrieve] count finishes for errors 0 and 1 separately.

Buffering Area Setting (For time order alarming)

Others
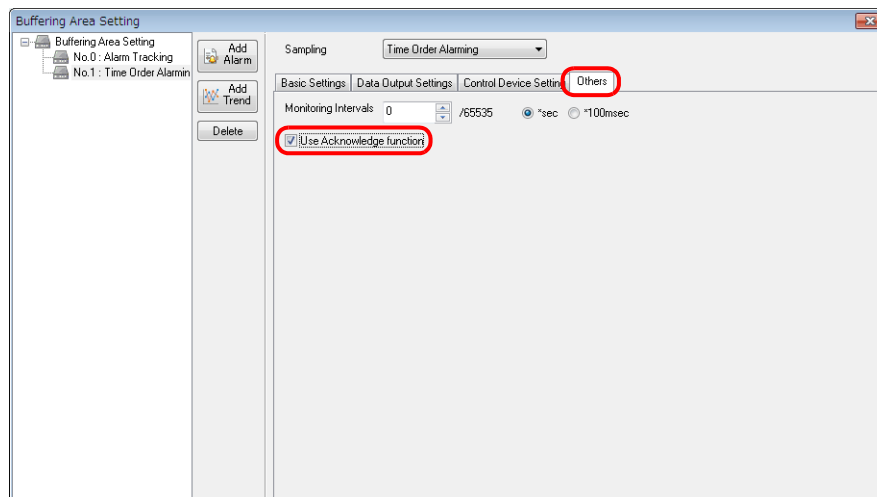
Use Alarm Acknowledge function	Select this box.

Style
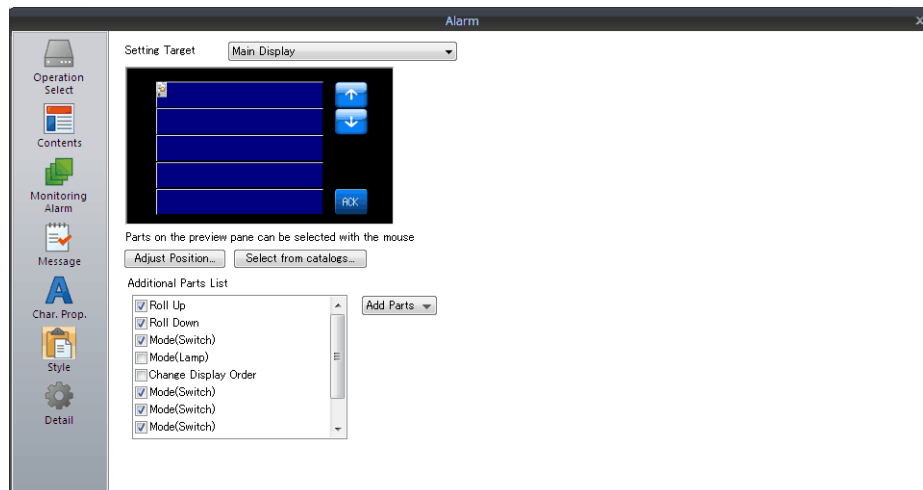
Item		Description
Additional Parts List		Displays a list of alarm-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
	Mode (Switch) [*1]	Display real-time display messages on a switch.
	Mode (Lamp) [*1]	Display real-time display messages on a lamp.
Adjust Position		Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs		Set the part design from the catalog.
Parts Design		Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane.

*1   Be sure to configure switch or lamp parts with four patterns.
The color settings and meanings of a four-pattern switch/lamp are as shown below.
OFF color: no error
ON color: error occurred
P3 color: error is not reset yet at acknowledgment bit ON
P4 color: error is already reset at acknowledgment bit ON
 * Blinking is available when the basic 16 colors are selected.

8

Display of Acknowledge Function Screen after Screen Change

If a currently displayed acknowledge function screen in time order alarming is changed over to a different screen and then displayed again, the error information on the acknowledge function screen remains the same as that before the screen change. Any reset errors will also be retained.
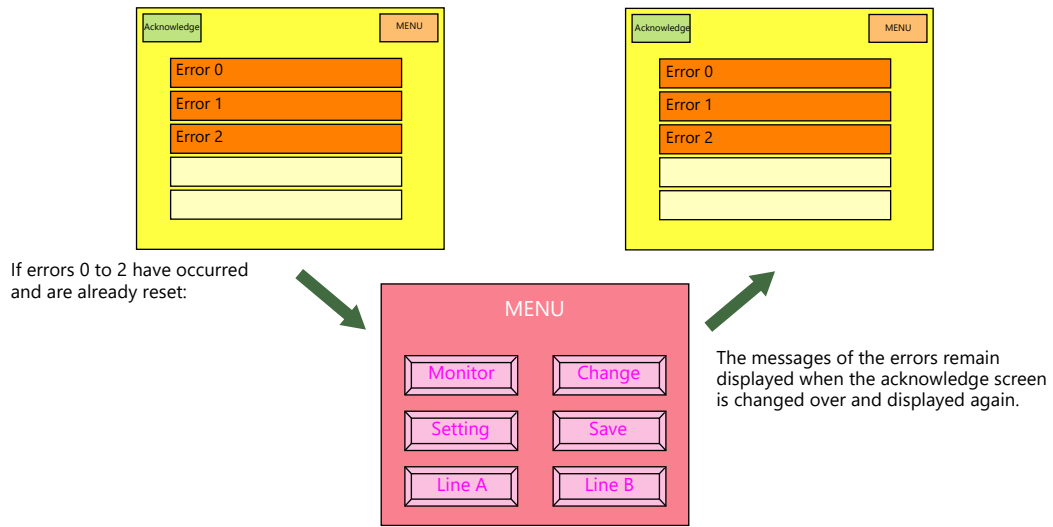
If errors 0 to 2 have occurred and are already reset:

The messages of the errors remain displayed when the acknowledge screen is changed over and displayed again.

9 Graph Display

9.1 Bar Graph

9.1.1 Overview

- Data in a device memory address can be expressed on a bar graph.
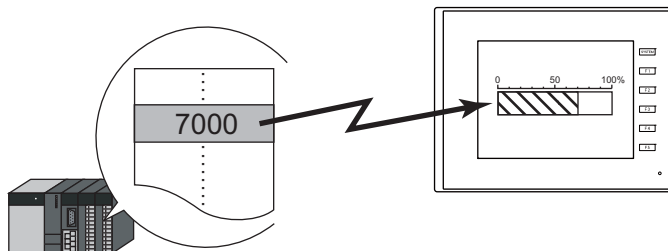
☞ For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-2.

- When data in a device memory address exceeds or falls short of the range specified, the graph color can be changed. This helps the operator to recognize the situation easily and correctly.
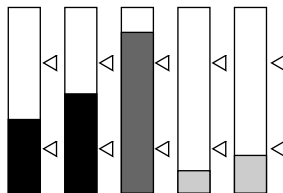
☞ For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-2.

- As shown below, it is possible to display a bar graph in several colors.
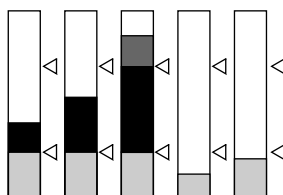
☞ For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-2.

- A reference point can be set and then data from the reference point to the specified data in a device memory address can be expressed on a graph (deviation display).
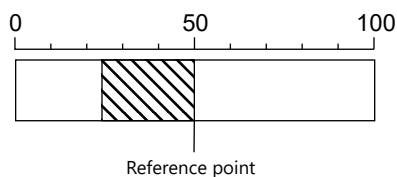
☞ For setting examples, refer to "Displaying Deviation from a Reference Value to the Current Value (Deviation Display)" page 9-4.

9.1.2 Setting Examples

Displaying Current Values (Standard Display)

The current value of a device memory address within the range of the minimum and maximum values can be displayed (standard display).

1. Click [Parts] → [Graph] → [Bar Graph] and place a bar graph on the screen.

2. Double-click on the bar-graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the device memory address to display on the graph with [Current Value] → [Device].
   - Select [Standard] for [Type].
   - Specify the graph display area using [Range].

3. Configure the following settings for [Style] and then click [Finish].
   To change the graph color depending on the value, proceed to step 4.

4. Configure the [Alarm] settings to change the graph color depending on the value.
   In this case, color settings set for [Style] are disabled.

5. Set the following to display the graph using the different colors for different value ranges.

This completes the necessary settings.

9

Displaying Deviation from a Reference Value to the Current Value (Deviation Display)

A reference point can be set and then data from the reference point to the specified device memory address can be expressed on a graph.

Reference point

1. Click [Parts] → [Graph] → [Bar Graph] and place a bar graph on the screen.

2. Double-click on the bar-graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the device memory address to display on the graph with [Current Value] → [Device].
   - Select [Deviation] for [Type].
   - Specify the value or device memory address to be used as the reference for [Standard].
   - Specify the graph display area.

3. Configure the following settings for [Style] and then click [Finish].
    To change the graph color depending on the value, proceed to step 4.

4. Configure the [Alarm] settings to change the graph color depending on the value.
    In this case, color settings set for [Style] are disabled.

5. Set the following to display the graph using the different colors for different value ranges.

    This completes the necessary settings.

9.1.3 Detailed Settings

Displayed Information

	Item	Description
Current Value	Device	Specify the device memory address to monitor as a graph.
	Input Type (DEC- / BCD, Real Number)	Select the data format of device memory values. The selection here also applies to the values of [Target Value], [Standard Value], [Range], and [Alarm]. * When [DEC-/BCD] is selected, the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting] takes effect.
	Data Length (1-Word, 2-Word)	Select data length of the device memory.

Display Setting	Type (Standard, Deviation)	Standard
		    Display the device memory value between the minimum and maximum values on a graph.
		
		Deviation
		    Set a reference value and display deviation from the reference value to the current value.

	Direction (UP, DW, LFT, RGT)	Set the direction to draw graph lines.
		    Vertical bar graph: UP / DW
		    Horizontal bar graph: LFT / RGT

	Target Value, Standard	Target Value
		    Set this when [Standard] is selected for [Type].
		    Display a line at the position of the target value on the graph.
		
		    * If a value less than the minimum value of the range is set, a line is not displayed.
		Standard
		    Set this when [Deviation] is selected for [Type].
		    Specify the reference value of the graph.
		
		    * If [Alarm] is configured, the [Standard] or [Target Value] setting is disabled.

	Range (Minimum/Maximum)	Specify the minimum and maximum values for the display range of the graph. If the display range is variable, select a device memory. If the display range is fixed, specify a constant.
	Display the scale according to the display range	This is only available for parts that correspond to a numerical display. An optimal scale is displayed according to the minimum and maximum of the value in the range. * This setting is only available when the minimum and maximum values are specified with constants.

Style

Item	Description
Select from catalogs	Type 　Set the part design. Color 　Set the part color.
Select from image files	Load a bitmap file.
Data Color	When [Standard] is selected for [Type]: 　Set the graph color from the minimum value to the device memory value. When [Deviation] is selected for [Type]: 　Set the graph color from the reference value to the device memory value. 　*　If [Alarm] is configured, this is disabled.
Target Value Color	When [Standard] is selected for [Type]: Set the color of the target value line displayed on the graph. 　*　If [Alarm] is configured, this is disabled.
Display Area Color	Set the color inside the graph area.
Display a frame around the display area	Display a frame around the graph area. When this checkbox is selected, the frame color can be set.

Alarm

- Type: Standard

- Type: Deviation

Item		Description
Use alarm display		Change the colors of the graph according to the device memory value.
Area Setting	When [Standard] is selected for [Type]: Upper Limit2/Upper Value/Area within the Range/Lower Value/Lower Limit2	Set the ranges for alarm display and each corresponding color.
	When [Deviation] is selected for [Type]: Upper Limit+/Standard Value/Lower Limit−	Set the ranges for alarm display and each corresponding color.
Display Setting	Add marks to upper and lower limit values	Display △ marks at the alarm range positions of the graph.
	Position	Specify the position of the △ marks. 　Vertical bar graph:　　Left/Right 　Horizontal bar graph:　Top/Bottom
	Mark Color	Specify the color of the △ marks.
	Display in separate colors	Display each alarm color separately on a single graph.

Examples of graphs with alarm settings

When [Standard] is selected for [Type]

| Lower limit color | Within range color | Upper limit color | Area color |
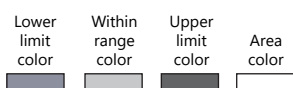
[Direction] set to RGT

- Single color use

50 150 250 350 450

Current value / Lower limit value / Upper limit value

50 150 250 350 450

Lower limit value / Current value / Upper limit value

50 150 250 350 450

Lower limit value / Upper limit value / Current value

- Separate color use

50 150 250 350 450

Current value / Lower limit value / Upper limit value

50 150 250 350 450

Lower limit value / Current value / Upper limit value

50 150 250 350 450

Lower limit value / Upper limit value / Current value

- With marks

50 150 250 350 450

Current value / Lower limit value / Upper limit value

When [Deviation] is selected for [Type]

| Lower limit color | Within range color | Upper limit color | Area color |

[Direction] set to RGT   A: Range value

- Single color use
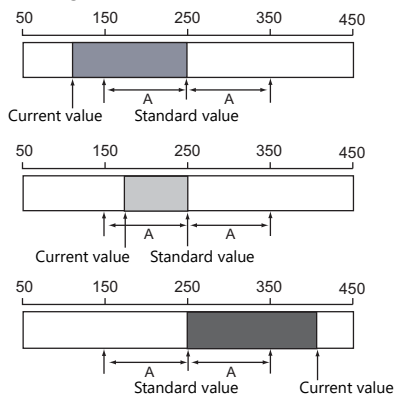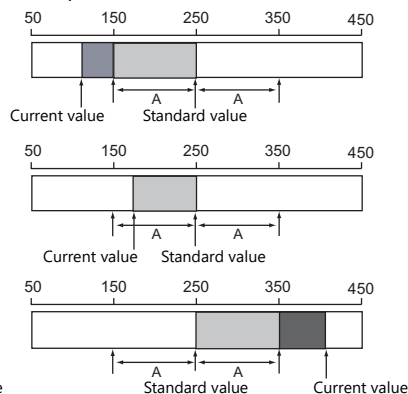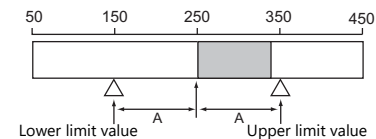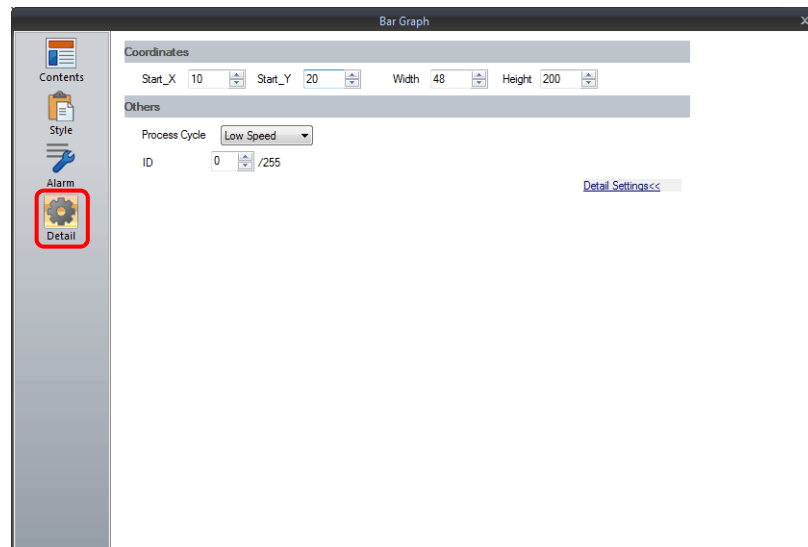
50 150 250 350 450

Current value / Standard value

50 150 250 350 450

Current value / Standard value

50 150 250 350 450

Standard value / Current value

- Separate color use

50 150 250 350 450

Current value / Standard value

50 150 250 350 450

Current value / Standard value

50 150 250 350 450

Standard value / Current value

- With marks

50 150 250 350 450

Lower limit value / A / A / Upper limit value

Detail

	Item	Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

9.2   Pie Graph

9.2.1 Overview

- Data in the specified device memory address can be expressed clockwise on a pie graph.
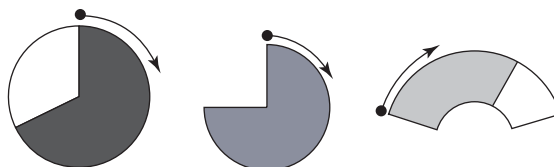
☞   For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-12.

- When data in a device memory exceeds or falls short of the range specified, the graph color can be changed. This helps the operator to recognize the situation easily and correctly.

☞   For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-12.

- As shown below, it is possible to display a bar graph in several colors.
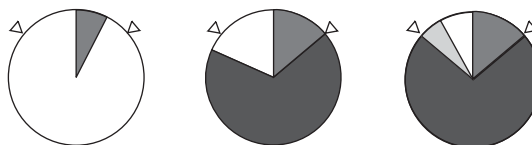
☞   For setting examples, refer to "Displaying Current Values (Standard Display)" page 9-12.

- A reference point can be set and then data from the reference point to the specified data in a device memory can be expressed on a graph (deviation display).

Reference point

☞   For setting examples, refer to "Displaying Deviation from a Reference Value to the Current Value (Deviation Display)" page 9-14.

9

9.2.2   Setting Examples

Displaying Current Values (Standard Display)

The current value of a device memory within the range of the minimum and maximum values can be displayed (standard display).

1. Click [Parts] → [Graph] → [Pie Graph] and place a pie graph on the screen.

2. Double-click on the pie graph to display the settings window.
    Configure the [Contents] settings as shown below.
    * Set the device memory address to display on the graph with [Current Value] → [Device].
    * Select [Standard] for [Type].
    * Specify the graph display area using [Range].

3. Configure the following settings for [Style] and then click [Finish].
   To change the graph color depending on the value, proceed to step 4.

4. Configure the [Alarm] settings to change the graph color depending on the value.
   In this case, color settings set for [Style] are disabled.

5. Set the following to display the graph using the different colors for different value ranges.

This completes the necessary settings.

Displaying Deviation from a Reference Value to the Current Value (Deviation Display)

A reference point can be set and then data from the reference point to the specified device memory address can be expressed on a graph.

Reference point

1. Click [Parts] → [Graph] → [Pie Graph] and place a pie graph on the screen.

2. Double-click on the pie graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the device memory address to display on the graph with [Current Value] → [Device].
   - Select [Deviation] for [Type].
   - Specify the value or device memory address to be used as the reference for [Standard].
   - Specify the graph display area.

3.　Configure the following settings for [Style] and then click [Finish].
　　To change the graph color depending on the value, proceed to step 4.

4.　Configure the [Alarm] settings to change the graph color depending on the value.
　　In this case, color settings set for [Style] are disabled.

5.　Set the following to display the graph using different colors for different value ranges.
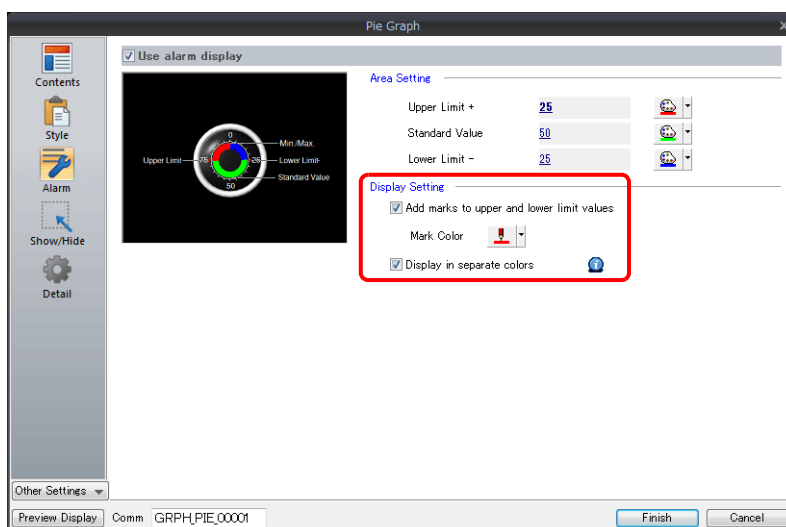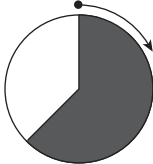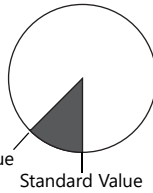
This completes the necessary settings.

9.2.3   Detailed Settings

Displayed Information

	Item	Description
Current Value	Device	Specify the device memory address to monitor as a graph.
	Input Type (DEC- / BCD, Real Number)	Select the data format of device memory values. The selection here also applies to the values of [Target Value], [Standard Value], [Range], and [Alarm]. * When [DEC-/BCD] is selected, the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting] takes effect.
	Data Length (1-Word, 2-Word)	Select data length of the device memory.

Display Setting	Type (Standard, Deviation)	Standard
		   Display the device memory value between the minimum and maximum values on a graph.
		
		Deviation
		   Set a reference value and display deviation from the reference value to the current value.

	Target Value, Standard	Target Value
		   Set this when [Standard] is selected for [Type].
		   Display a line at the position of the target value on the graph.
		
		* If a value less than the minimum value of the range is set, a line is not displayed.
		Standard
		   Set this when [Deviation] is selected for [Type].
		   Specify the reference value of the graph.
		
		* If [Alarm] is configured, the [Standard] or [Target Value] setting is disabled.

	Range (Minimum/Maximum)	Specify the minimum and maximum values for the display range of the graph. If the display range is variable, select a device memory. If the display range is fixed, specify a constant.
	Display the scale according to the display range	This is only available for parts that correspond to a numerical display. An optimal scale is displayed according to the minimum and maximum of the value in the range. * This setting is only available when the minimum and maximum values are specified with constants.

Style

Item	Description
Select from catalogs	Type 　　Set the part design. Color 　　Set the part color.
Select from image files	Load an image file.
Data Color	When [Standard] is selected for [Type]: 　　Set the graph color from the minimum value to the device memory value. When [Deviation] is selected for [Type]: 　　Set the graph color from the reference value to the device memory value. 　*　If [Alarm] is configured, this is disabled.
Target Value Color	When [Standard] is selected for [Type]: Set the color of the target value line displayed on the graph. 　*　If [Alarm] is configured, this is disabled.
Display Area Color	Set the color inside the graph area.
Display a frame around the display area	Display a frame around the graph area. When this checkbox is selected, the frame color can be set.
Display a doughnut-shaped graph	Display a doughnut-shaped pie graph. Select this checkbox to set the hole radius.

Alarm

- Type: Standard

- Type: Deviation

Item		Description
Use alarm display		Change the colors of the graph according to the device memory value. The color settings are implemented in the area settings.
Area Setting	When [Standard] is selected for [Type]: Upper Value/Area within the Range/Lower Value	Set the range for alarm display and each corresponding color.
	When [Deviation] is selected for [Type]: Upper Limit+/Standard Value/Lower Limit–	Set the reference value as well as the range for alarm display and each corresponding color.
Display Setting	Add marks to upper and lower limit values	Display △ marks at the alarm range positions of the graph.
	Mark Color	Specify the color of the △ marks.
	Display in separate colors	Display each alarm color separately on a single graph.

Examples of graphs with alarm settings

When [Standard] is selected for [Type]

Lower limit color   Within range color   Upper limit color   Area color

- Single color use

  Current value

  Upper limit value   Lower limit value   Upper limit value   Current value   Lower limit value   Upper limit value   Lower limit value

- Separate color use

  Current value

  Current value

  Upper limit value   Lower limit value   Upper limit value   Current value   Lower limit value   Upper limit value   Lower limit value

- With marks

  Current value

  Upper limit value   Lower limit value

When [Deviation] is selected for [Type]

Lower limit color   Within range color   Upper limit color   Area color

A: Range value

- Single color use

  Current value

  Current value

  Upper limit value   Standard value   Lower limit value   Upper limit value   Standard Value   Current value   Lower limit value   Upper limit value   Standard value   Lower limit value

- With marks

  Current value

  Upper limit value   Standard value   Lower limit value

- Separate color use

  Current value

  Current value

  Upper limit value   Standard value   Lower limit value   Upper limit value   Standard value   Current value   Lower limit value   Upper limit value   Standard value   Lower limit value

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Detail

Item		Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

9.3   Closed Area Graphs

9.3.1   Overview

- Changes to data in a closed area, such as a tank, can be expressed on a closed area graph.
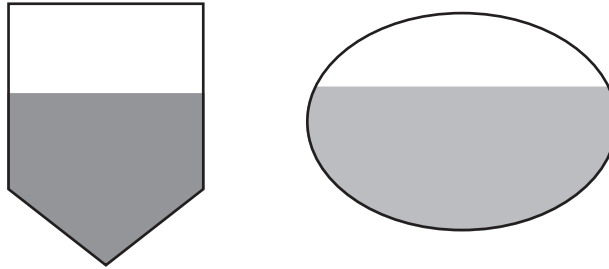
☞   For setting examples, refer to "Displaying Current Values" page 9-22.

- When data in a device memory exceeds or falls short of the range specified, the graph color can be changed.
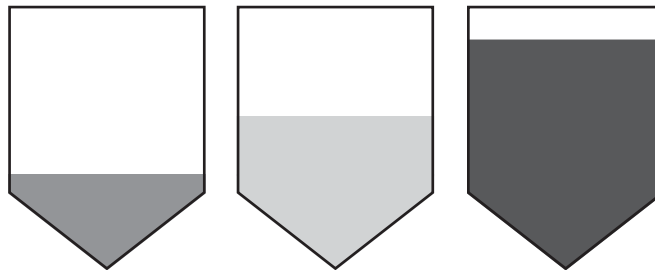
☞   For setting examples, refer to "Displaying Current Values" page 9-22.

- As shown below, it is possible to display a bar graph in several colors.
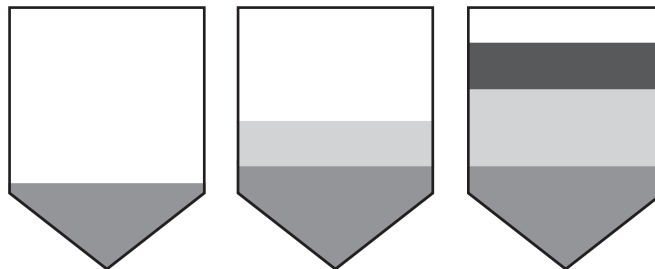
☞   For setting examples, refer to "Displaying Current Values" page 9-22.

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9.3.2 Setting Examples

Displaying Current Values

The current value of a device memory within the range of the minimum and maximum values can be displayed.
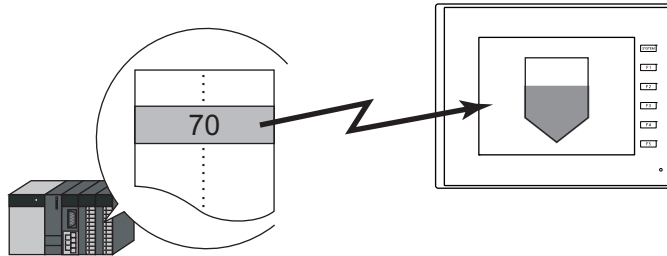
1. Click [Parts] → [Graph] → [Closed Area Graph] and place a closed area graph on the screen.
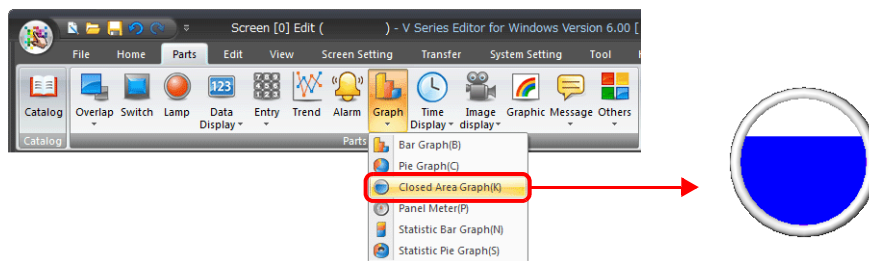
2. Double-click on the closed area graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the device memory address to display on the graph with [Current Value] → [Device].
   - Specify the graph display area using [Display Range].
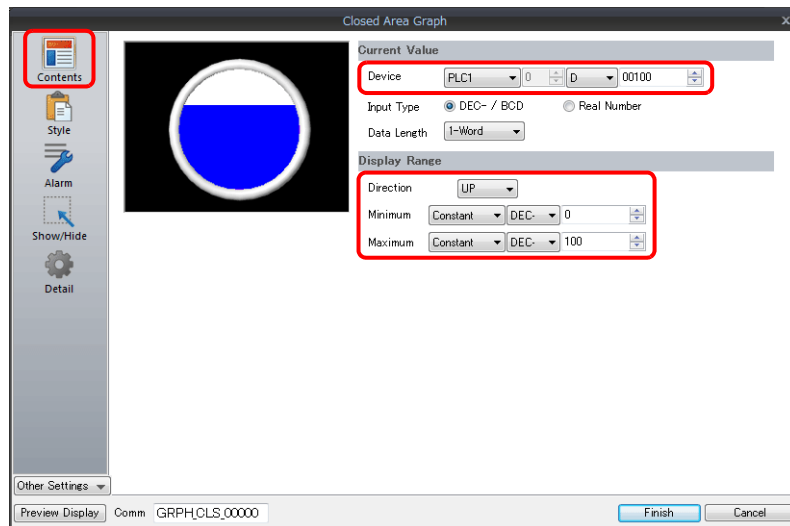
3. Configure the following settings for [Style] and then click [Finish].
   To change the graph color depending on the value, proceed to step 4.
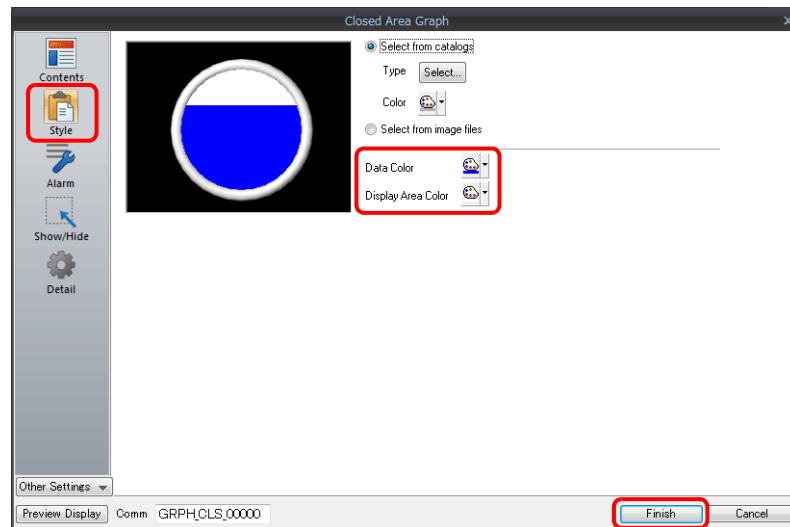
4. Configure the [Alarm] settings to change the graph color depending on the value.
   In this case, color settings set for [Style] are disabled.
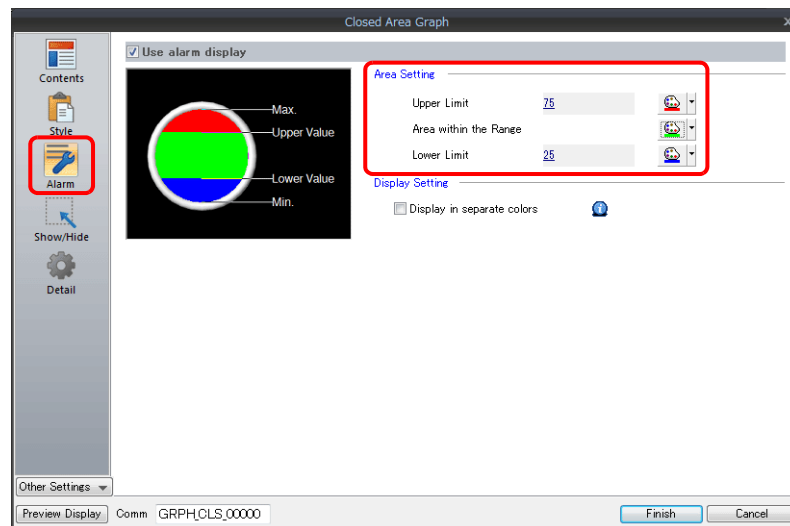
5. Set the following to display the graph using the different colors for different value ranges.
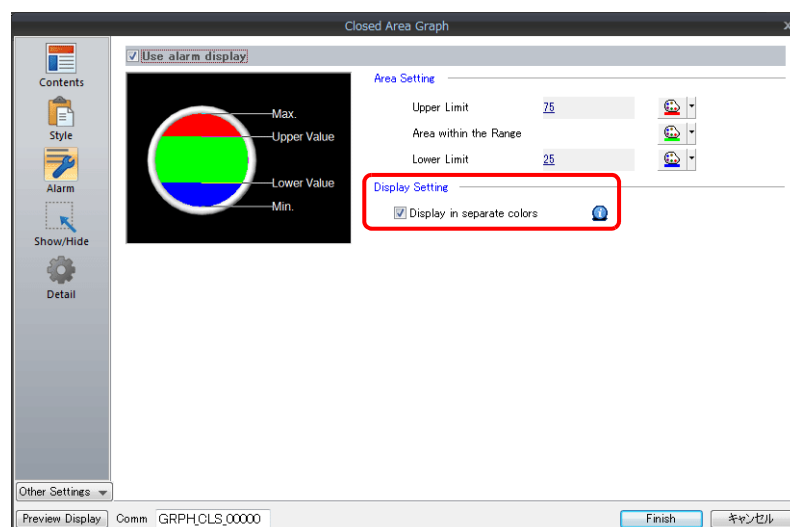
   This completes the necessary settings.

9.3.3   Detailed Settings

Displayed Information

Item		Description
Current Value	Device	Specify the device memory address to monitor as a graph.
	Input Type (DEC- / BCD, Real Number)	Select the data format of device memory values. The selection here also applies to the values of [Display Range] and [Alarm]. * When [DEC-/BCD] is selected, the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting] takes effect.
	Data Length (1-Word, 2-Word)	Select data length of the device memory.
Display Range	Direction (UP, DW, LFT, RGT)	Set the direction to draw graph lines.
	Minimum/Maximum	Specify the minimum and maximum values for the range of the graph. If the display range is variable, select a device memory. If the display range is fixed, specify a constant.

Style
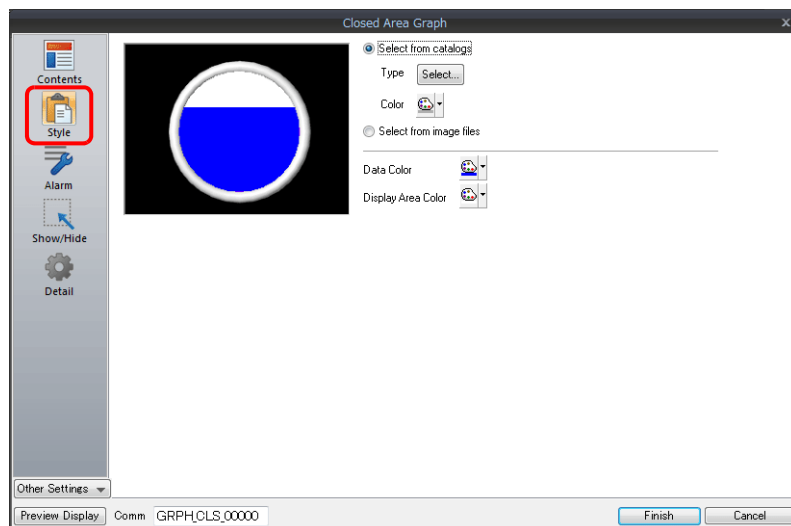
Item	Description

Select from catalogs	Type
	   Set the part design.
	Color
	   Set the part color.

Select from image files	Load a bitmap file.
Data Color	Set the graph color from the minimum value to the device memory value. * If [Alarm] is configured, this is disabled.
Display Area Color	Set the color inside the graph area.

Alarm
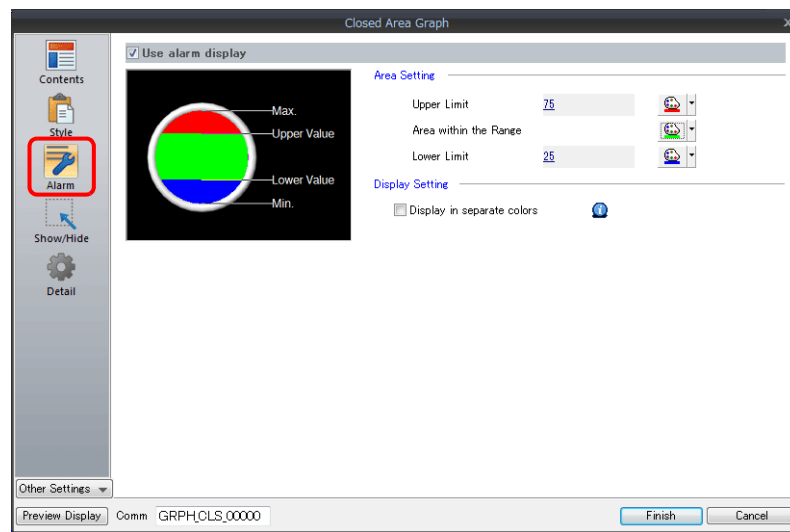
Item		Description
Use alarm display		Change the colors of the graph according to the device memory value. The color settings are implemented in the area settings.
Area Setting	Upper Limit/Area within the Range/Lower Limit	Set the range for alarm display and each corresponding color.
Display Setting	Display in separate colors	Display each alarm color separately on a single graph.

Examples of graphs with alarm settings

[Direction] set to UP
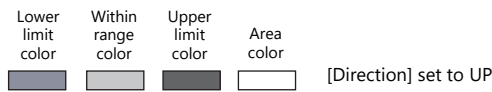
- Single color use
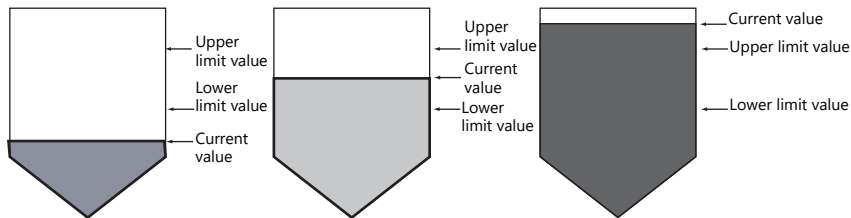
- Separate color use
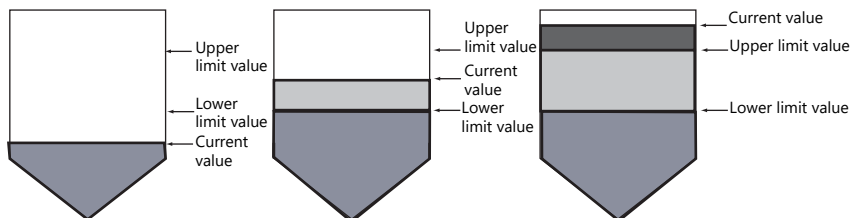
Detail
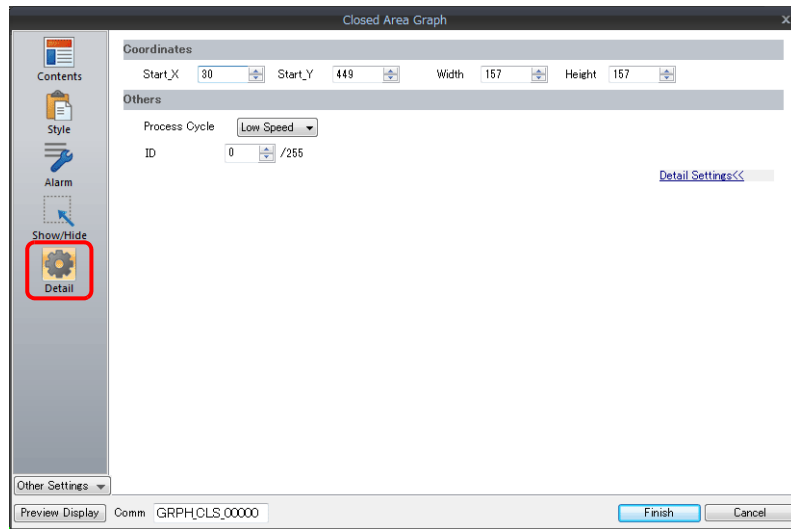
	Item	Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

9.4   Panel Meter

9.4.1   Overview

- Data in a device memory can be expressed in the form of an analog meter.
  The indicator can be selected to move in either the clockwise or counterclockwise direction.

  ☞   For setting examples, refer to "Displaying Current Values" page 9-28.

- Alarm display
  - Location used for alarms: indicator
    When data in the device memory exceeds or falls short of the range specified, the indicator color changes to show the status.
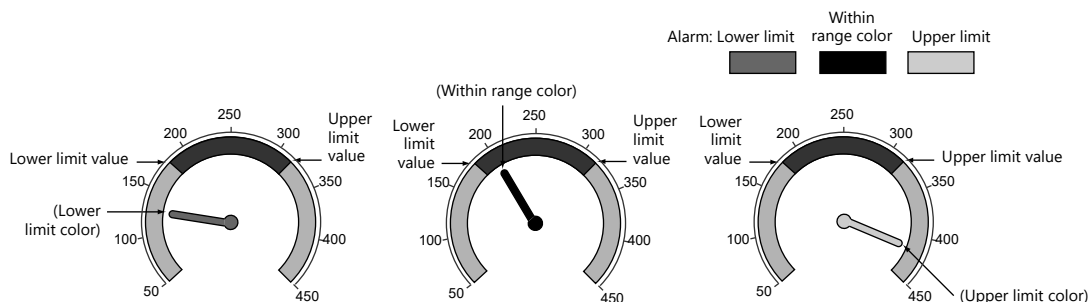
  ☞   For setting examples, refer to "Displaying Current Values" page 9-28.

  - Location used for alarms: Area
    When divisions are made in the alarm range, these divisions can be colored separately. Division into a maximum of 16 sections is allowed.
    Note that the color of the indicator does not change according to the alarm condition.
    Example: No. of divisions: 3
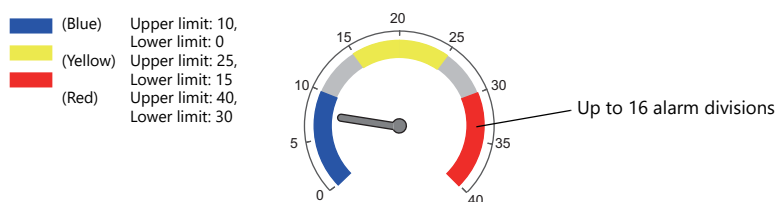
  ☞   For setting examples, refer to "Displaying Current Values" page 9-28.

- Extended indicator/scale settings
  The design of the scale or indicator can be changed using a bitmap file prepared by the user.
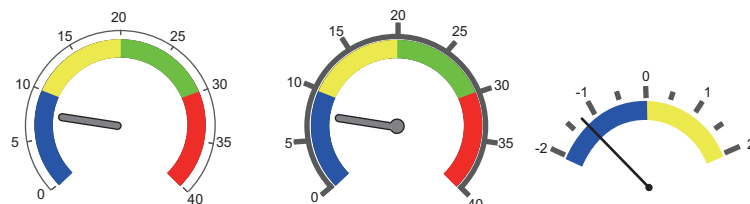
  ☞   For setting examples, refer to "9.4.4 Using Image Files for the Background and Scale" page 9-43.

- Numerical data display
  The current data can be displayed on the panel meter in numerical format.
  Example: When "8" is set in the device memory address D100
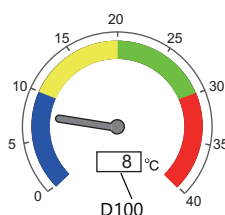
9.4.2 Setting Examples

Displaying Current Values

The current value of a device memory within the range of the minimum and maximum values can be displayed.
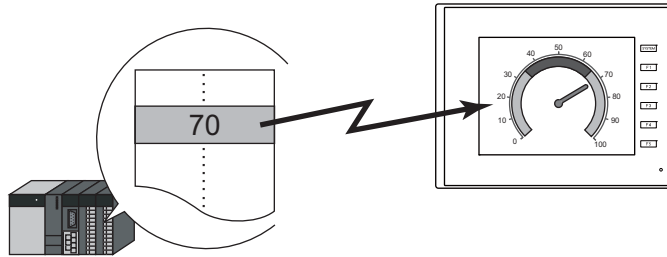
1. Click [Parts] → [Graph] → [Panel Meter] and place a panel meter on the screen.
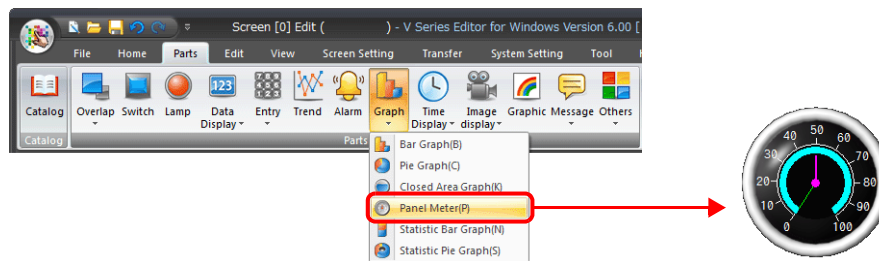
2. Double-click on the panel meter to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the device memory address to display on the panel meter with [Current Value] → [Device].
   - Select the direction of indicator movement with [Operation Setting] → [Progress Direction].
   - Specify the graph display area using [Display Setting] → [Range].
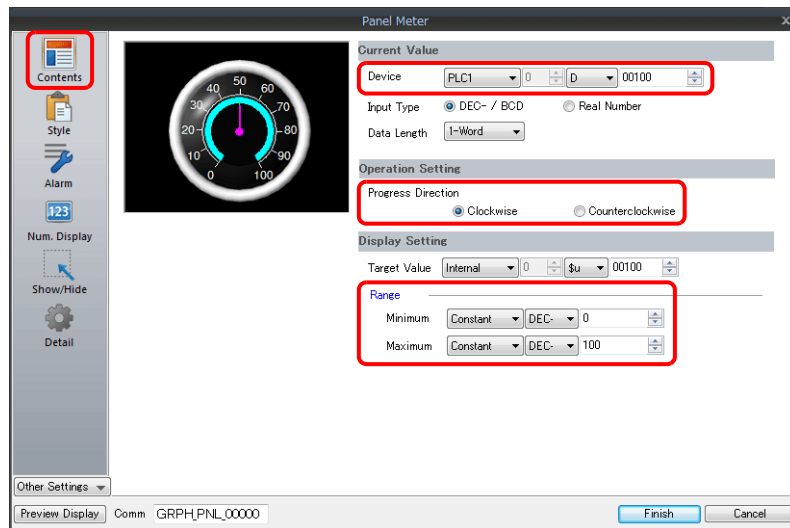
3. Configure the following settings for [Style] and then click [Finish].
    - Set the meter shape and color on the [Design] → [Meter] tab.
    - Set the indicator shape and color on the [Design] → [Indicator] tab.
    - Set the scale shape and color on the [Design] → [Scale] tab.

    To change the panel meter color depending on the value, proceed to step 4.
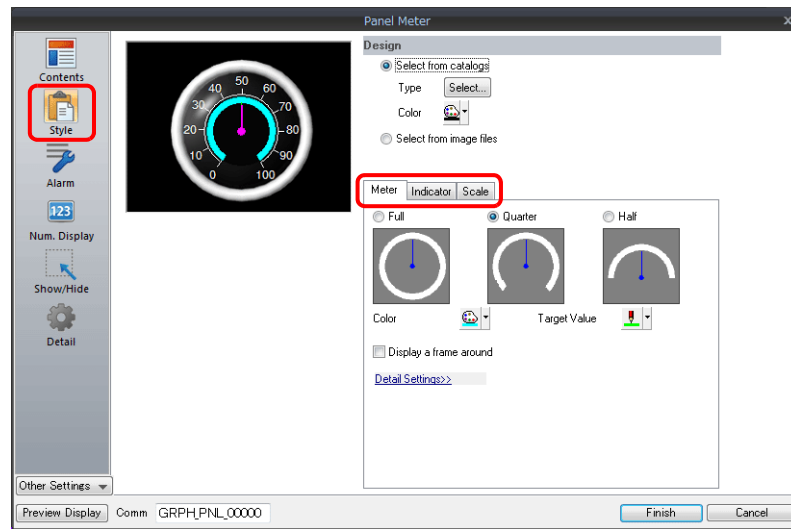
4. Configure the [Alarm] settings to change the indicator and meter color depending on the value.
    - When [Indicator] is selected for [Alarm Setting] → [Alarm Color Target]

    Set the three colors of the indicator, two colors of the meter area, and range. In this case, color settings set on the [Meter] and [Indicator] tabs in the [Style] settings are disabled.
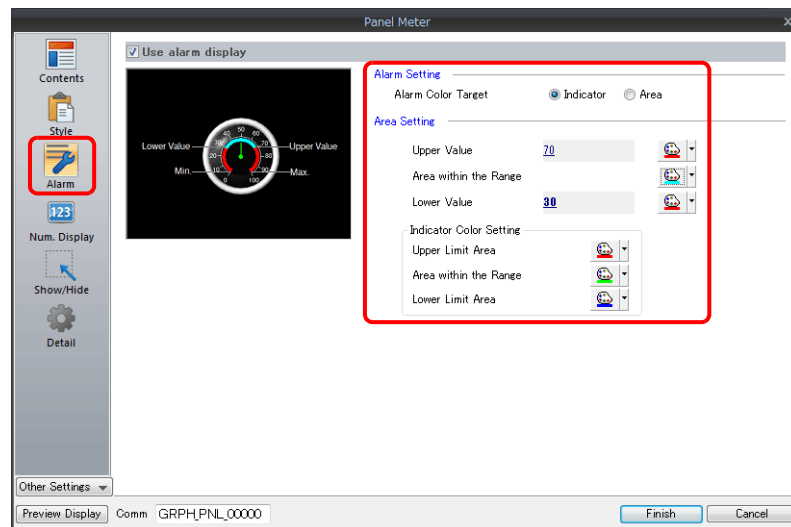
- When [Area] is selected for [Alarm Setting] → [Alarm Color Target]
  Set the color of the meter area and the range. (Up to 16 divisions)
  In this case, color settings set on the [Meter] tab in the [Style] settings are disabled.
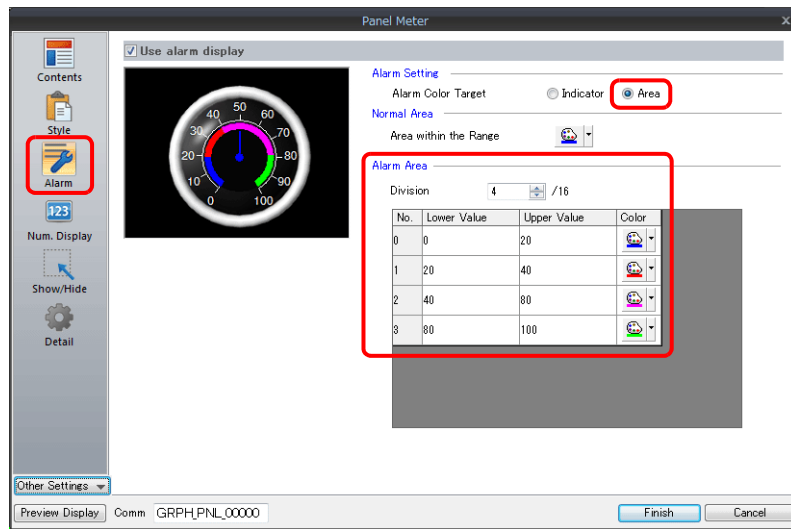
This completes the necessary settings.

9.4.3 Detailed Settings

Contents

Item		Description
Current Value	Device	Specify the device memory address to monitor.
	Input Type (DEC- / BCD, Real Number)	Select the data format of device memory values. The selection here also applies to the values of [Range] and [Alarm]. * When [DEC-/BCD] is selected, the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting] takes effect.
	Data Length (1-Word, 2-Word)	Select data length of the device memory.
Operation Setting	Progress Direction (Clockwise, Counterclockwise)	Select the direction of indicator movement.
Display Setting	Target Value	Display a line at the position of the target value on the panel meter. * If a value less than the minimum value of the range is set, a line is not displayed. * If [Alarm] is configured, the [Standard] or [Target Value] setting is disabled.
	Range (Maximum, Minimum)	Specify the minimum and maximum values for the display range of the panel meter. If the display range is variable, select a device memory. If the display range is fixed, specify a constant.

Style
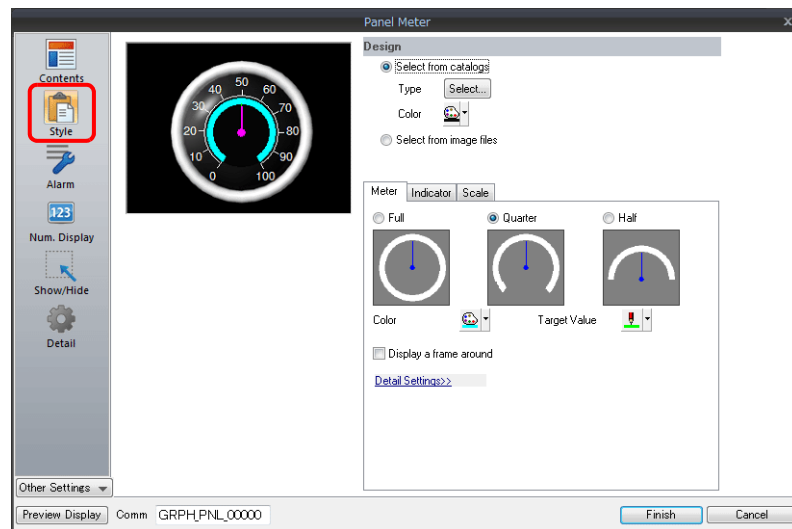
Item		Description
Design	Select from catalogs	Type Set the part design. Color Set the part color.
	Select from image files	Load a bitmap file.
	Meter	Set the color and size of the meter. For details, refer to "Meter" page 9-33.
	Indicator	Set the color of the indicator. For details, refer to "Indicator" page 9-34.
	Scaling	Set the color, size, and number of divisions for the scale. For details, refer to "Scaling" page 9-35.

Meter

Item		Description	
Full, Quarter, Half		Select the shape of the meter.	
Color		Set the color of the meter.	(diagram: Meter, Target Value, Frame)
Target Value		Set the color of the line displayed for the target value. * If [Alarm] is configured, this is disabled.	
Display a frame around		Select this checkbox to display a frame around the meter. When this checkbox is selected, the frame color can be set.	
	Frame	Set the frame color for the meter.	
Customize the size		Set the meter to an arbitrary size.	
	Start Angle	Set the start position of the meter.	Example: [Start Angle]: 180, [End Angle]: 0
	End Angle	Set the end position of the meter.	(diagram: 90°, 180°, 0°) * The panel meter area is the area circularly enclosed from the start angle to the end angle in the clockwise direction.
	Outer Radius	The meter comprises the area between the outside and inside circles. The meter width can be adjusted with the outside circle and inside circle radii.	Hole Outer circle Hole radius Outer circle radius * The inner circle must be set. The minimum radius of the inner circle is 10 pixels. The minimum difference between the radii of the outer and inner circles is 3 pixels.
	Inner Radius		

Indicator
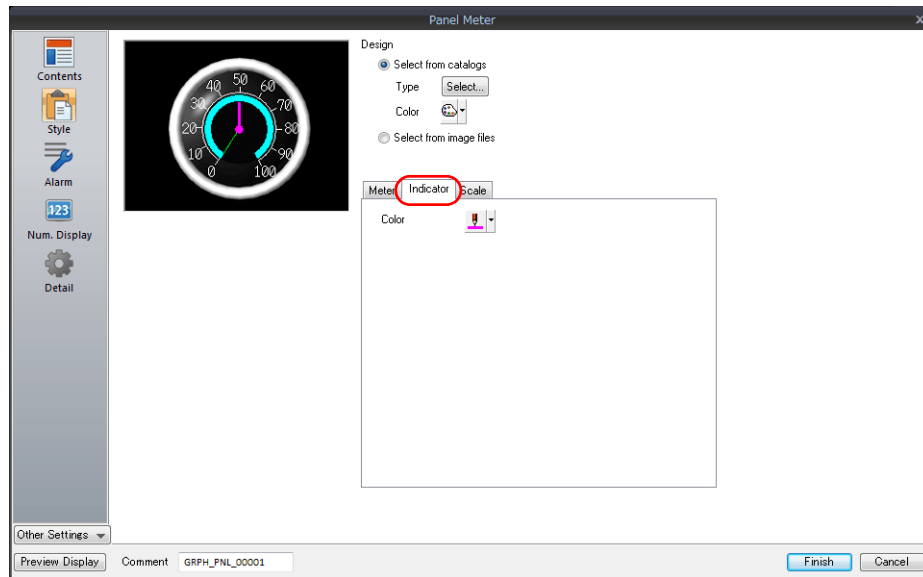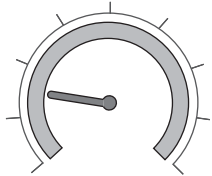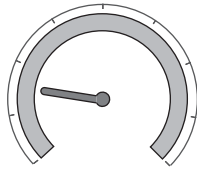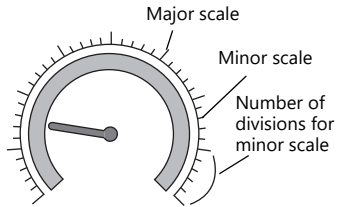
Item	Description
Color	Set the indicator color.
	* If [Alarm Color Target] is set to [Indicator] in the [Alarm] settings, this is disabled.

Scaling
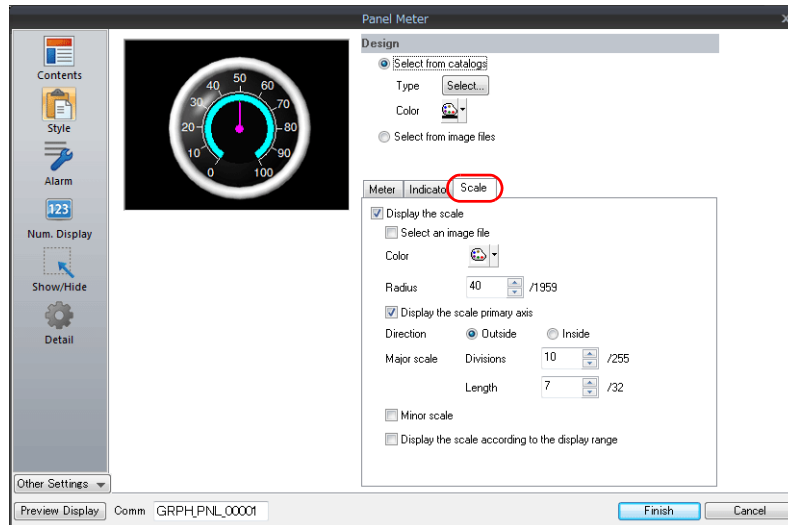
Item			Description	
Display the scale			Select this checkbox to display a scale on the panel meter.	
Select from image files			Select this checkbox to use an image file as the scale.	
	Select		Select an image file to display as the scale.	
	Size Setting	Width	Change the width of the image file.	
		Height	Change the height of the image file.	
		Fix aspect ratio	Enlarge/reduce the image file with the width and height bound to a fixed aspect ratio.	
	Position Setting	Base Point X	Adjust the horizontal position of the scale image.	Base point
		Base Point Y	Adjust the vertical position of the scale image.	
		Panel Meter Center Point	Displays the coordinates of the panel meter center point.	
		Default	Restore the base position of the scale image (center of the image file) to the center coordinates of the panel meter.	
Color			Set the scale color.	
Radius			Set the scale size.	Scaling / Scale radius
Display the scale primary axis			Select this checkbox to display the primary axis on the scale. With primary axis No primary axis	

Item		Description	
Direction	Outside	Display tick marks on the outside of the primary axis.	
	Inside	Display tick marks on the inside of the primary axis.	
Major scale	Divisions (1 - 255)	Set the number of divisions on the major scale across the entire scale.	Example: Major scale divisions: 8 Minor scale divisions: 5
	Length (1 - 16)	Set the length of the major scale. * If using the minor scale, the length increases and decreases by 2.	
Minor scale		Select this checkbox to divide the major scale by the minor scale. * The length of the minor scale is half of the major scale.	
	Divisions (1 - 16)	Set the number of divisions across the major scale.	
Display the scale according to the display range		This is only available for parts that correspond to a numerical display. An optimal scale is displayed according to the minimum and maximum of the value in the range. This setting is only available when the minimum and maximum values are specified with constants. Display numerical values on the scale according to the display range of the panel meter.	

Alarm

Alarm color target: indicator

Item			Description
Use alarm display			Select this checkbox to use the alarm function.
Alarm Setting	Alarm Color Target	Indicator	The indicator color is displayed using three alarm colors according to the upper and lower limit values. The meter is displayed using the two colors for within the range of the upper and lower limits, and outside of the range.
		Area	The meter color can be divided into a maximum of 16 colors according to the [Alarm Area] settings. The indicator color is fixed. For details on settings, refer to "Alarm color target: area" page 9-38.
Area Setting	Upper Value		Set the color of the meter for the upper limit value and outside the range of the upper and lower limits of the alarm display.
	Area within the Range		Set the within range color.
	Lower Value		Set the color of the meter for the lower limit value and outside the range of the upper and lower limits of the alarm display.
	Indicator Color Setting	Upper Limit Area	Set the indicator color when the current value exceeds the upper limit value.
		Area within the Range	Set the indicator color when the current value is within the range of the upper and lower limits.
		Lower Limit Area	Set the indicator color when the current value is less than the lower limit value.

Alarm color target: area

Item			Description	
Use alarm display			Select this checkbox to use the alarm function.	
Alarm Setting	Alarm Color Target	Indicator	The indicator color is displayed using three alarm colors according to the upper and lower limit values. The meter is displayed using the two colors for within the range of the upper and lower limits, and outside of the range. For details on settings, refer to "Alarm color target: indicator" page 9-37.	
		Area	The meter color can be divided into a maximum of 16 colors according to the [Alarm Area] settings. The indicator color is fixed.	
Normal Area	Area within the Range		Specify the color of the area not included in the alarm range in the display range of the panel meter.	Example: Divisions: 4, clockwise
Alarm Area	Division		Set the number of alarm areas.	
	No. 0 - 15	Lower Value	Set the lower limit value of the alarm area.	
		Upper Value	Set the upper limit value of the alarm area.	
		Color	Set the display color of the alarm area.	* Drawing is performed in order from "Data 0 property" to "Data 15 property". When a range overlaps with another when drawn, the color of the data property with the higher number is displayed in the foreground.

Num. Display

A panel meter can be set with a numerical data display to show the current value.
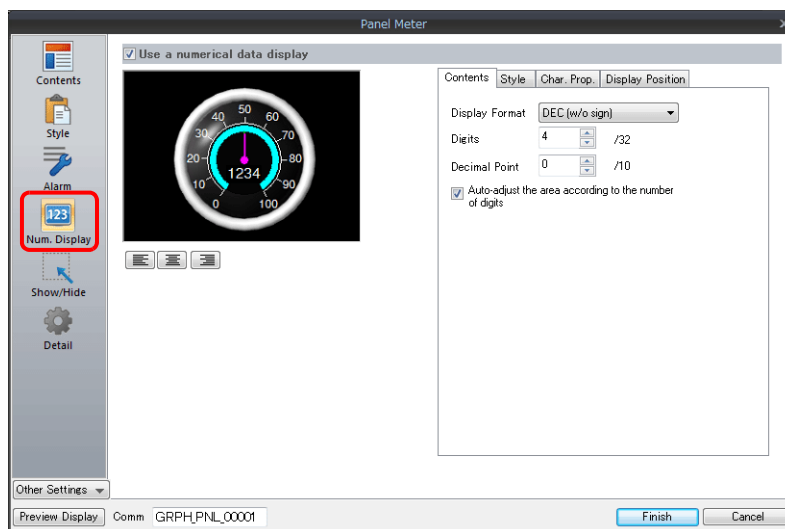
Item		Description
Use a numerical data display		Select this checkbox to display a numerical data display within the panel meter.
	Contents	Specify the display format, number of digits, and number of decimal places for the numerical data display. For details, refer to "Contents" page 9-39.
	Style	Specify the design of the numerical data display. For details, refer to "Style" page 9-40.
	Char. Prop.	Set a text color and size for the numeric data display. For details, refer to "Char. prop." page 9-41.
	Display Position	Specify the display position of the numerical data display. For details, refer to "Position" page 9-41.

Contents
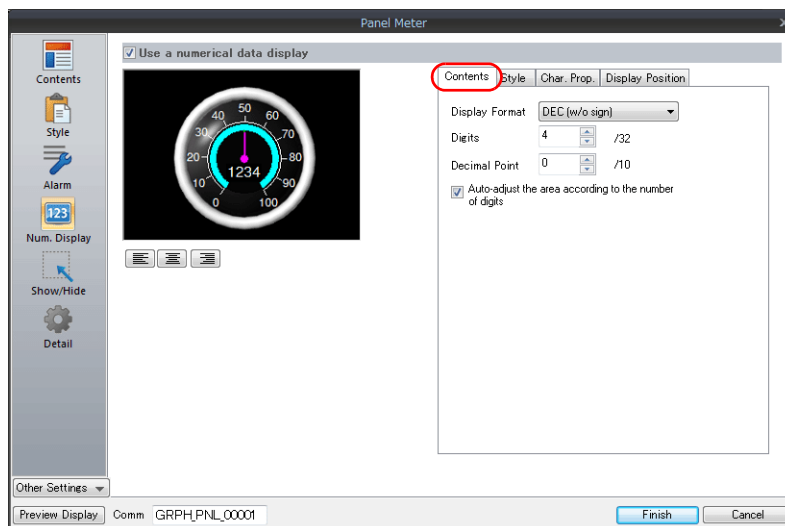
Item	Description
Display	Set the numerical value format.
Digit	Set the number of digits for the numerical data display.
Decimal Point	Set the number of decimal places. When no decimal point is required, set "0".
Auto-adjust the area according to the number of digits	Select this checkbox to automatically adjust the item size based on the [Digit] and [Decimal Point] settings.

9

Style
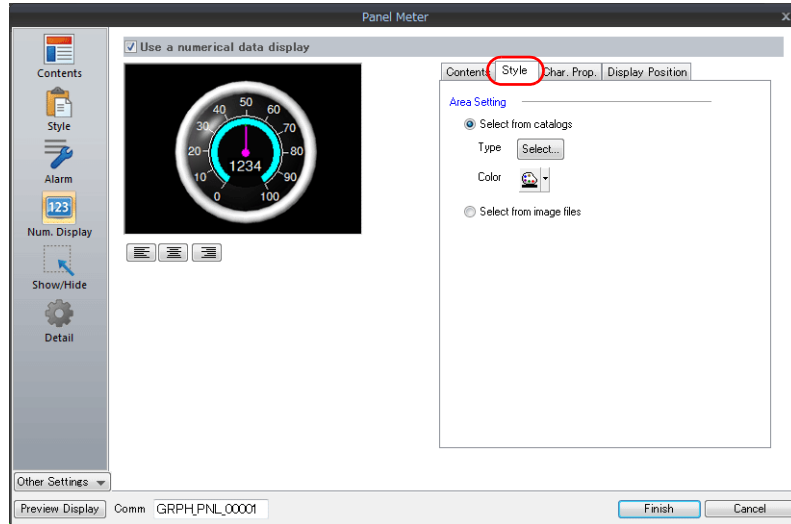
Item			Description

Area Setting	Select from catalogs		Select the design of the numerical data display part to use from the parts catalog.
			Type
			    Select the design of the numerical data display part.
			Color
			    Set the color of the numerical data display part.

	Select from image files		Select the design of the numerical data display part from an image file.
		Select	Select the image file to use.
		Width	Change the width of the image file.
		Height	Change the height of the image file.
		Fix aspect ratio	Enlarge/reduce the image file with the width and height bound to a fixed aspect ratio.

☞   For details on selecting image files, refer to "9.4.4 Using Image Files for the Background and Scale".

Char. prop.
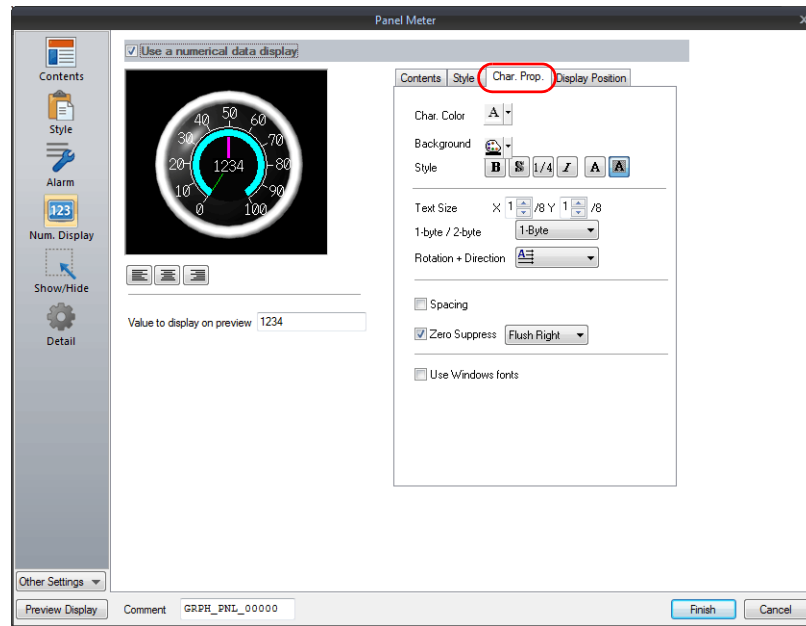
Item	Description
Color	Set the text color.
Background	Set the background color of the numerical data display area.
Style	Set the text style.
Text Size	Set the text size. * This setting changes to point specification when using a Windows font.
Rotation +	Set the orientation of text. * This cannot be set when using a Windows font.
Spacing	To set a text spacing, select this checkbox and specify a spacing. * This cannot be set when using a Windows font.
Zero Suppress	To set zero suppression, select this checkbox and select flush left or flush right.
Use Windows fonts	Select this checkbox to use a Windows font.

Position
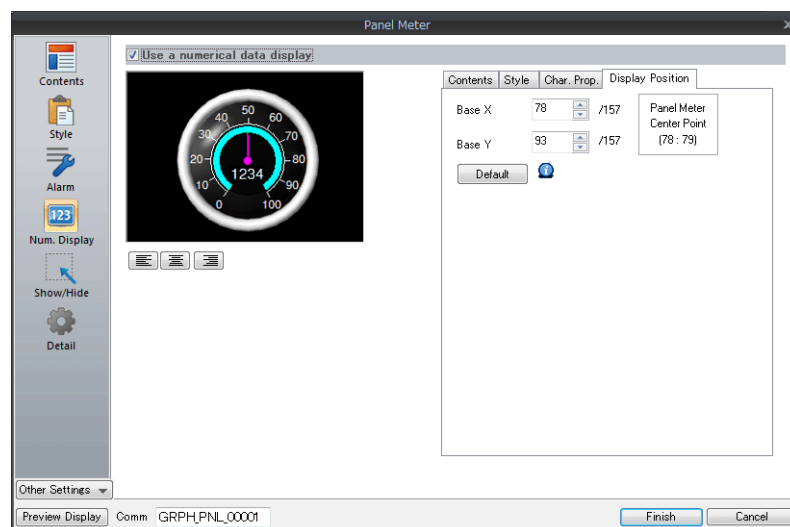
Item	Description	
Base X	Adjust the horizontal position of the numerical data display.	
Base Y	Adjust the vertical position of the numerical data display.	
Panel Meter Center Point	Displays the coordinates of the panel meter center point.	
Default	Restore the base position of the numerical data display (center of the item) to the center coordinates of the panel meter.	
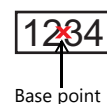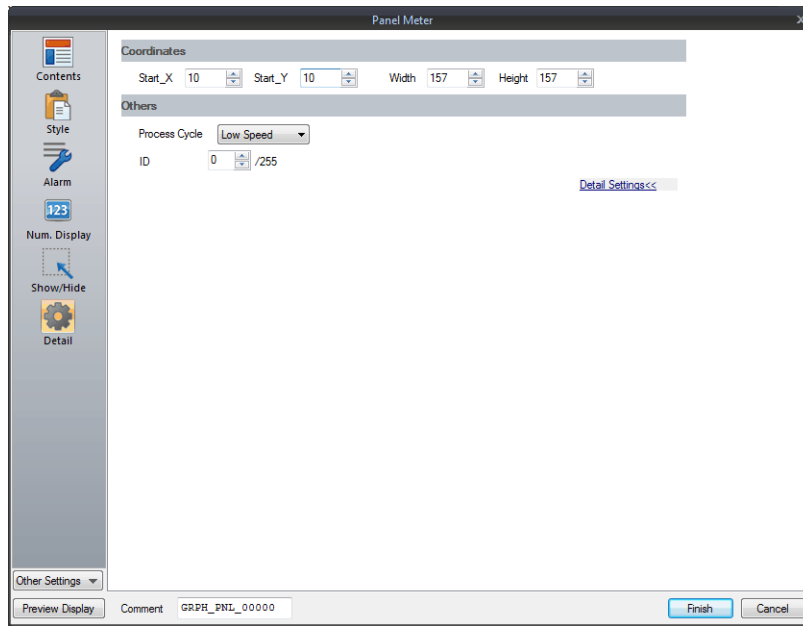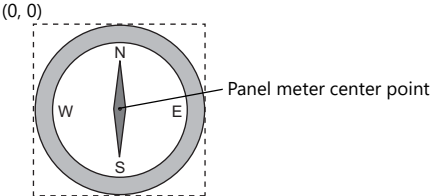
Base point

Detail

Item		Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

9.4.4   Using Image Files for the Background and Scale

An image file created by the user can be used for the part design (background and scale).

Style

Item		Description
Background	Select from images files	Select a bitmap file from the desired folder. The selected bitmap file is stored at ".\MONITOUCH\User\Parts".
Scale	Select from images files	
	Width, Height	Change the width and height of the imported bitmap image.
	Fix aspect ratio	Select this checkbox to use a fixed width-to-height ratio when changing the size of the bitmap image.
	Panel Meter Center Point	Displays the coordinate values of the panel meter (circle) center point.
	Base Point X, Base Point Y	Specify the X and Y coordinate values of the base point in dots to adjust the position of the scale. The indicator rotates around the [Panel Meter Center Point].
	Default	Restore the X and Y coordinate values of the base point to those specified for [Panel Meter Center Point].

Setting procedure

This section explains the procedure for importing a bitmap file into the panel meter.

Background of the panel meter   Scaling
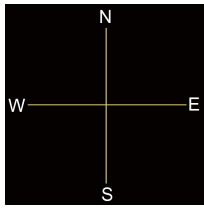
back_A.bmp
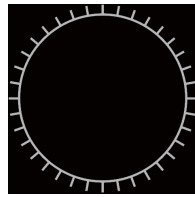
scale_A.bmp

* Black (code 0, 0, 0) areas in the bitmap image automatically becomes transparent on MONITOUCH.
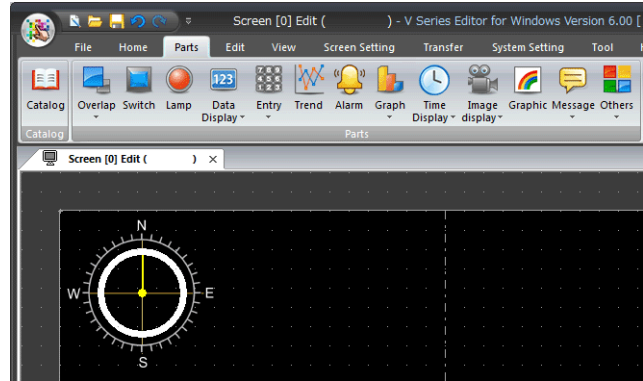
1. Place a panel meter on the screen.
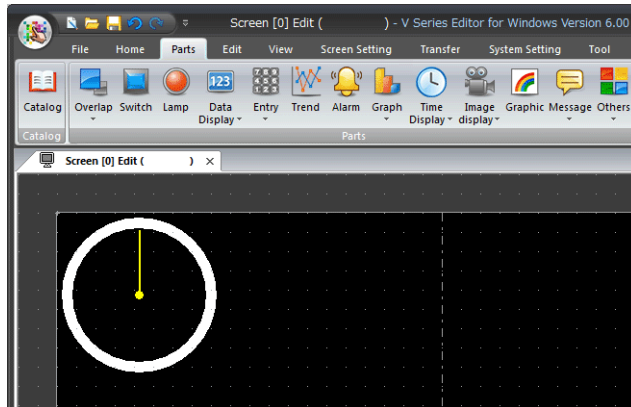
2. Import a background image for the panel meter.
    Select the [Style] → [Design] → [Select from image files] radio button in the settings window and click the [Select] button to select an image file (e.g. back_A.bmp).

Background of the panel meter
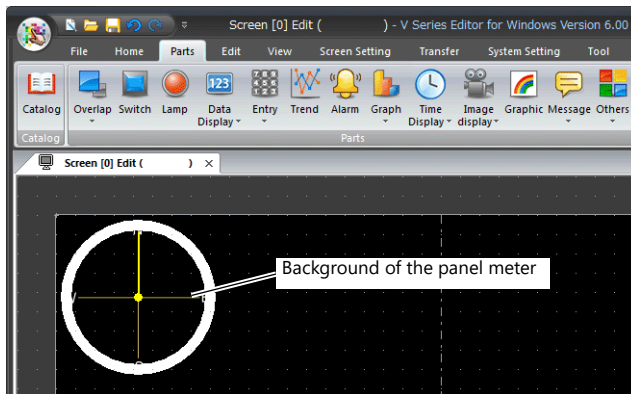
3. Select the [Style] → [Meter] → [Detail Settings] in the settings window to enlarge or reduce the size using the [Outer Radius] and [Inner Radius] values.
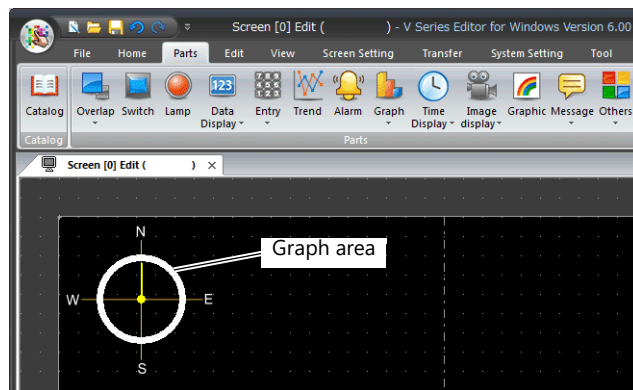
4. Import a bitmap image of the scale.
    Select the [Style] → [Scale] → [Display the scale] → [Select an image file] checkbox in the settings window and click the [Select] button to select an image file (e.g. scale_A.bmp).
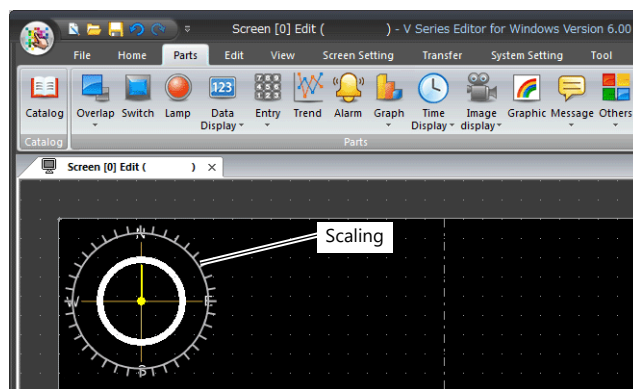
5. Specify values for [Width] and [Height] on the [Style] → [Scale] tab to reduce the size of the scale.
    The position of the scale can be moved by specifying values for [Base Point X] and [Base Point Y].
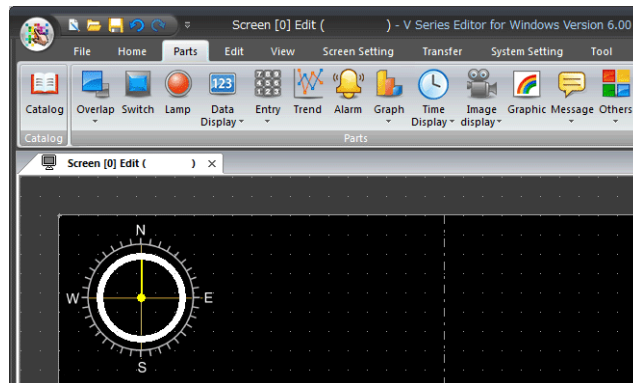
    This completes the necessary settings.

Restrictions

- The maximum panel meter size is width × height = 65936 dots.
- The order of drawing is shown below. Drawing is performed in ascending order.

Panel meter structure

1. Part area *

2. Alarm

3. Scale

4. Indicator

5. Numerical data display
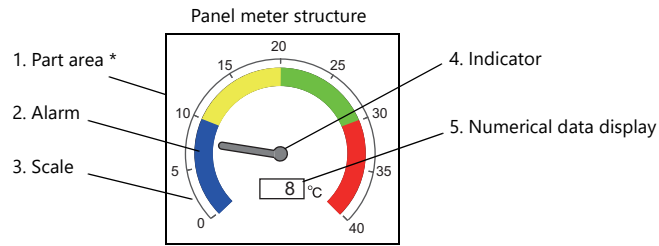
     * When a draw item edited in the [Modify Part] window is placed on a 3D panel meter part, the item is placed over the panel meter.

- The numerical data display is displayed even when a value falls outside the range specified for [Scale] (specified at [Contents] → [Range]).
  However, if the number of digits exceeds the specified value, "---" is displayed.

9.5   Statistic Bar Graph

9.5.1   Overview

- Percentages of data contained in consecutive device memory addresses can be expressed on a graph.
  One statistic bar graph can be divided into a maximum of eight sections.

  ☞   For setting examples, refer to "Displaying a Bar Graph of the Ratio of D100 to D104 Values" page 9-48.

- It is also possible to indicate percentages as numerical values for the statistic bar graph.
  In this case, the statistic bar graph must be linked to a numerical data display.
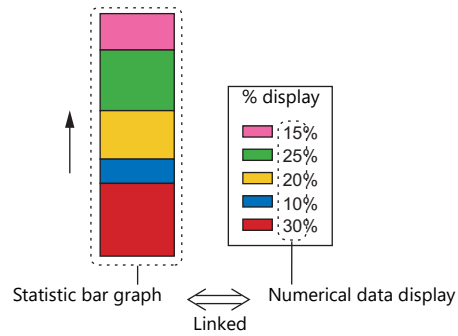
Statistic bar graph   ⟺   Numerical data display
Linked

% display

	15%
	25%
	20%
	10%
	30%

  ☞   For setting examples, refer to "Displaying a Numerical Data Display of the Ratio of D100 to D104 Values" page 9-49.

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9.5.2 Setting Examples

Displaying a Bar Graph of the Ratio of D100 to D104 Values

The following example shows how to display the ratio between the values of five device memory addresses on a bar graph.
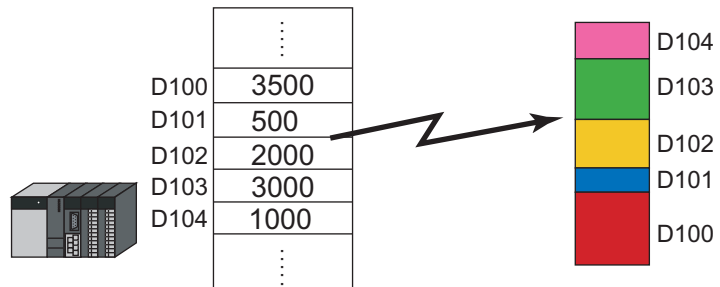
1. Click [Parts] → [Graph] → [Statistic Bar Graph] and place a statistic bar graph on the screen.
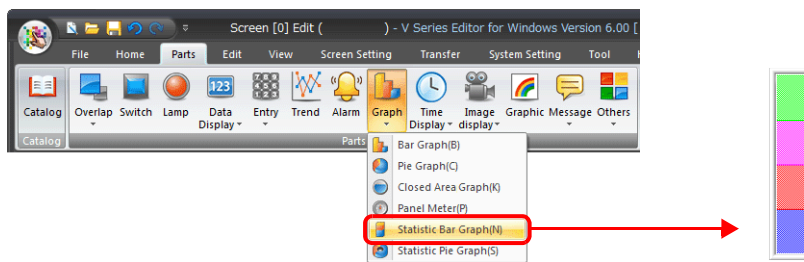
2. Double-click on the statistic bar-graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the top device memory address to display on the graph with [Top Data] → [Device].
   - Set the number of device memory addresses to display on the graph with [Display Setting] → [Number of Data to Display].
   - Set the color of each device memory on the graph display with [Display Setting] → [Color Setting for Data].
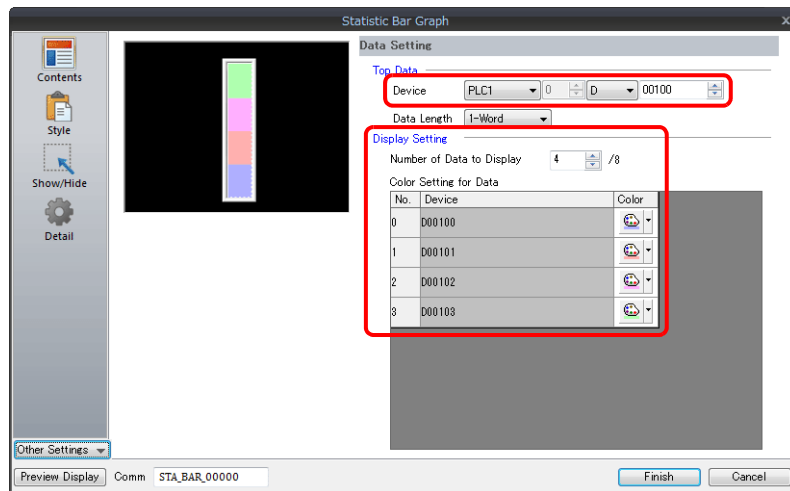
This completes the necessary settings.

Displaying a Numerical Data Display of the Ratio of D100 to D104 Values

The following example shows how to display the ratio between the device memory addresses displayed on the statistic bar graph on a numerical data display.
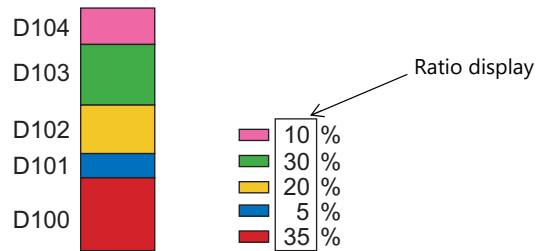
1. Click [Parts] → [Graph] → [Statistic Bar Graph] and place a statistic bar graph on the screen.

2. Double-click on the statistic bar-graph to display the settings window.
    Select [Num. Display] under [Add Parts] in the [Style] settings.

3. The settings window for the numerical data display is displayed. Select [Statistic Graph % Display] for [Function] and specify a value for [Statistic Graph No.]. Click [Finish] to close the settings window of the numerical data display.

4. Repeat steps 2. and 3. to place multiple numerical data displays.
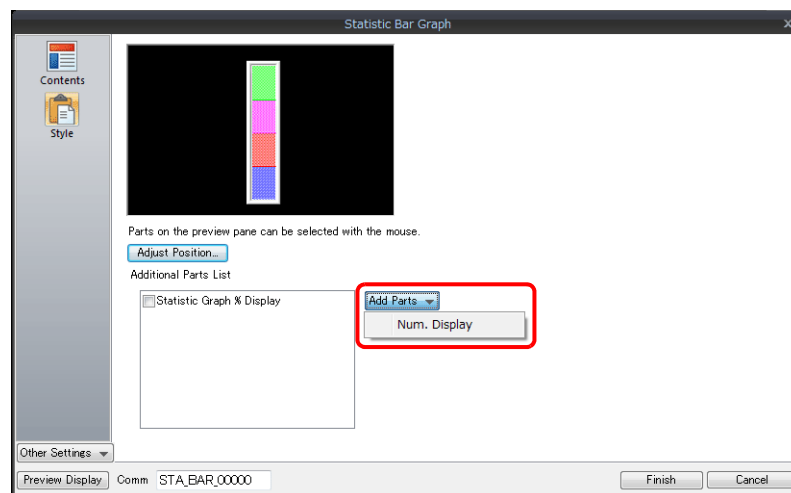
This completes the necessary settings.

9.5.3   Detailed Settings

Contents

Item			Description
Data Setting	Top Data	Device	Set the top device memory address to display on the statistic graph. The required device memory are automatically allocated to the statistic graph. * The data format relies on the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting].
		Data Length (1-Word, 2-Word)	Select data length of the device memory.
	Display Setting	Number of Data to Display	Set the number of device memory to display on the statistic graph.
		Color Setting for Data	Set the color for each data memory displayed on the statistic graph.
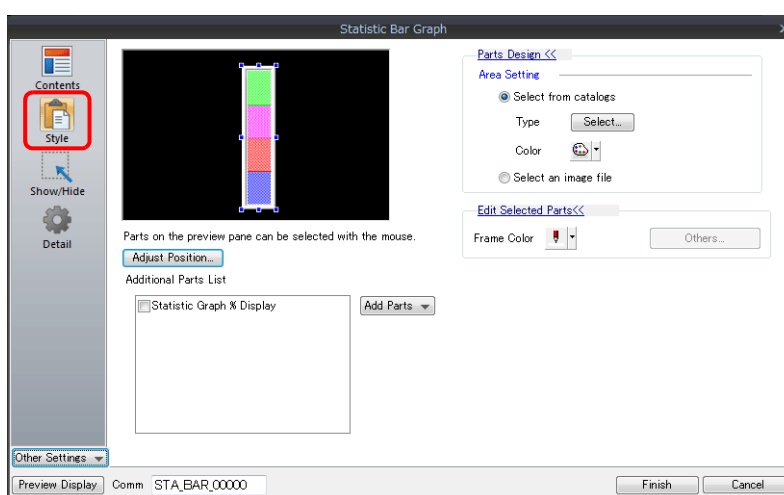
Style

Item		Description

Select from catalogs		Type
		    Set the part design.
		Color
		    Set the part color.

Select an image file		Load a bitmap file.
Frame Color		Set the color of the frame around the graph area.
Additional Parts List	Statistic Graph % Display	Add [Statistic Graph % Display].
Add Parts	Num. Display	Add a numerical data display part.
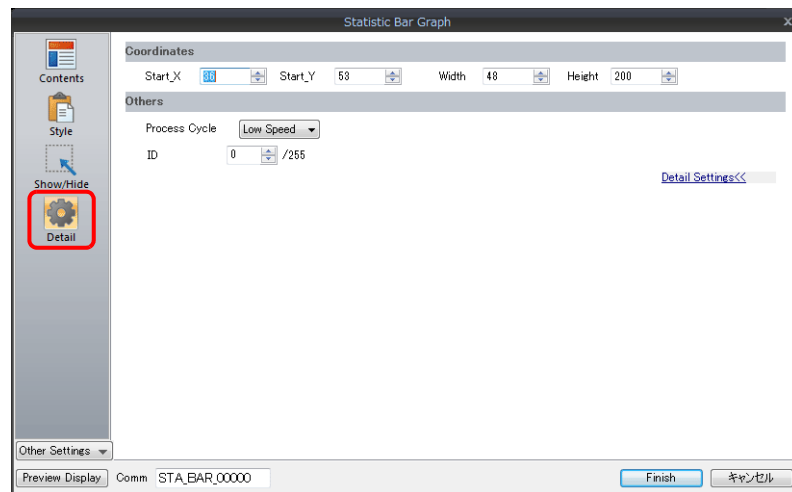
Detail

	Item	Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

9.6   Statistic Pie Graph

9.6.1   Overview

- Percentages of data contained in consecutive device memory addresses can be expressed on a graph.
  One statistic pie graph can be divided into a maximum of eight sections.

  ☞   For setting examples, refer to "Displaying a Pie Graph of the Ratio of D100 to D103 Values" page 9-54.

- It is also possible to indicate percentages as numerical values for the statistic pie graph.
  In this case, the statistic pie graph must be linked to a numerical data display.
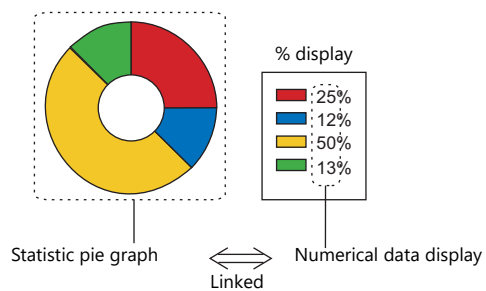
% display

25%
12%
50%
13%

Statistic pie graph   ⟺   Numerical data display
                  Linked

☞   For setting examples, refer to "Displaying a Numerical Data Display of the Ratio of D100 to D103 Values" page 9-55.

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9.6.2 Setting Examples

Displaying a Pie Graph of the Ratio of D100 to D103 Values

The following example shows how to display the ratio between the values of four device memory addresses on a pie graph.
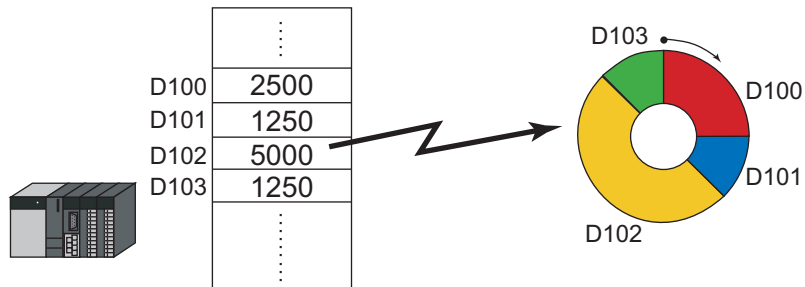
1. Click [Parts] → [Graph] → [Statistic Pie Graph] and place a statistic pie graph on the screen.
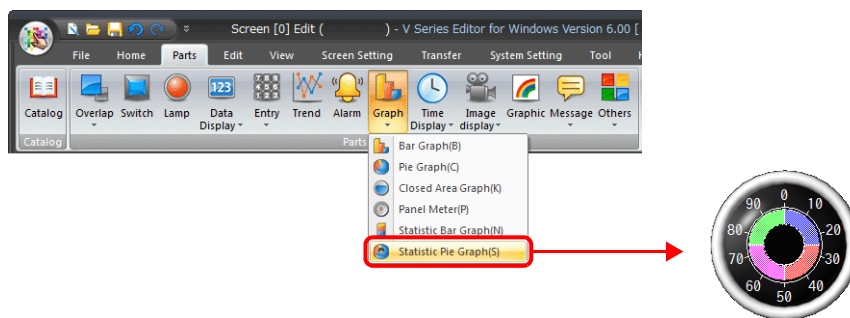
2. Double-click on the statistic pie graph to display the settings window.
   Configure the [Contents] settings as shown below.
   - Set the top device memory address to display on the graph with [Top Data] → [Device].
   - Set the number of device memory addresses to display on the graph with [Display Setting] → [Number of Data to Display].
   - Set the color of each device memory address on the graph display with [Display Setting] → [Color Setting for Data].
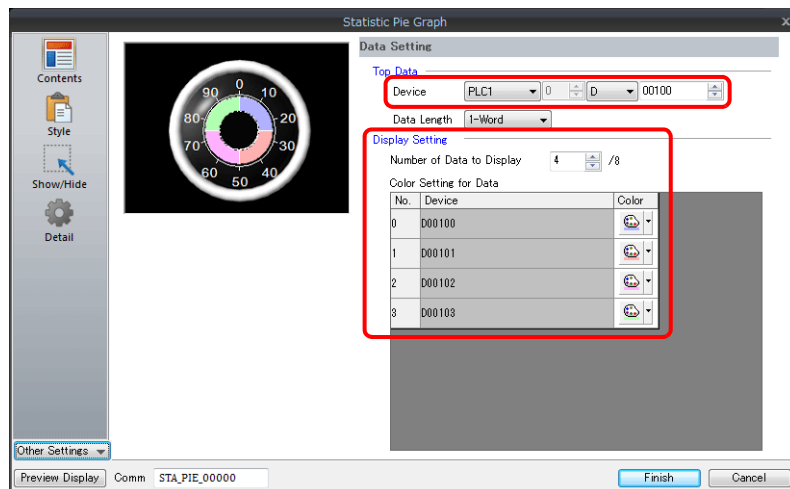
This completes the necessary settings.

Displaying a Numerical Data Display of the Ratio of D100 to D103 Values

The following example shows how to display the ratio between the device memory addresses displayed on the statistic pie graph on a numerical data display.
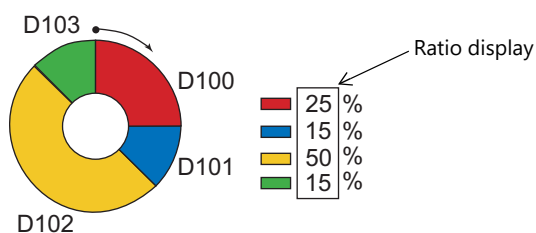
1. Click [Parts] → [Graph] → [Statistic Pie Graph] and place a statistic pie graph on the screen.

2. Double-click on the statistic pie graph to display the settings window.
    Select [Num. Display] under [Add Parts] in the [Style] settings.

3. The settings window for the numerical data display is displayed. Select [Statistic Graph % Display] for [Function] and specify a value for [Statistic Graph No.]. Click [Finish] to close the settings window of the numerical data display.

4. Repeat steps 2. and 3. to place multiple numerical data displays.
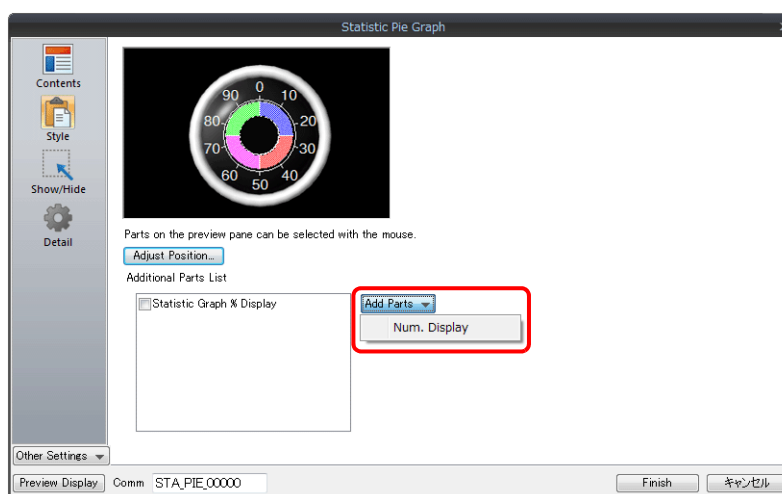
This completes the necessary settings.

9.6.3   Detailed Settings

Contents

Item			Description
Data Setting	Top Data	Device	Set the top device memory address to display on the statistic graph. The required device memory are automatically allocated to the statistic graph. * The data format relies on the setting at [Code: DEC/BCD] under [Communication Setting] in the [PLC Properties] window accessible via [System Setting] → [Hardware Setting].
		Data Length (1-Word, 2-Word)	Select data length of the device memory.
	Display Setting	Number of Data to Display	Set the number of devices to display on the statistic graph.
		Color Setting for Data	Set the color for each data displayed on the statistic graph.
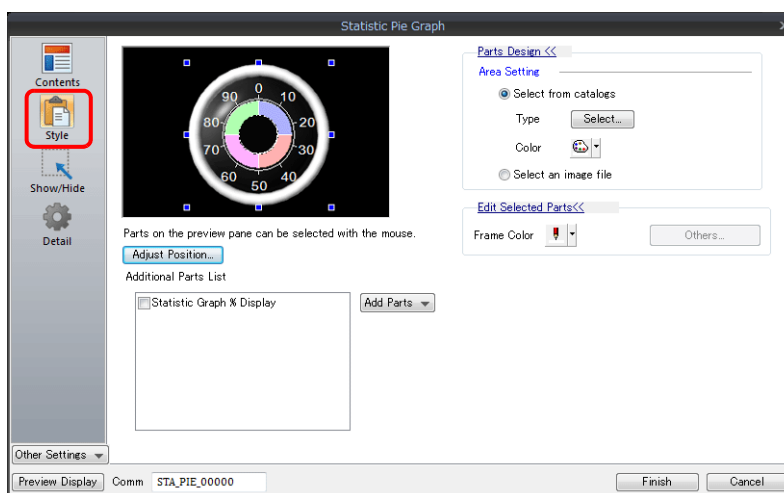
Style

Item		Description

Select from catalogs		Type
		    Set the part design.
		Color
		    Set the part color.

Select an image file		Load an image file.
Frame Color		Set the color of the frame around the graph area.
Additional Parts List	Statistic Graph % Display	Add [Statistic Graph % Display].
Add Parts	Num. Display	Add a numerical data display part.
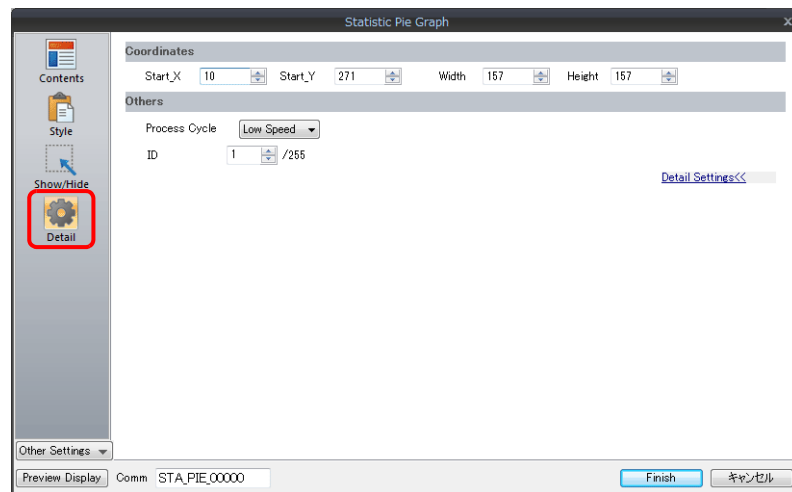
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

10 Calendar

10.1   Overview

- The calendar part is used to show the year, month, day, hour, minute, second, and day of the week on the screen.
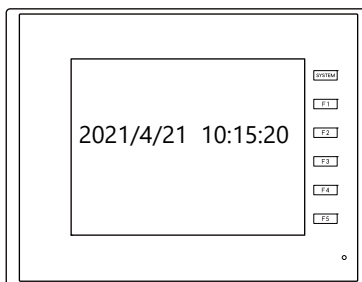
- Range of calendar display

Model	Display Range[*1]	When Power is Turned On First Time after Purchase [*2]
TS2060	2006/1/1 to 2105/12/31	2016/4/1, 9:00:00
TS1000S		2018/4/1, 9:00:00

*1 To use the built-in calendar of the TS series, use the system program Ver. 2.380 or later.
   When using system program Ver.2.370 or earlier, the calendar display range of the TS series is 2006/1/1 to 2037/12/31.
*2 Without communication with a PLC with a calendar function and without using the built-in calendar of the TS

- Depending on the calendar data to be used, the setting and correction methods vary. Refer to the following table.

	PLC Calendar [*1]	TS Calendar [*2]	User Format [*3]
Part	• Time display • Calendar	• Time display • Calendar	• Time display
Required Settings	Connected device settings [*1] [Calendar] and SRAM/clock settings [*4] Built-in clock not used	SRAM/clock settings [*4]	Time display format setting
At Power ON	The PLC calendar [*1] is automatically read and displayed.	The TS calendar is displayed.	Data in the device memory set for the time display part is read and displayed.
Running	TS CPU clock	TS CPU clock	
Auto Correction	The PLC calendar [*1] is automatically read at 01:23:45 a.m.	–	–

Correction	The bit of the device memory set for the calendar is turned ON.
	   or
	Macro:
	SET_CLND PLC1
	PLC_CLND [*5]........... PLC2 - 8
		Main Menu screen
		   or
		Macro: SET_SYS_CLND
			–

Backup at Power OFF	×	○	×

*1 PLC calendar: Calendar that the PLC retains in the CPU
   Because a maximum of 8-way communication is possible on the TS, the PLC calendar data to be read must be determined.
   This can be configured using the [Calendar] setting at [System Setting] → [Hardware Setting] → [Control Area]. When [PLC Selection] is set to [PLC1], the calendar of PLC1 is read; when [PLC Selection] is set to [PLC3], the calendar of PLC3 is read.
   However, if the PLC specified for [PLC Selection] is not equipped with a built-in calendar, it is regarded as "no calendar".
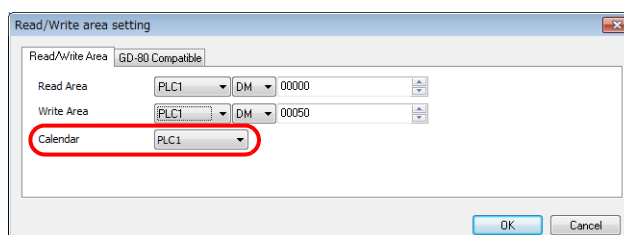
*2 TS calendar: Calendar on the TS unit

*3 User format: Calendar in the user-defined format created in the PLC

*4   SRAM/Clock Setting
        Always set this option when using the built-in calendar in the TS unit.
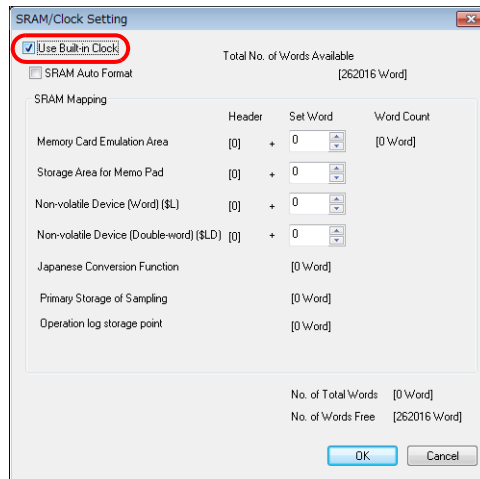
- Select [System Setting] → [Unit Setting] → [SRAM/Clock] and select the [Use SRAM Calendar] checkbox.
- Always install a backup battery.

        ☞   For details on batteries, refer to the TS2060 Hardware Specifications or the TS1000 Smart Hardware Specifications.

*5   In the case of PLC2 to PLC8, calendar correction is performed by the execution of macro commands "PLC_CLND" and "SYS (SET_SYS_CLND)".
        When the bit of the device set for calendar reading is turned ON, the calendar data of the PLC specified for [Calendar] will be read as explained in Note 1 (*1).

        ☞   For details, refer to the Macro Reference Manual.

10.2   Time Display

10.2.1 Overview

- Displays the PLC clock.
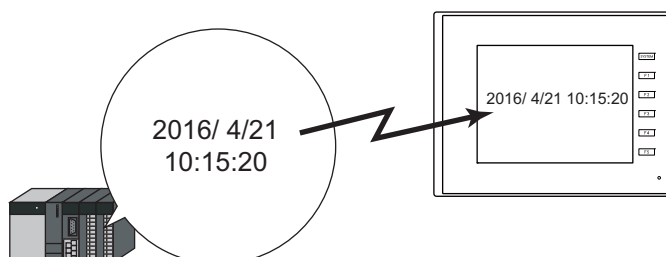
☞   For setting examples, refer to "Displaying the PLC Calendar" page 10-4.

- Displays the TS unit clock.
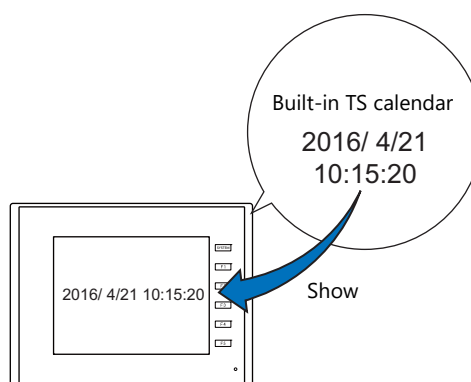
☞   For setting examples, refer to "Displaying the Built-in TS Calendar" page 10-6.

- Displays the values of consecutive device memory addresses as the time.
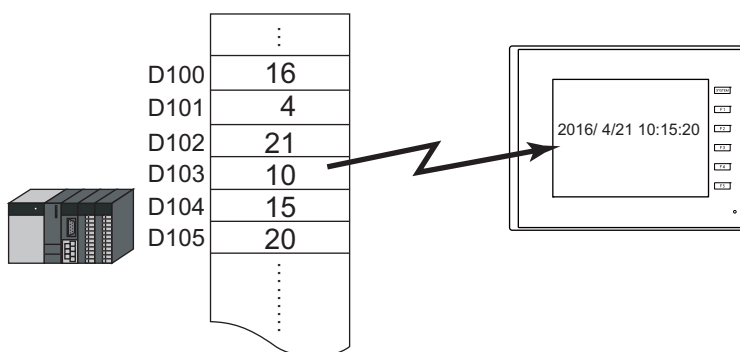
☞   For setting examples, refer to "Display Using the Time Display Format Setting" page 10-8.

- Displays the seconds data stored in device memory in timer format.
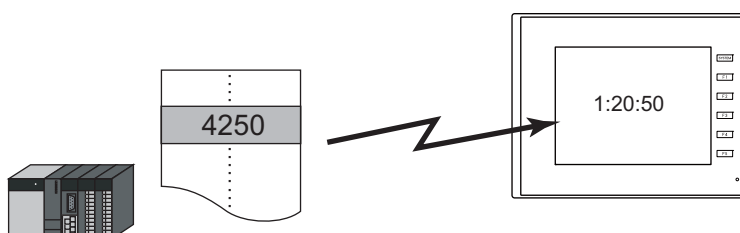
☞   For setting examples, refer to "Displaying Seconds Data Stored in Device Memory in Timer Format" page 10-10.

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10.2.2 Setting Examples

Displaying the PLC Calendar

Display the PLC's built-in calendar on the TS unit.
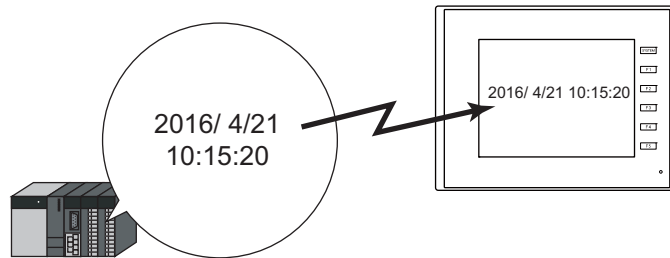
1. Click [System Setting] → [Hardware Setting] → [Read/Write Area].
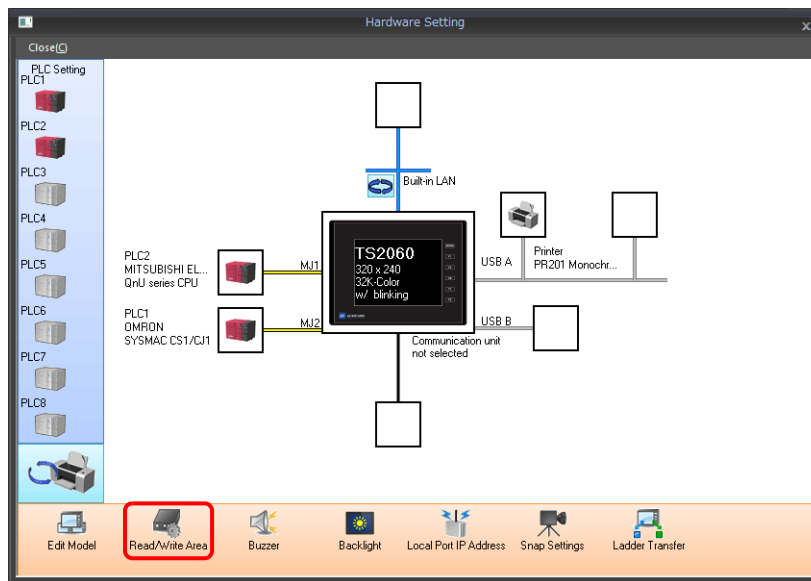
2. Set the PLC to use at [PLC Selection] under [Calendar Setting].
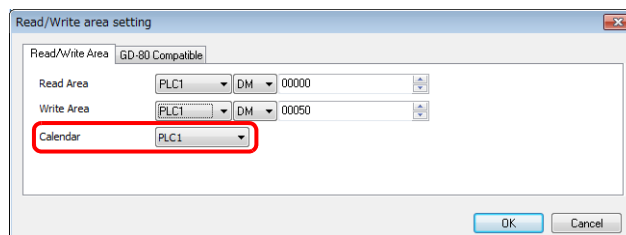
3. Click [System Setting] → [Unit Setting] → [SRAM/Clock] and deselect the [Use SRAM Calendar] checkbox.
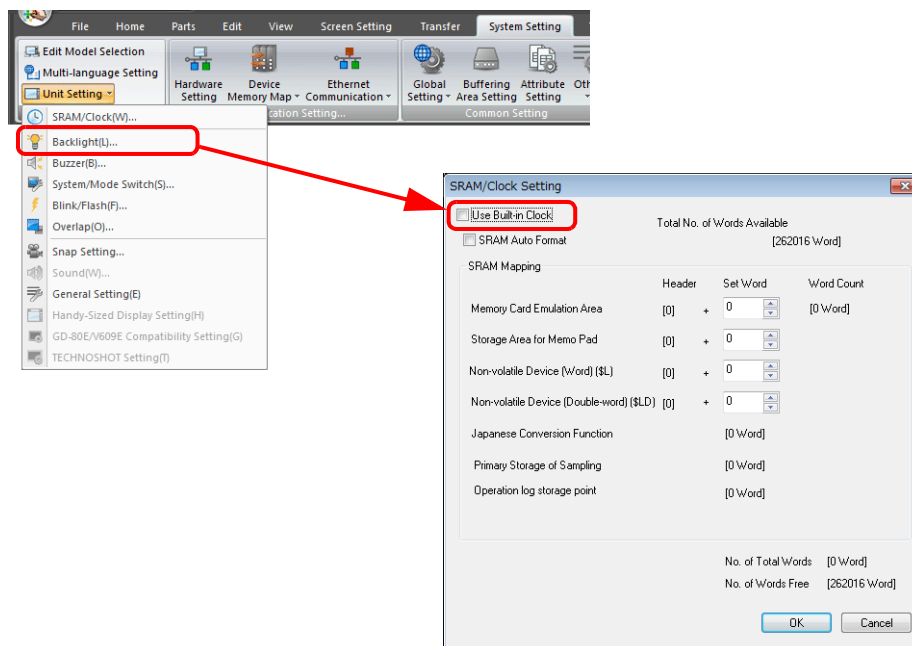
4. Click [Parts] → [Time Display] → [Time Display] and place a time display part.
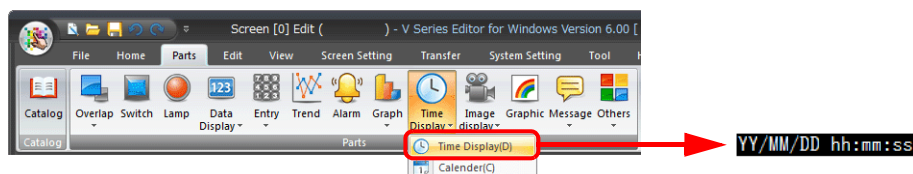
5. Double-click on the time display part to display the settings window.
Configure the [Contents] settings as shown below.
- Select [Type] → [Display the system calendar].
- Specify the format of the date and time under [Display Format].
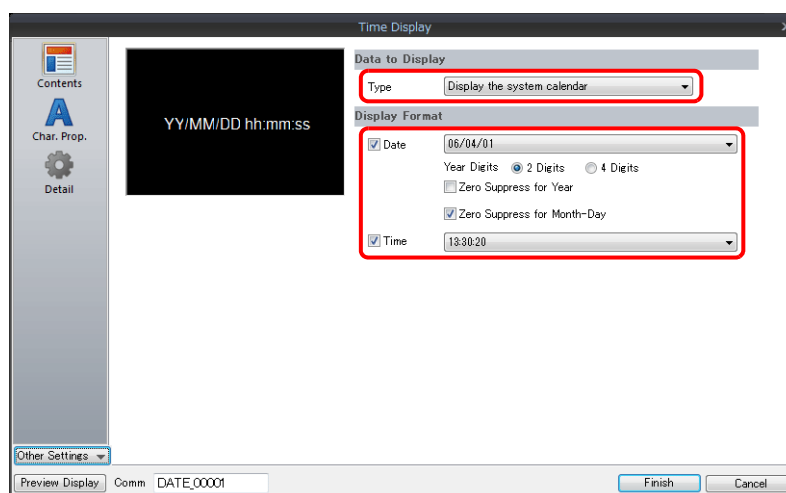
This completes the necessary settings.

Displaying the Built-in TS Calendar

The following example shows how to display the built-in TS calendar.
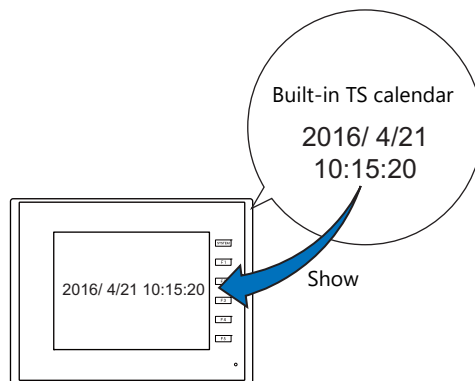
1. Click [System Setting] → [Unit Setting] → [SRAM/Clock] and select the [Use SRAM Calendar] checkbox.
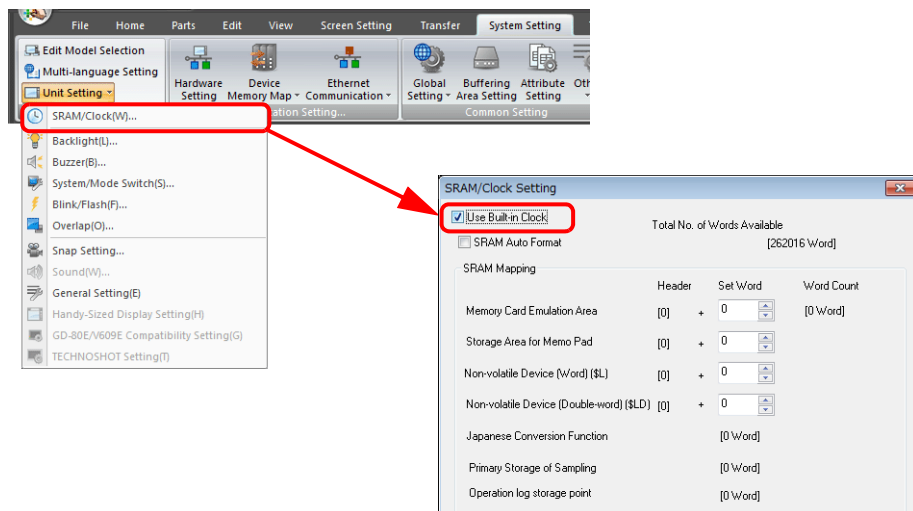
2. Click [Parts] → [Time Display] → [Time Display] and place a time display part.
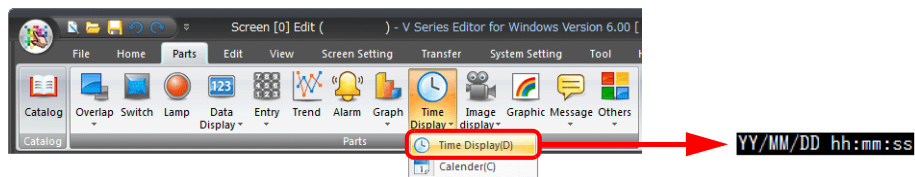
3. Double-click on the time display part to display the settings window.
    Configure the [Contents] settings as shown below.
    - Select [Type] → [Display the system calendar].
    - Specify the format of the date and time under [Display Format].
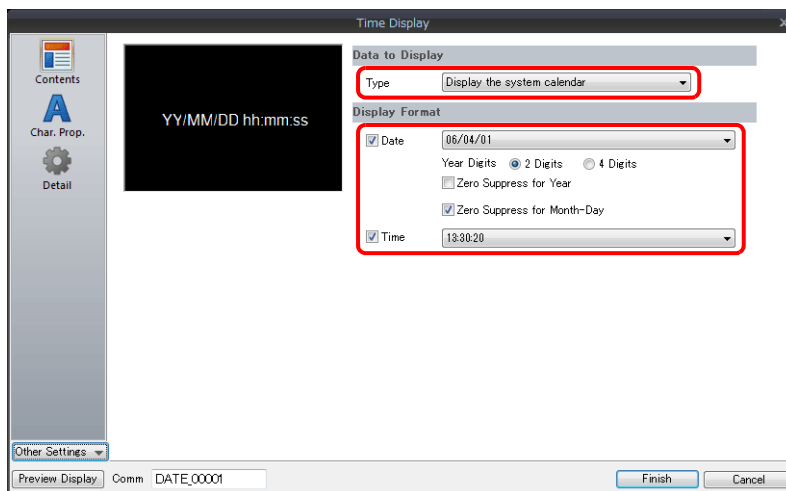
This completes the necessary settings.

Display Using the Time Display Format Setting
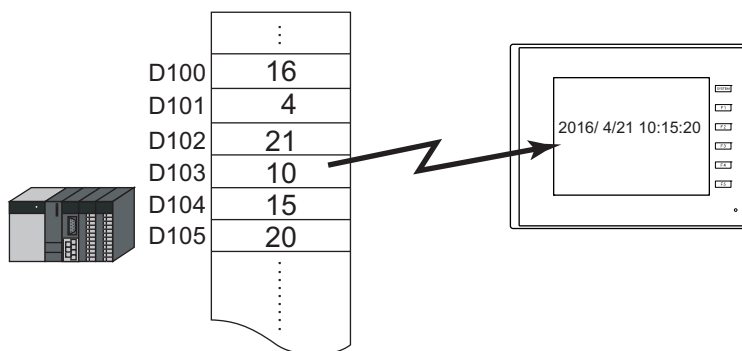
1. Click [Parts] → [Time Display] → [Time Display] and place a time display part.
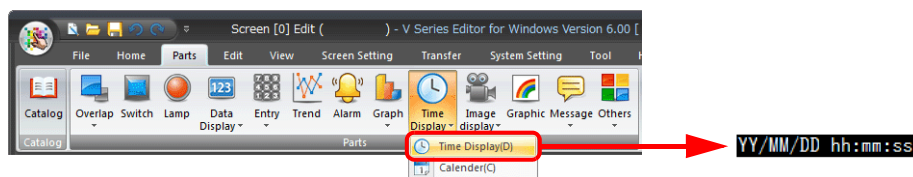
2. Double-click on the time display part to display the settings window.
    Configure the [Contents] settings as shown below.
    - Select [Type] → [Display the value of the designated device].
    - Select [Display Mode] → [Time Display].
    - Specify the top device memory address to use for time display with [Device Designation].
    - Specify the display format of the date and time under [Display Format].
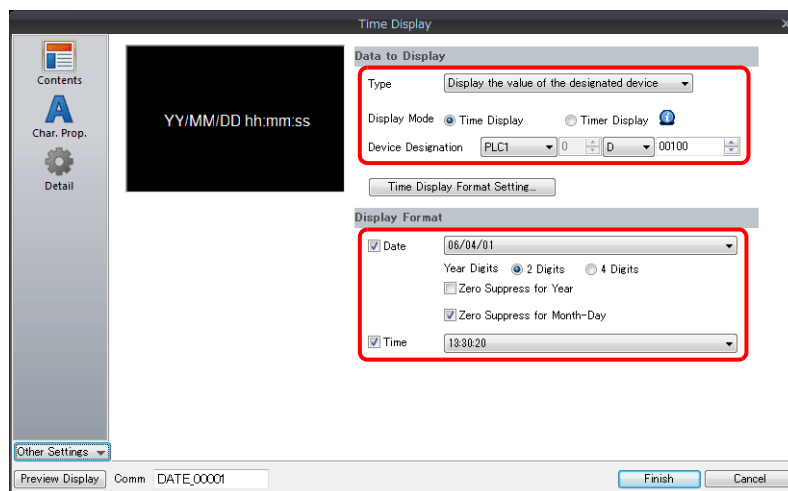
3. Specify the format of the data to read with [Time Display Format Setting].

Example 1: Read Word Count: 6
            Data Unit: Word
            Code Type: BCD
            0000: Year
            0001: Month
            0002: Day
            0003: Hour
            0004: Minute
            0005: Sec

D100	16
D101	4
D102	21
D103	10
D104	15
D105	20

2016/ 4/21 10:15:20
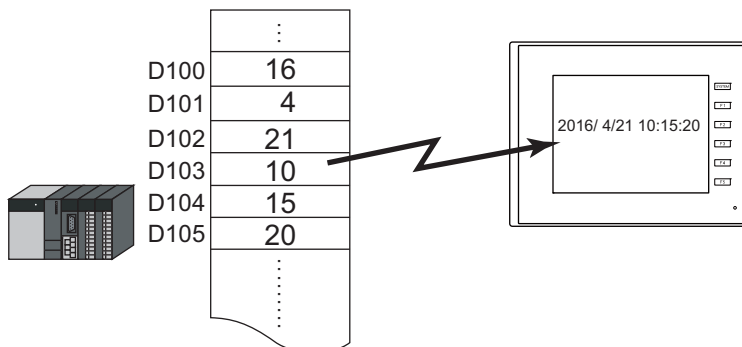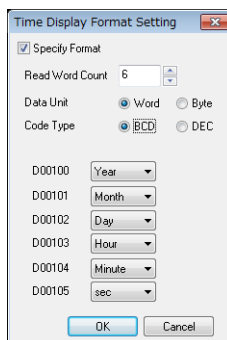
Example 2: Read Word Count: 3
            Data Unit: Byte
            Code Type: BCD
            0000: Year Month
            0001: Day Hour
            0002: Minute Sec

D100	1604
D101	2110
D102	1520

2016/ 4/21 10:15:20
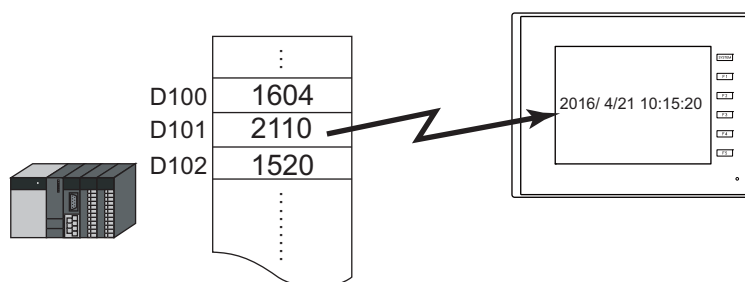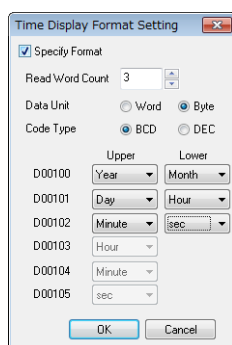
This completes the necessary settings.

Displaying Seconds Data Stored in Device Memory in Timer Format

The following example shows how to display the seconds data stored in device memory in timer format on a TS unit.
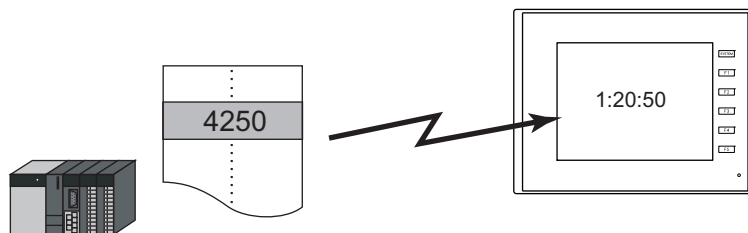
1. Click [Parts] → [Time Display] → [Time Display] and place a time display part.
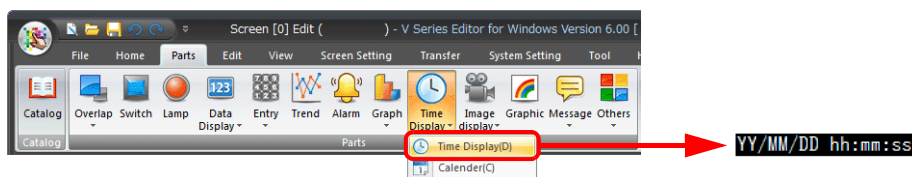
2. Double-click on the time display part to display the settings window.
   Configure the [Contents] settings as shown below.
   - Select [Type] → [Display the value of the designated device].
   - Select [Display Mode] → [Timer Display].
   - Specify the device memory address for storing the seconds data with [Device Designation].
   - Specify the display format of the time under [Display Format].
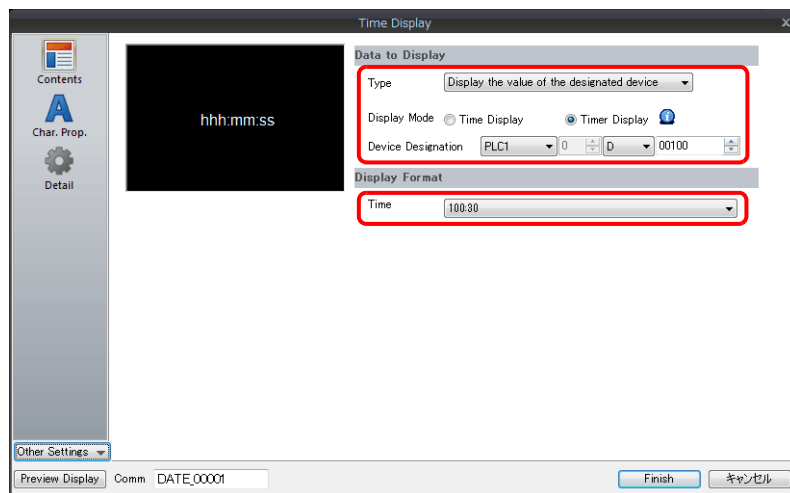
This completes the necessary settings.

10.2.3 Detailed Settings

Contents

Item			Description
Data to Display	Type	Display the system calendar	Use data from the PLC calendar, TS calendar, or calendar device memory. The display format can be set freely and the character size enlarged or reduced easily.
		Display the value of the designated device	Use a user-formatted calendar. Display the values of consecutive device memory addresses as the calendar.
	Display Mode	Time Display	This setting is available when "Display the value of the designated device" is selected for [Type]. Display the values of consecutive device memory addresses as the calendar.
		Timer Display	This setting is available when "Display the value of the designated device" is selected for [Type]. Display the seconds data stored in device memory in timer format.
	Device Designation		This setting is available when "Display the value of the designated device" is selected for [Type]. Specify the top address of the device memory for reading.
	Time display format setting		This setting is available when "Display the value of the designated device" is selected for [Type]. Set the calendar data format. For details, refer to "Time display format setting" page 10-12.
Display Format	Date		Select this checkbox to display the date. Set the date display format.
		Year Digits	Set the number of digits used to express the year.
		Zero Suppress for Year	Specify whether to use zero suppression for the year.
		Zero Suppress for Month-Day	Specify whether to use zero suppression for the month and day.
	Time		Select this checkbox to display the time. Set the time display format.

Time display format setting
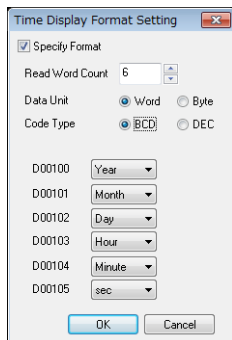
Item	Description
Specify Format	Select this checkbox if [Data Display] → [Type] → [Display the value of the designated device] is selected and [Display Mode] is set to [Time Display].
Read Word Count (1 - 6)	Data for the number of words to be read starting at [Device Designation] are read as the calendar data.
Data Unit *1 (Word, Byte)	Select [Word] or [Byte] for data unit when reading data from the PLC.
Code Type (BCD/DEC)	Select the code to be used at the time of reading data from the PLC.
0000 - 0005	Specify the contents of data for each device memory address.

*1 Device memory allocation for each data unit
   • Word

   • Byte

Character Properties

Item	Description
Color	Set the text color and area background color.
Style	Set the text style.
Character Size	Set the text size. This setting changes to point specification when using a Windows font, Gothic font, or stroke font.
1-byte / 2-byte	Select one-byte or two-byte display.
Rotation + Direction	Set the orientation of text. This cannot be set when using a Windows font.
Spacing	To set a text spacing, select this checkbox and specify a spacing. This cannot be set when using a Windows font.
Use Windows fonts	Select this checkbox to use a Windows font.
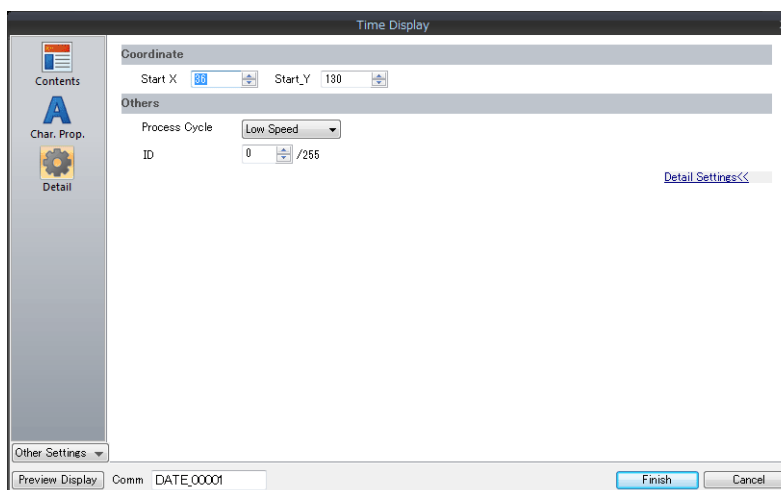
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at bottom left of part)
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set the ID.

10.3 Calendar

10.3.1 Detailed Settings
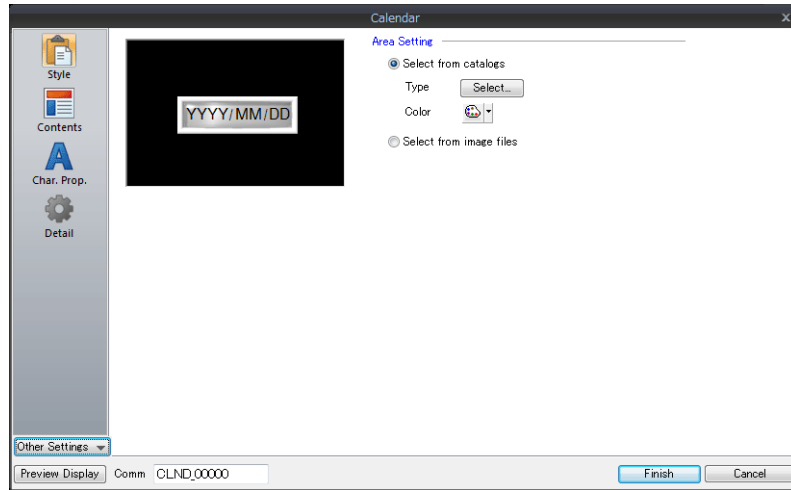
Style

Item		Description

Area Setting	Select from catalogs	Type
		    Set the part design.
		Color
		    Set the part color.

	Select from image files	Load a bitmap file.

Contents

Item		Description

Display Format	Item to Display	Set the items to display on the calendar.
		The year in Western calendar format and the hour (0 to 24) are displayed.
		    Year Month Day Hour Minute Second
		    Year Month Day
		    Hour Minute Second
		    User format
		        Select the checkbox of the items to display from year, month, day, hour, minute, and second.

	Year	Select either two digits or four digits to indicate the year. Display example: Two digits indicate the year 2016 as "16", and four digits as "2016".
Display days of the week		Register the display names of each day of the week. A maximum 13 one-byte characters (6 two-byte characters) can be used.

Character Properties

When [Batch edit date/time] is selected

The character properties of the year, month, day, hour, minute, and second can be set at once.

Item	Description
Color	Set the text color and area background color.
Style	Set the text style.
Character Size	Set the text size. This setting changes to point specification when using a Windows font, Gothic font, or stroke font.
Rotation + Direction	Set the orientation of text. This cannot be set when using a Windows font.
Spacing	To set a text spacing, select this checkbox and specify a spacing. This cannot be set when using a Windows font.
Zero Suppress	Select this checkbox to use zero suppression.
1-byte / 2-byte	Select one-byte or two-byte display.
Use Windows fonts	Select this checkbox to use a Windows font.

When [Edit Date/Time Individually] is selected

The character properties of the year, month, day, hour, minute, and second can be set individually.
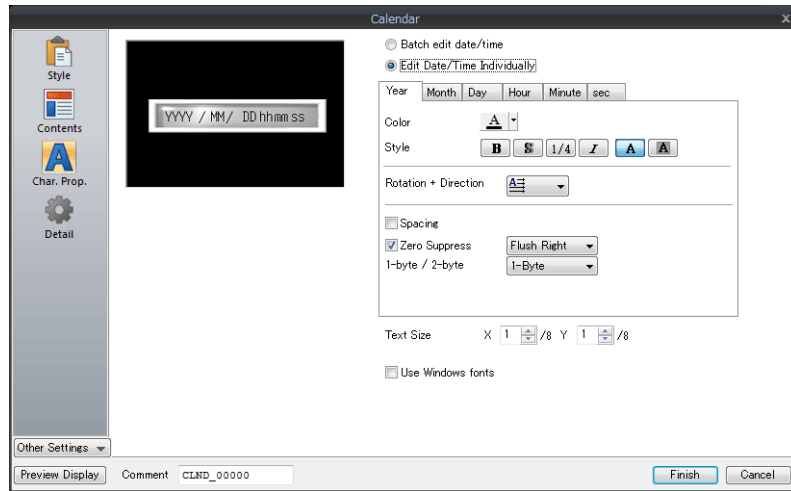
Item		Description
Year/Month/ Day/Hour/ Minute/sec	Color	Set the text color and area background color.
	Style	Set the text style.
	Rotation + Direction	Set the orientation of text. This cannot be set when using a Windows font.
	Spacing	To set a text spacing, select this checkbox and specify a spacing. This cannot be set when using a Windows font.
	Zero Suppress	Select this checkbox to use zero suppression.
	1-byte / 2-byte	Select one-byte or two-byte display.
Character Size		Set the text size. This setting changes to point specification when using a Windows font, Gothic font, or stroke font.
Use Windows fonts		Select this checkbox to use a Windows font.
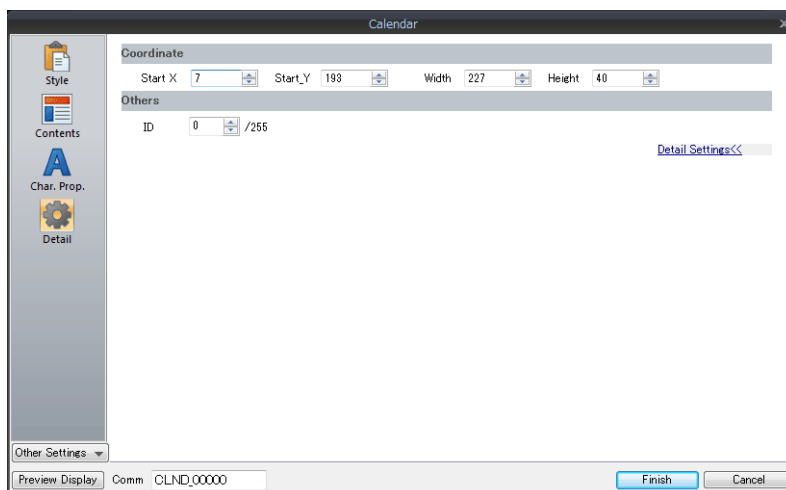
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the placement coordinates. (Coordinates at top left of part)
	Width/Height	Specify the width and height of the part.
Others	ID	Set the ID.

Notes

- Calendar parts consist of "hour, minute, and second" parts and "year, month, and day" parts as well as two-level displays. Additionally, there are parts for punctuation marks like ":" and "-".
- Calendar data is displayed in the following format on the computer.

YY or YYYY	MM	DD	hh	mm	ss	SUN
Year	Month	Day	Hour	Minute	Second	Weekday (Displayed as registered)

10.4 Calendar Data Correction

Calendar data that no longer displays the actual time can be corrected.
The setting method varies depending on the part selected.
Check the table of correction fields on "Overview" page 10-1 and correct the data as needed.

10.4.1 Correcting in the Control Area

PLC with Calendar Function

1. Refer to the PLC manual and correct time data in the calendar device memory of the PLC.
2. Set bit 11 of read area "n" configured at [System Setting] → [Hardware Setting] → [Read/Write Area].
   The TS will read the calendar data from the PLC.

PLC without Calendar Function

1. Set the correct calendar data for the [Calendar device] specified on the [GD-80 Compatible] tab window at [System Setting] → [Hardware Setting] → [Read/Write Area].
2. Set bit 11 of read area "n" specified on the [Read/Write Area] tab window.
   The set calendar data will be read.

(Operation Example)

[Calendar device]:   D100 to 106
[Read Area]:   D0

(1) Set the data.
    D100 = 2016
    D101 = 4
    D102 = 20
    D103 = 12
    D104 = 30
    D105 = 0
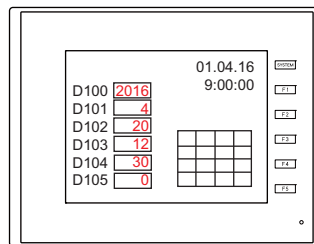
(2) Set bit 11 of read area "D0".
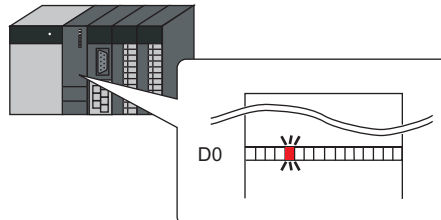
Calendar readout
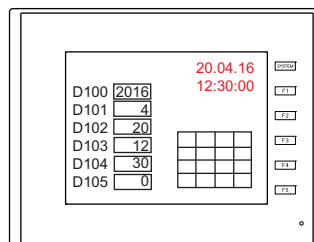
10.4.2 Correcting Using a Macro

The calendar data in PLC 1 can be corrected by executing the macro command "SYS (SET_CLND)".

1. According to the macro format, set data for "year, month, day, hour, minute, and second" correctly at the relevant device memory.
2. Execute the "SYS(SET_CLND)" macro command as the ON macro of a switch, etc.

   The calendar data is written to PLC1.

   The corrected calendar data will be read.

(Operation Example)

(1) Set the data.
Set 20.04.16, 12:00:00.

$u0000 = 2016 (W)
$u0001 = 4 (W)
$u0002 = 20 (W)
$u0003 = 12 (W)
$u0004 = 0 (W)
$u0005 = 0 (W)
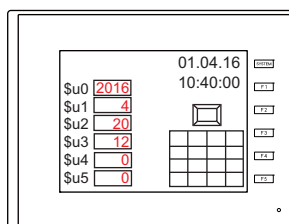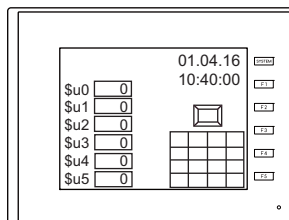
(2) Execute the macro command.
Set the calendar of PLC1, port 1 to 20.04.16 12:00:00.

[ON Macro Edit]
SYS(SET_CLND) $u0000
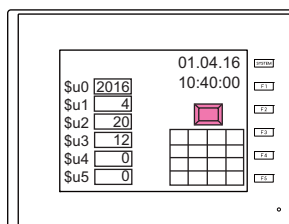
Rewrite the PLC calendar.
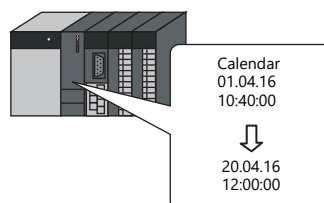
Calendar readout

Macro commands "PLC_CLND" and "SYS(SET_SYS_CLND)" are used to correct the calendar data in PLC2 to PLC8.
For details, refer to the Macro Reference Manual.
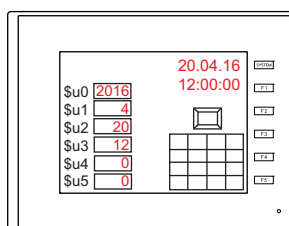
10.4.3 Correcting in Local Mode

Calendar data can be set on the [SRAM/Clock] screen that can be displayed in Local mode.

* **Correction can only be performed when using the built-in clock.**

☞ For details on settings, refer to the TS2060 Hardware Specifications or the TS1000 Smart Hardware Specifications.

MEMO

MONITOUCH

11   Graphics

11.1 Graphics

11.1 Graphics

11.1.1 Overview

A variety of pre-registered graphics can be displayed on the screen or changed based on bit activation and the graphic number.

The graphic display method differs depending on the [Operation Select] setting.

- Switch
  Switches can be used to display or change between graphics and text registered in the graphic library.
  In this case, the displayed graphics cannot be moved or transformed.
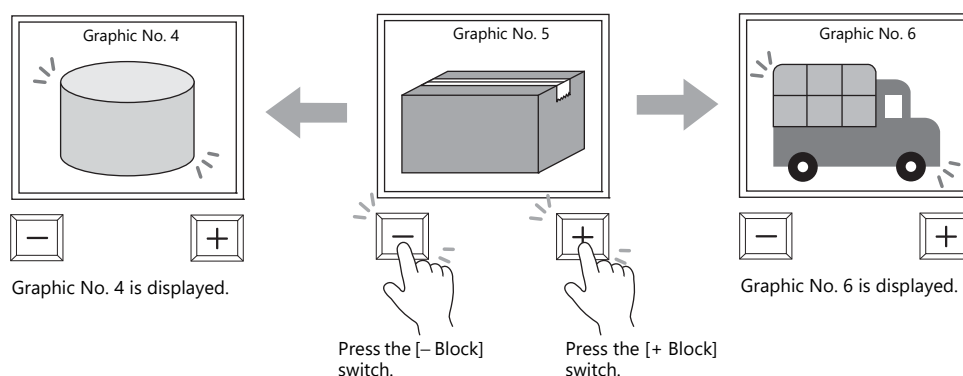
- Device (No. Designation)
  A graphic number can be specified for display using the [Device (No. Designation)] setting.
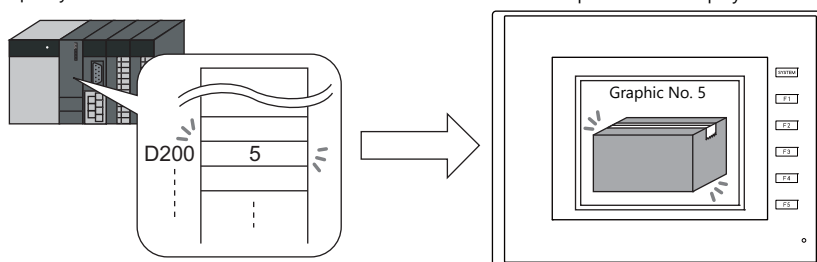
The displayed graphics can be moved or transformed.
To animate or transform graphics or text, set up parameters for these items in the graphic library.
When parameters are set, the required device memory addresses are allocated for animation and transformation.
For details on the procedure for setting parameters, refer to "11.1.4 Graphic Library (Parameter Settings)" page 11-15.
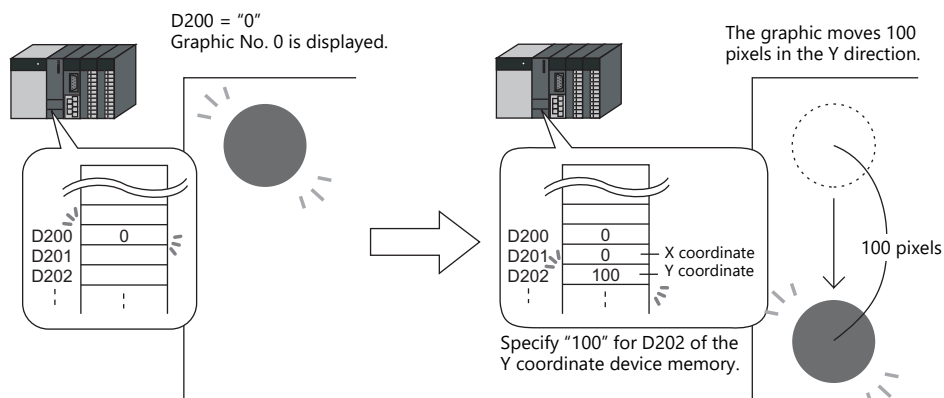
- Device (Bit Designation)
  The graphics or text registered in the graphic library can be shown or hidden according to bit activation.
  There are two display types.

  - Type: 1-Graphic
    When the bit is set to ON, the corresponding graphic is shown, and when the bit is set to OFF, the graphic is hidden.

  When bit 1 of D200 is activated ...

  Screen

  The picture corresponding to bit 1 is displayed on the screen.

  D200

  Beer
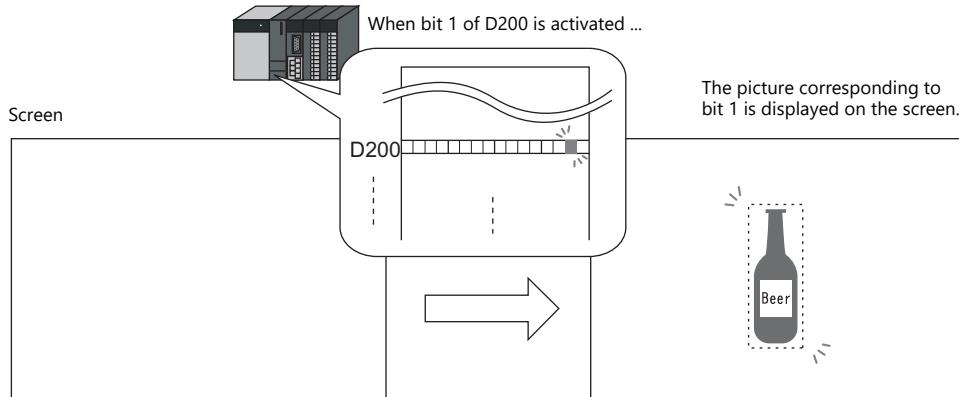
  - Type: 2-Graphic
    Two graphics are assigned to one bit. When the bit is set to OFF, the OFF graphic is displayed, and when the bit is set to ON, the ON graphic is displayed.

  Bit 1 of D200 is deactivated.

  D200

  Screen

  Bit 1 of D200 is activated.

  D200

  OFF graphic is displayed on the screen.

  Changes to the ON graphic.
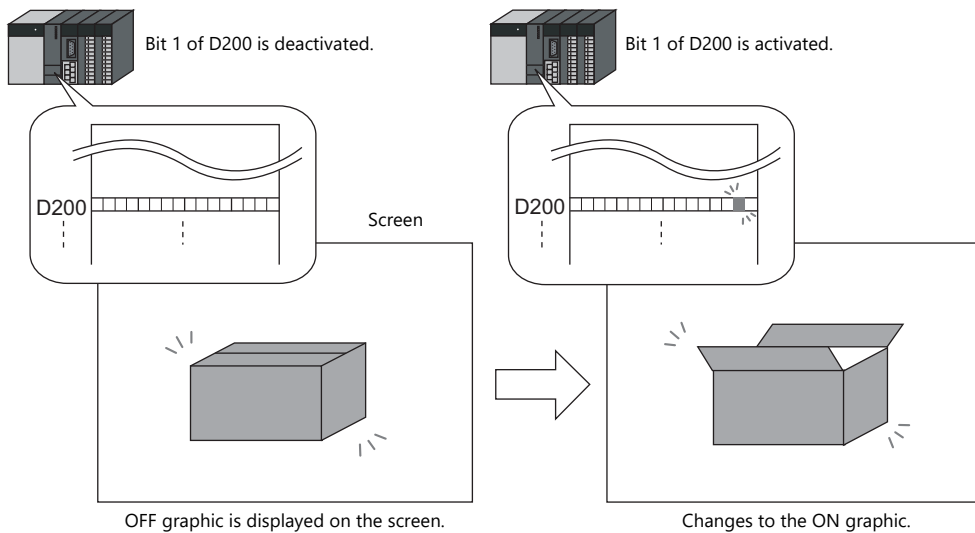
- It is possible to move or transform the graphics or text set for [1-Graphic] and [2-Graphic].
  To animate or transform graphics or text, set up parameters for these items in the graphic library.
  When parameters are set, the required device memory addresses are allocated for animation and transformation.
  For details on the procedure for setting parameters, refer to "11.1.4 Graphic Library (Parameter Settings)" page 11-15.

  Bit 1 of D200 is activated and Graphic No. 0 is displayed.

  D200

  Specify "100" for D201 of the X coordinate device memory.

  D200
  D201   100

  For the X coordinate

  The graphic moves 100 pixels in the X direction.
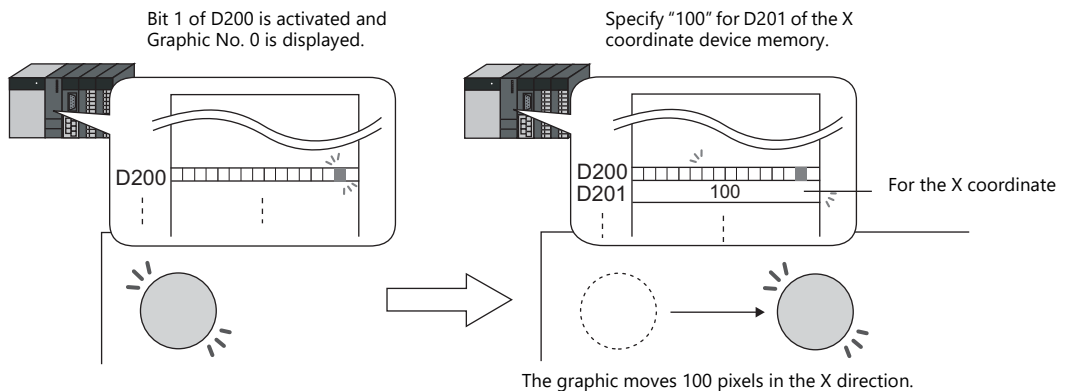
  * The graphic mode display is possible without placing a display area part. For details, refer to page 11-7.

11.1.2 Detailed Settings

Operation Select: Switch

Graphic Select
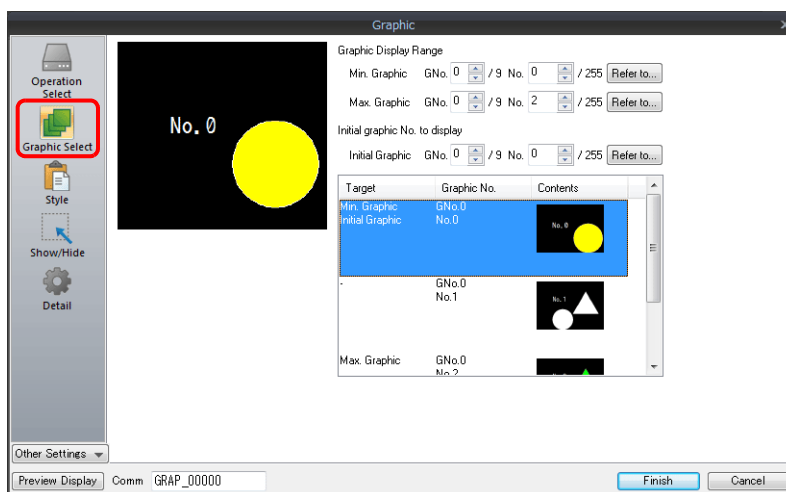
Item	Description
Min. Graphic	Set the graphic with the lowest number among those to be displayed on the screen.
Max. Graphic	Set the graphic with the highest number among those to be displayed on the screen.
Initial Graphic	Set the initial graphic to show when the screen is displayed. Select an initial graphic number between the minimum and maximum graphic numbers.

Style
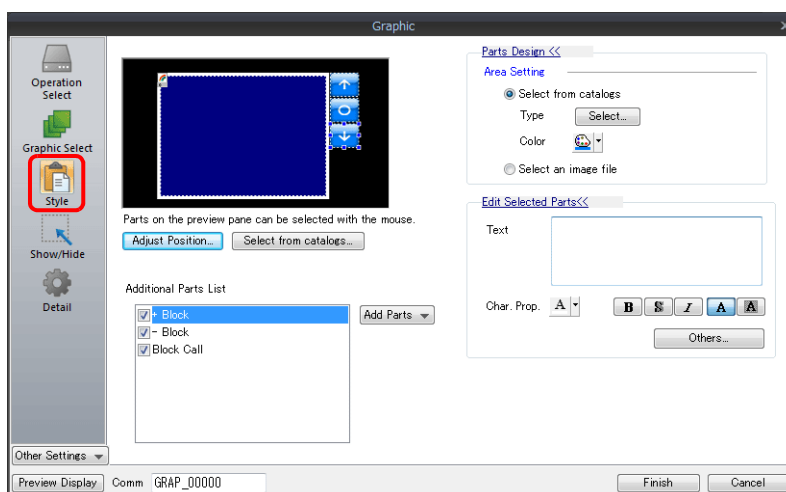
Item		Description
Additional Parts List		Select an operation switch. Parts can be added to the list using the [Add Parts] button.
	+ Block	Switches to the next graphic.
	− Block	Switches to the previous graphic.
	Block Call	Switches to the specified graphic number. The graphic number is specified via [Edit Selected Parts] → [Others].
Parts Design		Set the design and color of parts.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane. Part size can also be changed.
Adjust Position		Displays the window for adjusting the placement position of each part.
Select from catalogs		Set the part design from the catalog.

Display area

The size of the display area must be changed to accommodate the graphic for display.
The position of the "OFF" mark (offset mark) of the graphic library corresponds to the upper left corner of the display area part on the screen. Take this position into consideration when determining the size of the display area part.

Graphic library editing   Screen editing

Display area

Offset position at the upper left corner of the display area

Show/Hide

Set the show and hide settings of graphic items.

☞ For details, refer to "14 Item Show/Hide Function".
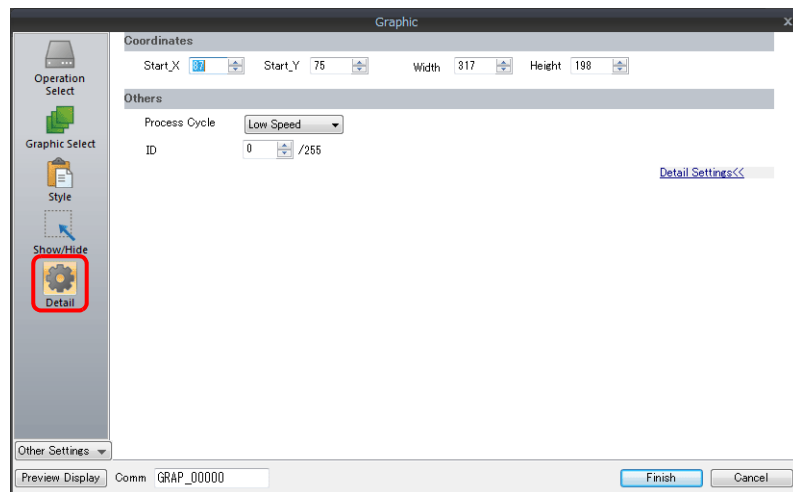
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the coordinates of the display area.
	Width/Height	Set the size of the display area.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set an ID number.

Operation Select: Device (No. Designation)

Graphic Select

Item	Description
Device Designation	Specify the device memory addresses used for specifying a graphic number. Consecutive device memory addresses are used when a parameter is specified. [1] | Device Memory	Description	Remarks
---	---	---
n	Graphic No.	
n + 1	Parameter 1	Only with parameter specification.
n + 2	Parameter 2	
:	:	
n+63	Parameter 63		
Graphic G No. Designation	Selected Specify 0 to 9 for the graphic group number. The graphics that can be displayed on the screen are limited to those (0 to 255) of the specified group number. Unselected All graphics corresponding to graphic group numbers 0 to 9 can be displayed. Specify the graphic numbers using absolute addresses (0 to 2559).
No. of Parameter [1]	This is required when moving or changing graphics. Set the maximum parameter value of items registered in the graphic library. The valid parameter number determines the number of words secured for the specified device memory address. For details on parameter settings, refer to "11.1.4 Graphic Library (Parameter Settings)" page 11-15.

Table under Graphic G No. Designation:

With Group No. Specification		Without Group No. Specification (Absolute Address)	
Group No.	Graphic No.	Group No.	Graphic No.
0	0000 - 0255	(None)	0000 - 0255
1	0000 - 0255		0256 - 0511
2	0000 - 0255		0512 - 0767
3	0000 - 0255		0768 - 1023
4	0000 - 0255		1024 - 1279
5	0000 - 0255		1280 - 1535
6	0000 - 0255		1536 - 1791
7	0000 - 0255		1792 - 2047
8	0000 - 0255		2048 - 2303
9	0000 - 0255		2304 - 2559

*1   Example of using parameters
The table below shows device memory assignment and contents when the following settings are configured.
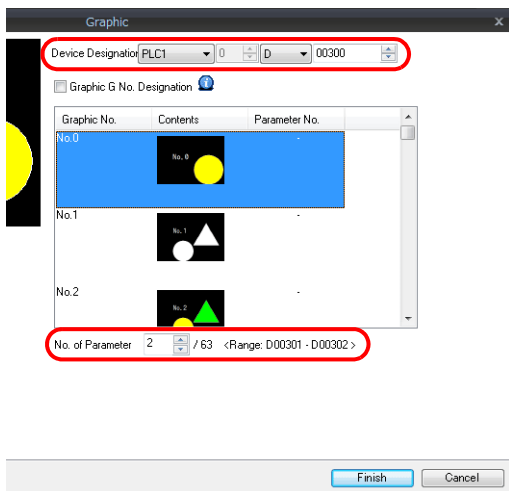
Graphics   Graphics library
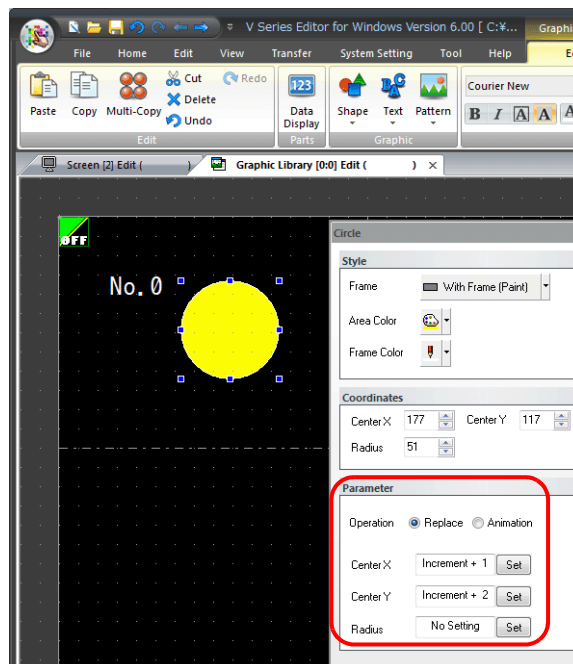
Device Memory	Description		Remarks
D300	Device	Device memory for graphic number specification	
D301	Parameter 1	Device memory for Center X coordinate specification	[Valid parameter No.] is set to "2" so two words are secured for use.
D302	Parameter 2	Device memory for Center Y coordinate specification	

Style
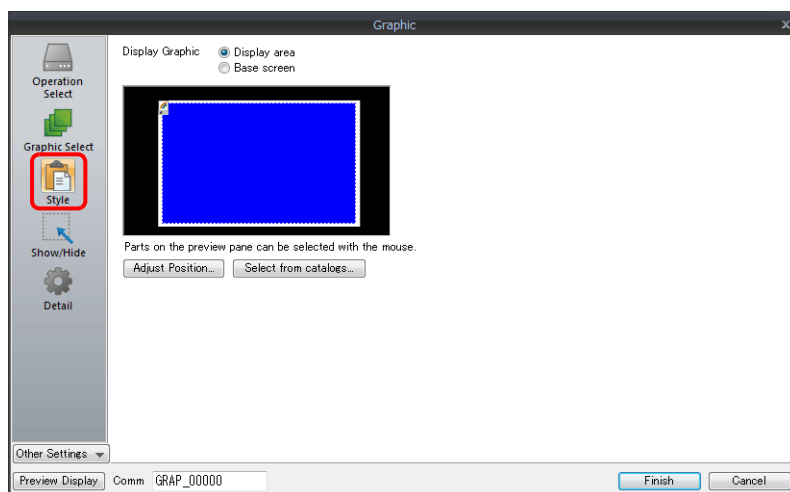
Item	Description
Display Graphic	Select the area for displaying graphics. Display area/Base screen
Adjust Position	Displays the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs	Set the part design from the catalog.

Display area

- When [Display Graphic] is set to [Display area]
  The offset position of the graphic library corresponds to the upper left corner of the display area part. Take this position into consideration when determining the size of the display area part. Refer to page 11-4.
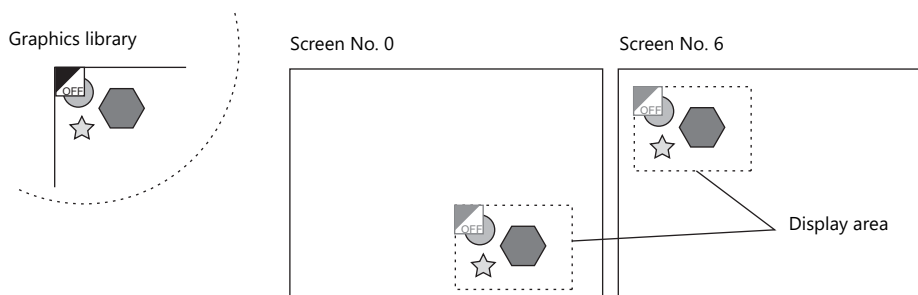
- When [Display Graphic] is set to [Base screen]
  The offset position of the graphic library corresponds to the upper left corner of the screen.
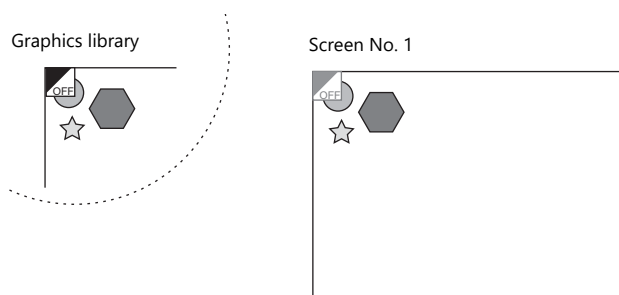
⚠️ If [Base area] for [Display Graphic] is selected and there is no display area, the previous picture may remain on the screen when the picture is changed.

Show/Hide

Set the show and hide settings of graphic items.

☞   For details, refer to "14 Item Show/Hide Function".
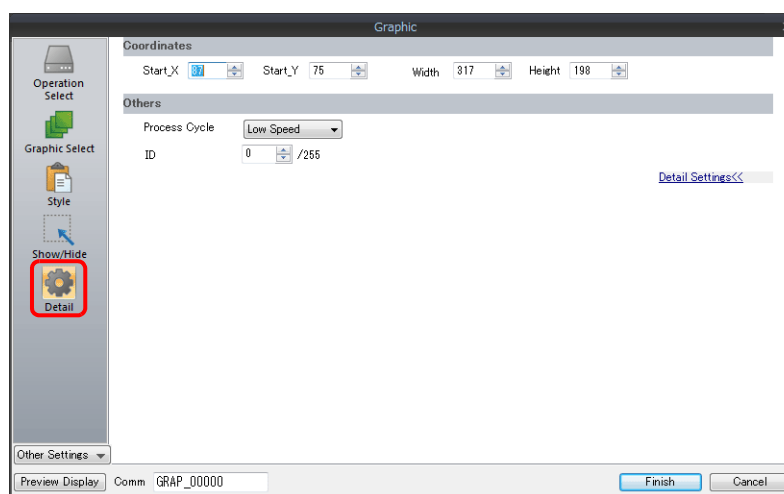
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the coordinates of the display area.
	Width/Height	Set the size of the display area.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set an ID number.

Operation Select: Device (Bit Designation)

Graphic Select
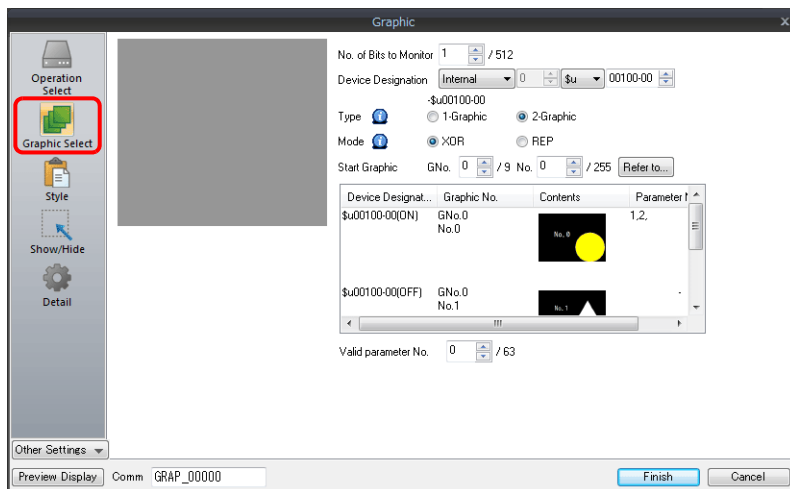
Item	Description
No. of Bits to Monitor [*1]	Set the total number of bits used for displaying graphics. 1 - 512
Device Designation [*1]	Set the device memory used for displaying graphics. Consecutive bits are used for the number of monitored bits.
Type [*1]	Select the graphic display method.
1-Graphic	A graphic is displayed when the bit is set to ON. OFF: Graphic hidden ON: Graphic shown
2-Graphic	A graphic is displayed when the bit is set to either ON or OFF. OFF: OFF graphic shown ON: ON graphic shown
Mode [*3]	Specify the display state when changing between graphics. This setting is available when [Type] is set to [2-Graphic]. When [Type] is set to [1-Graphic], the mode is fixed to [XOR].
XOR	Bit OFF: OFF graphic is displayed. Bit OFF → ON: OFF graphic is cleared and ON graphic is displayed. Bit ON → OFF: ON graphic is cleared and OFF graphic is displayed.
REP	Bit OFF: OFF graphic is displayed. Bit OFF → ON: ON graphic is displayed over the OFF graphic. Bit ON → OFF: OFF graphic is displayed over the ON graphic. The graphics are not XORed with the base screen and are instead displayed in their original colors.
Start Graphic [*1]	Set the starting graphic group number and graphic number of the graphic to display.
Valid parameter No. [*2]	This is required when moving or transforming the graphics. Specify the total number of parameters set for each graphic. The number of words for the device memory and allocation is determined from this total and the parameter numbers.

*1   Display example:

    [Device Designation]: D200, [Start Graphic]: GNo. 0, No. 0, [No. of Bits to Monitor]: 12

    - Type: 1-Graphic

MSB															LSB

D200 bit No.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Graphic No. 0 graphic No. (Bit ON)

✕	✕	✕	✕	11	10	9	8	7	6	5	4	3	2	1	0

Because [No. of Bits to Monitor] is 12, 12 graphics can be assigned to these bits (bit 0 to bit 11).

    - Type: 2-Graphic

MSB															LSB

D200 bit No.

15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00

Graphic No. 0 graphic No. (Bit ON)

✕	✕	✕	✕	22	20	18	16	14	12	10	8	6	4	2	0

(Bit OFF)

✕	✕	✕	✕	23	21	19	17	15	13	11	9	7	5	3	1

Because [No. of Bits to Monitor] is 12, 24 graphics can be assigned to these bits (bit 0 to bit 11).

*2   Display example:
[Device Designation]: D200, [Type]: 1-Graphic, [Start Graphic]: GNo. 1, No. 4, [No. of Bits to Monitor]: 20, [Valid parameter No.]: 4

D200	For graphic relay operation (16 relays)
D201	For graphic relay operation (4 relays)
D202	For parameter No. 1
D203	For parameter No. 2
D204	For parameter No. 3
D205	For parameter No. 4

Total of 20
= [No. of Bits to Monitor]

MSB   LSB

D200 bit No.	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Graphic No. 1 graphic No. (Bit ON)	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4

16 bits for monitoring

Bit No. of D201	15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
Graphic No. 1 graphic No. (Bit ON)													23	22	21	20

Because [No. of Bits to Monitor] is 20, 20 graphics are assigned to 16 bits in D200 and 4 bits in D201.

4 bits for monitoring

*3   Display example:
- Mode: XOR

Bit: OFF
OFF graphic is displayed.

Bit: ON
OFF graphic is cleared and ON graphic is displayed.

Bit: OFF
ON graphic is cleared and OFF graphic is displayed.
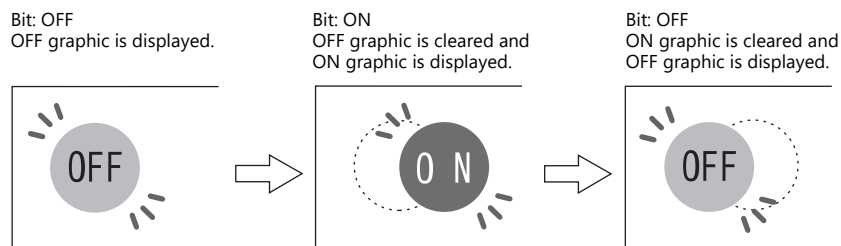
In XOR mode, the graphic color is XORed with the colors of the base screen (display area). Therefore, the graphic is displayed in the color XORed with the base color (= XORed color), rather than the color specified during editing. For details on XORed color, refer to .

Graphic library editing
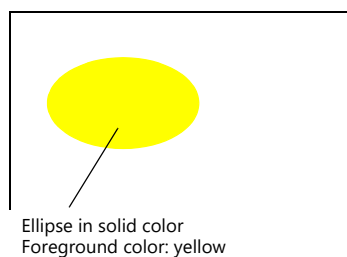
When displayed on the screen (background: blue):
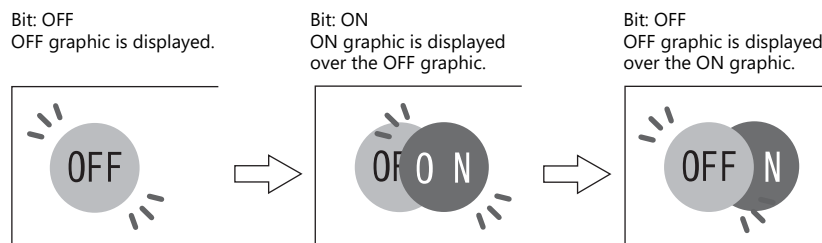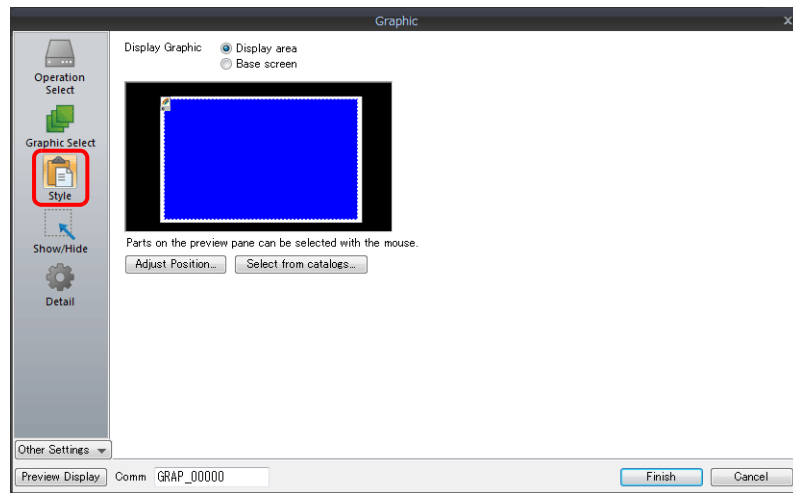
Ellipse in solid color
Foreground color: yellow

Yellow ellipse is XORed into white by blue screen.

- Mode: REP

Bit: OFF
OFF graphic is displayed.

Bit: ON
ON graphic is displayed over the OFF graphic.

Bit: OFF
OFF graphic is displayed over the ON graphic.

Style

Item	Description
Display Graphic	Select the area for displaying graphics. Display area/Base screen
Adjust Position	Displays the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs	Set the part design from the catalog.

Display area

- Offset
  - When [Display Graphic] is set to [Display area]

    The offset position of the graphic library corresponds to the upper left corner of the display area part. Take this position into consideration when determining the size of the display area part.
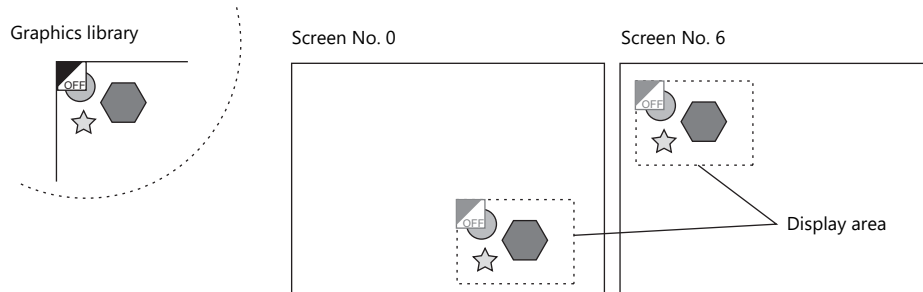
  - When [Display Graphic] is set to [Base screen]

    The offset position of the graphic library corresponds to the upper left corner of the screen.
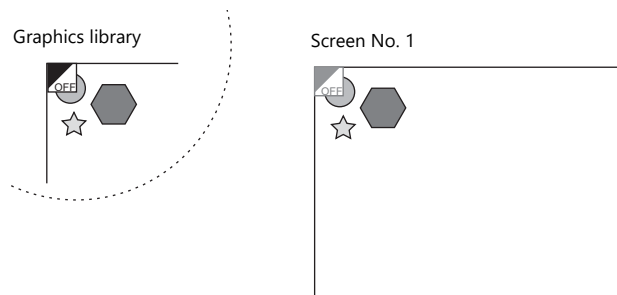
- Transparency

  Select the [Transparent] checkbox for the display area part to add transparency to the display area part properties. Select this checkbox to avoid a situation where graphics under the display area part are hidden.

  - Example with transparent setting
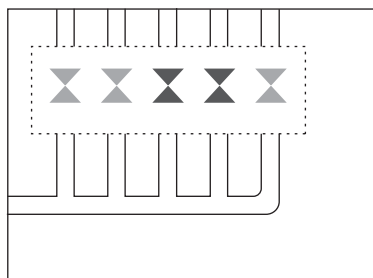
  - Not transparent   - Transparent

Show/Hide

Set the show and hide settings of graphic items.

☞ For details, refer to "14 Item Show/Hide Function".
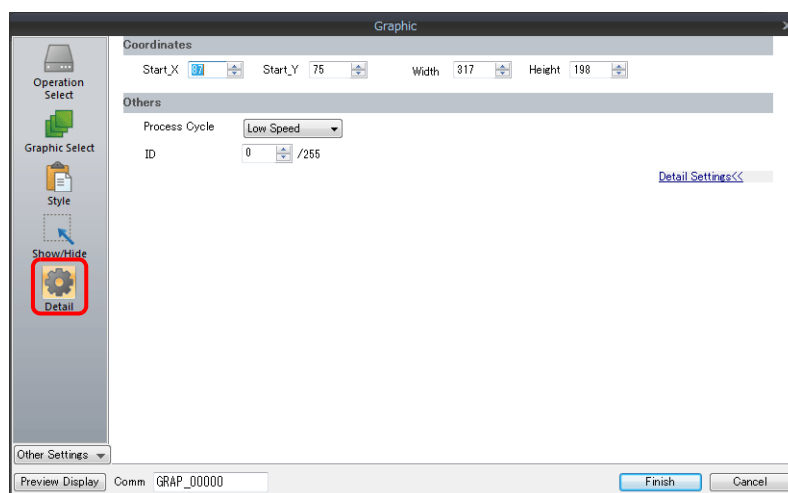
Detail

Item		Description
Coordinates	Start X/Start Y	Specify the coordinates of the display area.
	Width, Height	Set the size of the display area.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set an ID number.

11.1.3 Graphic Display Color

Display Modes

When graphics are displayed on the screen, there are two types of display modes.
- XOR: Graphic colors are XORed with the colors of the base screen.
- REP: Original graphic colors are shown.

Whether XOR or REP is used for the display state is determined by the mode and parameter settings. Refer to the following table.

Graphic Switching Method	Type	Graphic Registration	Parameter	
			Action: Replace	Action: Animation
Switch			REP	XOR
Device (No. Designation)			REP	XOR
Device (Bit Designation)	1-Graphic		XOR	XOR
	2-Graphic	Mode: XOR	XOR	XOR
		Mode: REP	REP	XOR

* When the graphic to be displayed is a "Paint" graphic, it cannot be displayed in XORed colors.
* When a pattern with a [Transparent Color Setting] is used, the graphic can be displayed with the original colors even if [Mode] is set to [XOR]. For details, refer to page 11-13.

XORed Colors

When [XOR] is selected, graphic colors are XORed with the colors of the base screen (display area). The resulting color is called "XORed color." The basic eight XORed colors are shown below.

		Overlaid picture colors (basic eight colors)							
		Black	Blue	Red	Magenta	Green	Cyan	Yellow	White
Base screen picture colors (basic eight colors)	Black	Black	Blue	Red	Magenta	Green	Cyan	Yellow	White
	Blue	Blue	Black	Magenta	Red	Cyan	Green	White	Yellow
	Red	Red	Magenta	Black	Blue	Yellow	White	Green	Cyan
	Magenta	Magenta	Red	Blue	Black	White	Yellow	Cyan	Green
	Green	Green	Cyan	Yellow	White	Black	Blue	Red	Magenta
	Cyan	Cyan	Green	White	Yellow	Blue	Black	Magenta	Red
	Yellow	Yellow	White	Green	Cyan	Red	Magenta	Black	Blue
	White	White	Yellow	Cyan	Green	Magenta	Red	Blue	Black

XOR operations

Each of the basic eight colors has an identification code as given below:

64k-color		32k-color	
Color	Code HEX	Color	Code HEX
Black	0000	Black	0000
Blue	001F	Blue	001F
Red	F800	Red	7C00
Magenta	F81F	Magenta	7C1F
Green	07E0	Green	03E0
Cyan	07FF	Cyan	03FF
Yellow	FFE0	Yellow	7FE0
White	FFFF	White	7FFF

When a color is XORed with another color, it means that the two color codes are XORed to obtain another code.

	64k-color XORed color of blue and white	32k-color XORed color of blue and white
Blue	0000 0000 0001 1111 (001F)	0000 0000 0001 1111 (001F)
White	1111 1111 1111 1111 (FFFF)	0111 1111 1111 1111 (7FFF)
	XOR ↓	XOR ↓
Yellow	1111 1111 1110 0000 (FFE0)	0111 1111 1110 0000 (7FE0)

XOR Display Transparency (Pattern Transparency)

Because animation on a graphic display is always XORed, it is impossible to display the same colors on the screen as initially set for the background color (other than black).

Additionally, because the XORed color is affected by the base color, when animation is performed on multiple background colors, the color changes whenever the background does.

Original pattern

The original color is affected by the background color.

CHECKER

The original color is affected by the background color.
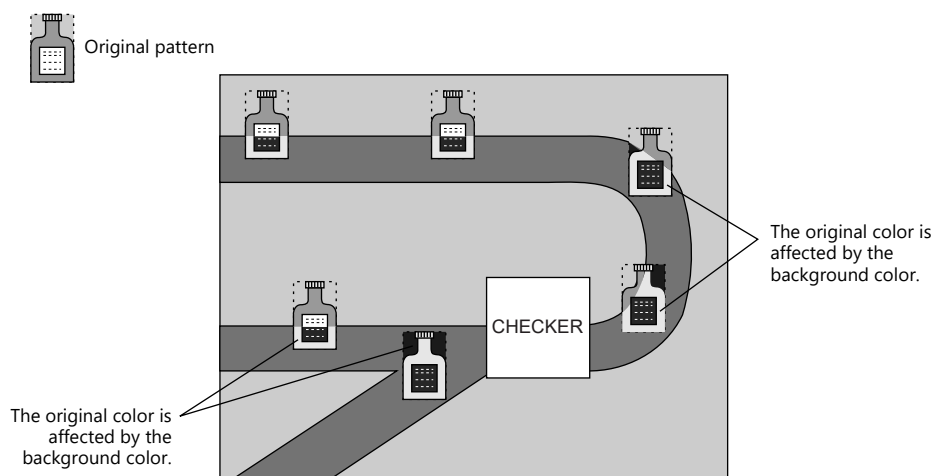
When a transparent pattern is used for animation, colors can be displayed just as they were originally created.

Transparent color

Original pattern

Displayed without being affected by the background.

CHECKER

Displayed without being affected by the background.
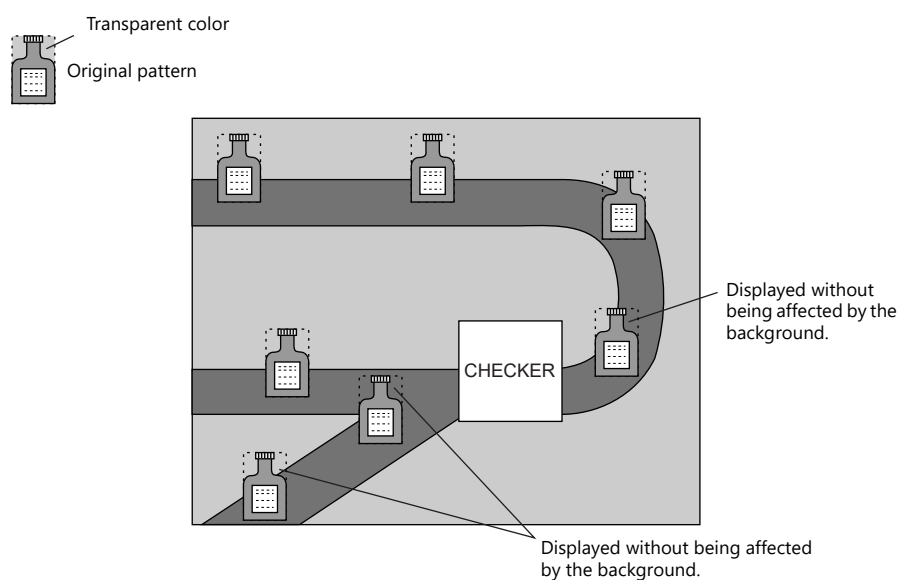
*   Always select the [With Transparent] checkbox for the pattern when using this function.

Pattern editing

- Set the color not to show on the screen for the [Transparent Color Setting] in the [Pattern Edit] window.
- Only one transparent color can be set per pattern.
- For a pattern like the one below, the perimeter color (red) is set as the transparent color. Consequently, when this pattern is displayed on the screen, the red area becomes transparent and the background color is displayed.
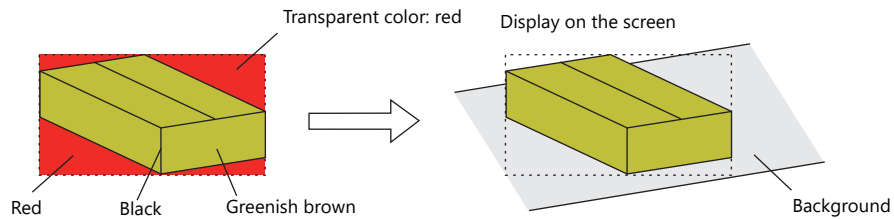
The following limitations apply when using the transparent color setting for a pattern. If limitations are not observed, the transparent color setting is automatically invalidated and the pattern is displayed in the color that is XORed with the background color.

- Specification limitations are as follows:

  - Maximum pattern size: 4,088 dots [*1]
  - Maximum per screen: 64 [*2]
  - Total size per screen: 256K dots [*2]

    *1   Pattern size = X size $\times$ Y size

    $80 \times 50 = 4,000 < 4,088$ dots
    The transparent color setting is valid for this pattern.
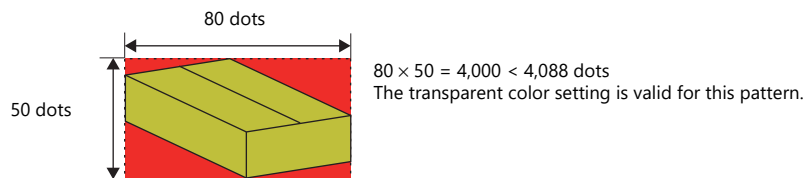
    *2   This number includes all patterns, switches, and lamps with transparent color settings.

- Set either [Device (No. Designation)] or [Device (Bit Designation)] for [Method] in the [Operation Select] settings of the graphic settings window.
  - With [Method: Device (No. Designation)]
    When displaying several graphics by switching them over, it is recommended to place a display area part.
  - With [Method: Device (Bit Designation)]
    - [Type: 1-Graphic]
      By using a pattern with transparent color settings, patterns which otherwise would be displayed in XORed colors can be displayed in their original colors.
    - [Type: 2-Graphic], [Mode: XOR]
      It is necessary to set [Type: 2-Graphic] when changing over between two graphics. In this case, be sure to set [XOR] for [Mode]. If [REP] is selected for a pattern with a transparent color setting, it may not be displayed correctly.

* When using patterns with a transparent color setting for animations, overlapping the patterns with each other may result in an abnormal display. Take care not to overlap patterns with transparent color settings in animations. When you animate a pattern with a transparent color setting and overlap it with a pattern with a transparent color setting placed as a drawing, there will be no problem with the display.

11.1.4 Graphic Library (Parameter Settings)

Configure parameter settings to move, transform, and change graphics registered at [Home] → [Registration Item] → [Graphic Library].

Parameter Targets and Settings

The following drawing items can be set using parameters.

Graphics	Item Specified by Parameter	Refer to
Straight line	Start point, end point	
Continuous line	Point 0 (to n) coordinates	page 11-15
Rectangle	Start point, end point	
Parallelogram	Start point, PX2, PY2, PX3, PY3	page 11-15
Polygon	Center coordinates, radius, start angle, number of corners	
Circle	Center coordinates, radius	
Arc, sector	Center coordinates, radius, start angle, end angle	
Ellipse, elliptical arc, elliptical sector	Center coordinates, X radius, Y radius	
Text	Start point (coordinates at the bottom left of the first character)	
Pattern	Start point (coordinates of the top left corner), (pattern) No.	page 11-16
Paint [1]	Start point	page 11-16
Graphic call	Start point (library) No.	
Pixel	Start point	
Data display	Start point (coordinates of the bottom left of the first digit), No.	page 11-16

[1] Paint is not drawn correctly if operation of the graph is set to animation in the parameter settings.

Continuous line (point 0 (to n) coordinates)

If a continuous line is drawn as shown below, there are seven points at which parameters can be set.
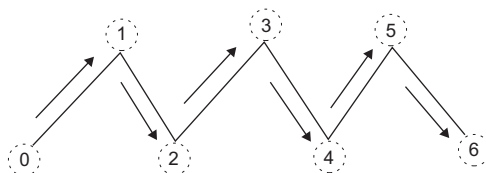
Parallelogram

- PX2
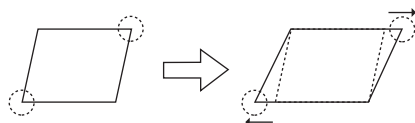
- PY2
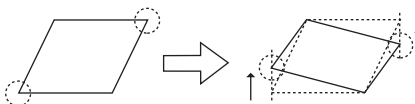
- PX3
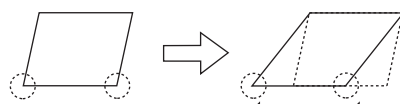
- PY3
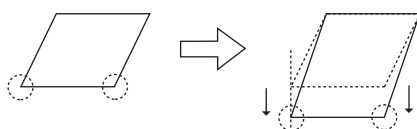
Pattern

- Start point
  The start point is the top left corner of the pattern, as shown below.
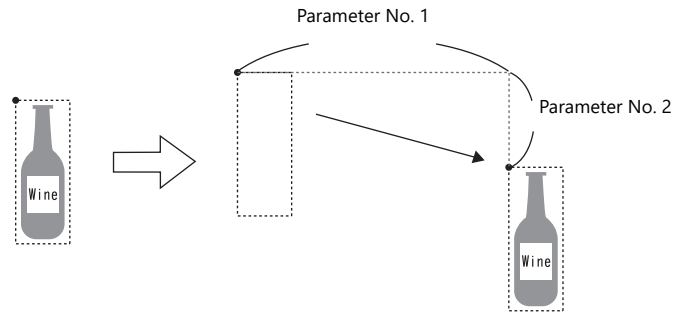
- Pattern No.
  Set the parameters for the numbers to change the picture by specifying a number.
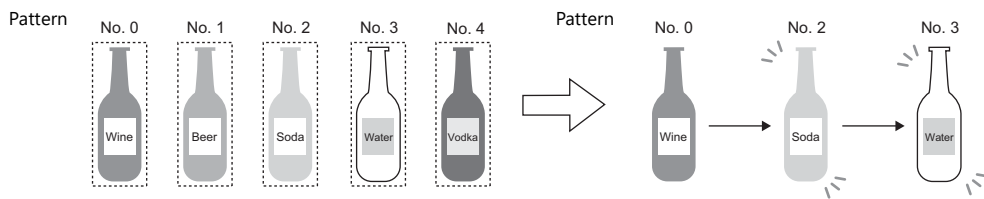
Paint (start point)

The coordinates of the paint start point can be changed using a parameter device memory.
Note that drawing is performed using REP instead of XOR so the previous paint display (e.g. circle) will remain.
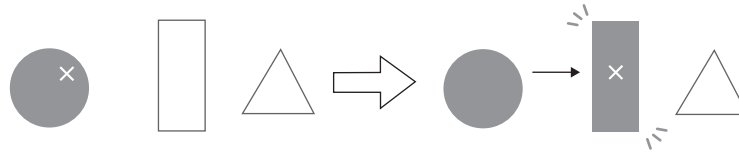
Data display
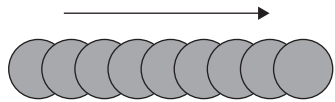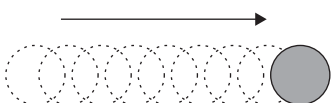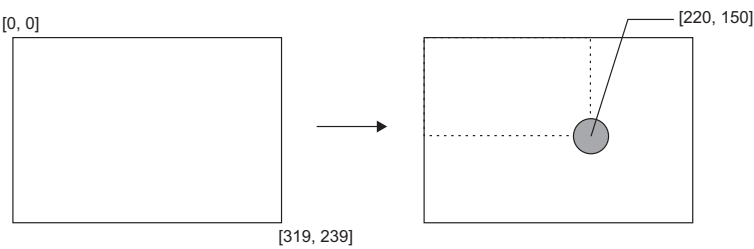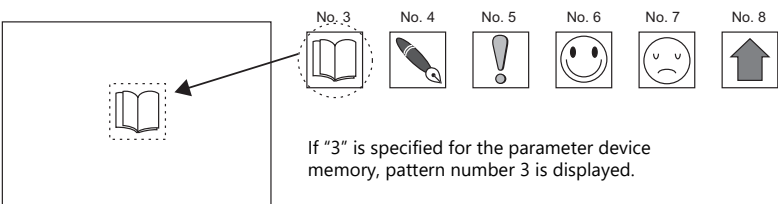
The position of the data display can be moved.
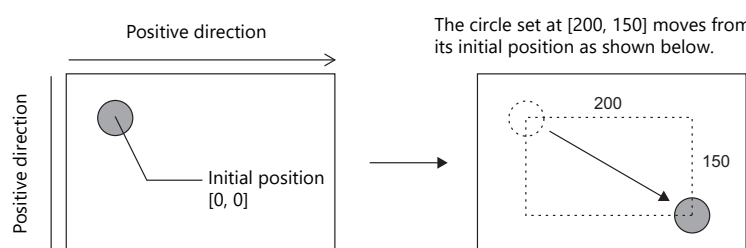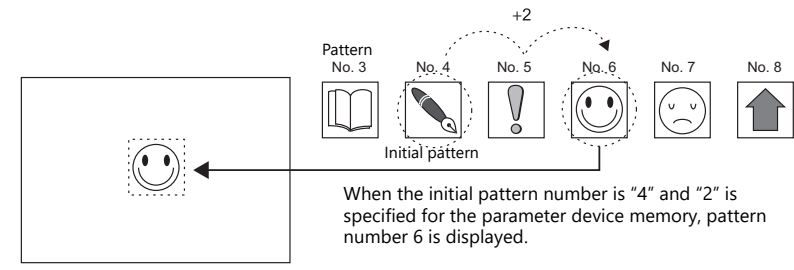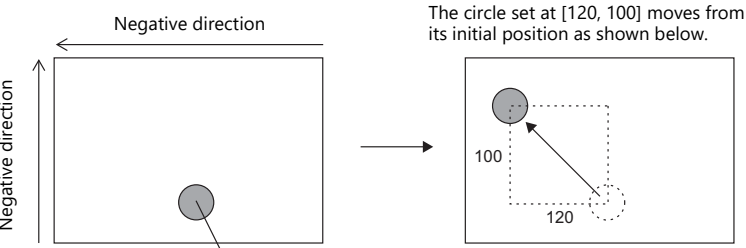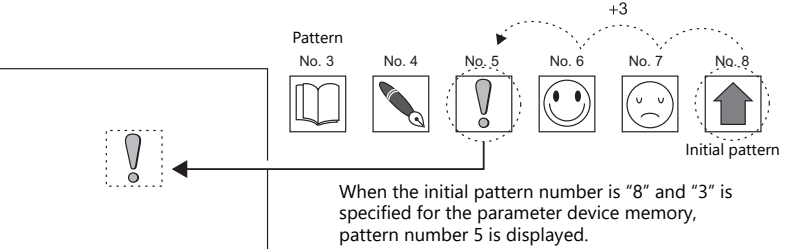
Parameter Settings

Set parameters in the graphic editing window of each graphic.

Item		Description
Operation		Select whether to overwrite the previous state or erase the previous state before drawing anew.
	Replace	Overwrite the previous state. The previous state will remain.
	Animation	Always draw the latest state.
Set		Set the parameter of each setting item using the [Set] button.
	No Setting	Do not secure a device memory for the parameter.
	Absolute Input	Specify the parameter value using absolute coordinates. When specifying coordinates The following shows an example when target coordinate values are specified in a device memory where the coordinates of the top left corner of the screen are [0, 0] and the coordinates of the bottom right corner are [319, 239]. A circle specified at X = 220 and Y = 150 is displayed at the following location. When specifying numbers (pattern, graphic call) The following shows an example when a registered pattern number or graphic library graphic number is specified directly. If "3" is specified for the parameter device memory, pattern number 3 is displayed.

Item		Description
	Incremental + Input	Specify the input parameter value using relative coordinates in the positive direction. When specifying coordinates The following shows how the graphic moves in the positive direction when a positive value is specified to the device memory and in the negative direction when a negative value is specified to the device memory where the placement position of the graphic is [0, 0]. When specifying numbers (pattern, graphic call) The following shows how a number higher than the placed one is called when a positive value is specified to the device memory and a number lower than the placed one is called when a negative value is specified to the device memory where "0" is set for the number of the placed pattern or graphic. When the initial pattern number is "4" and "2" is specified for the parameter device memory, pattern number 6 is displayed.
	Incremental – Input	Specify the input parameter value using relative coordinates in the negative direction. When specifying coordinates The following shows how the graphic moves in the negative direction when a positive value is specified to the device memory and in the positive direction when a negative value is specified to the device memory where the placement position of the graphic is [0, 0]. When specifying numbers (pattern, graphic call) The following shows how a number lower than the placed one is called when a positive value is specified to the device memory and a number higher than the placed one is called when a negative value is specified to the device memory where "0" is set for the number of the placed pattern or graphic. When the initial pattern number is "8" and "3" is specified for the parameter device memory, pattern number 5 is displayed.

12 Message

12.1   Message Mode

12.1.1 Overview

This function displays messages on the screen by specifying the line number of a message previously registered in the message registration area (message editing) or by grouping these messages into blocks and specifying the block number(s). The message mode has four kinds of display configurations as shown below.

```
                    ┌─────────────────────┐
                    │  How do you display  │
                    │     message(s)?      │
                    └──────────┬──────────┘
          ┌────────────────────┴────────────────────┐
          ▽                                          ▽
┌─────────────────────┐                  ┌─────────────────────┐
│ Display in blocks. What │              │ Display line by line. How │
│      block type?      │                │  do you configure display? │
└──────────┬──────────┘                  └──────────┬──────────┘
     ┌─────┴─────┐                             ┌─────┴─────┐
     ▽           ▽                             ▽           ▽
┌─────────┐ ┌─────────┐              ┌──────────────┐ ┌──────────────┐
│ Page block │ │ Direct block │      │ Display the registered │ │ Display the registered │
│         │ │         │              │ message continuously. │ │ message separately. │
└────┬────┘ └────┬────┘              └──────┬───────┘ └──────┬───────┘
     ▼           ▼                          ▼                ▼
┌─────────────┐ ┌─────────────┐  ┌─────────────┐ ┌─────────────┐
│[Operation Select]:│ │[Operation Select]:│ │[Operation Select]:│ │[Operation Select]:│
│  Page Block  │ │  Direct Block  │ │  Page Message  │ │  Direct Message  │
└─────────────┘ └─────────────┘  └─────────────┘ └─────────────┘
```

Refer to (A) on page 12-2.   Refer to (B) on page 12-2.   Refer to (C) on page 12-3.   Refer to (D) on page 12-3.

Other message display methods are described in "5.3 Message Display" page 5-26 and "8 Alarm".

How to Specify Block Numbers

If [Operation Select] is set to [Page Block] or [Direct Block] in the message mode, specify the [Page Block] or [Direct Block] number to which the message to display is registered.

A [Operation Select]: Page block

Register the message that was previously registered in the message editing area as [Page Block].
The corresponding "page block" is displayed on the screen.
To display a page block on the screen, there are two ways: changeover with a switch or changeover with respect to data in a device memory address.

☞ For setting examples, refer to "Displaying Messages (Page Blocks)" page 12-4.
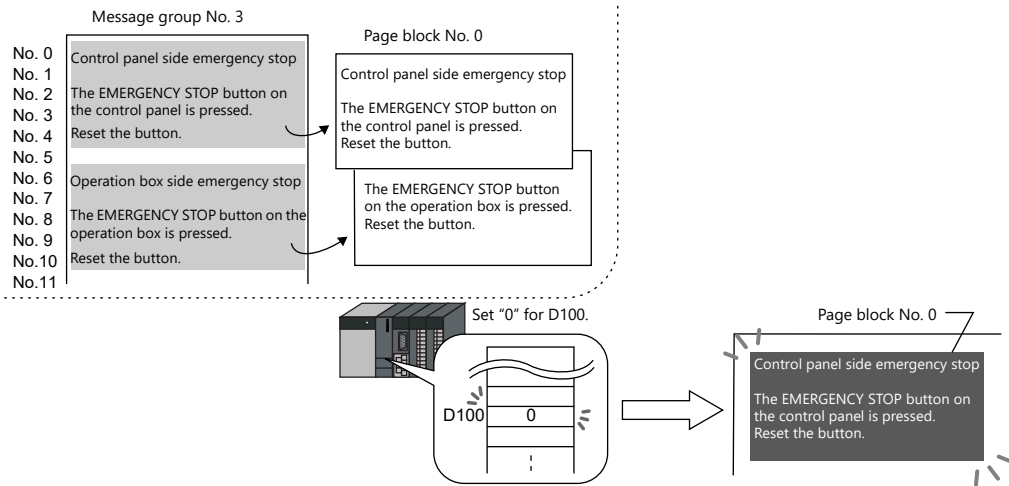
B [Operation Select]: Direct block

Register the message that was previously registered in the message editing area as [Direct Block].
The corresponding "direct blocks" are displayed on the screen.
To display a direct block on the screen, there are two ways: changeover with a switch or changeover with respect to data in a device memory address.
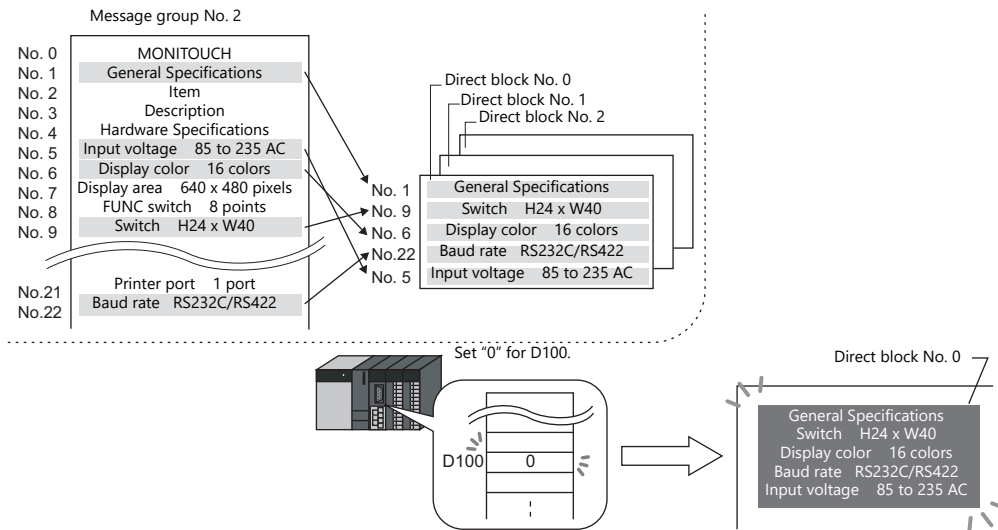
How to Specify Message Numbers

If [Operation Select] is set to [Page Message] or [Direct Message] in the message mode, always specify the number of the message to display.

C [Operation Select]: Page message

Specify the line number of the top message to display. Several lines of the message, of the number specified, are continuously displayed within the display area on the screen.

Four lines from message No. 3 (to message No. 6) are displayed in order on the screen.
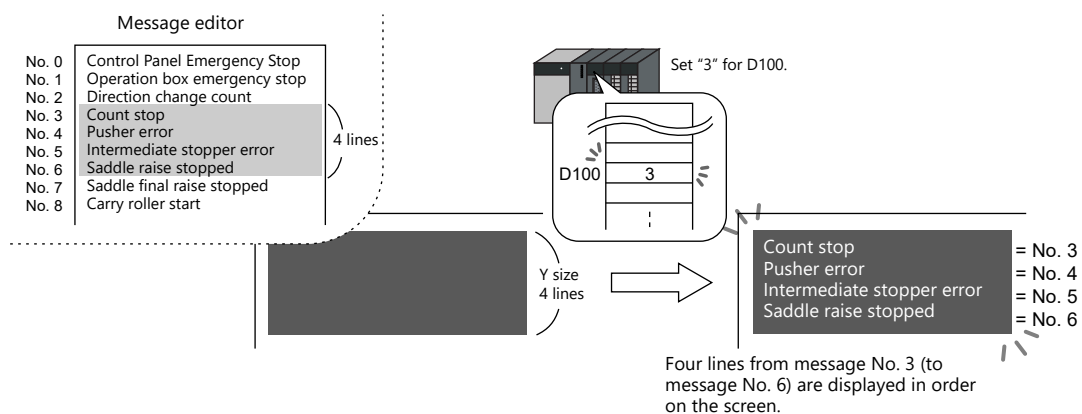
D [Operation Select]: Direct message

One device memory address is automatically assigned to each line in the message display area. Specify the message number to display based on the assigned device memory address.

A message specified by the device memory address is displayed on the screen.

Device memory addresses, each of which specifies a message number, are assigned consecutively for 3 lines.
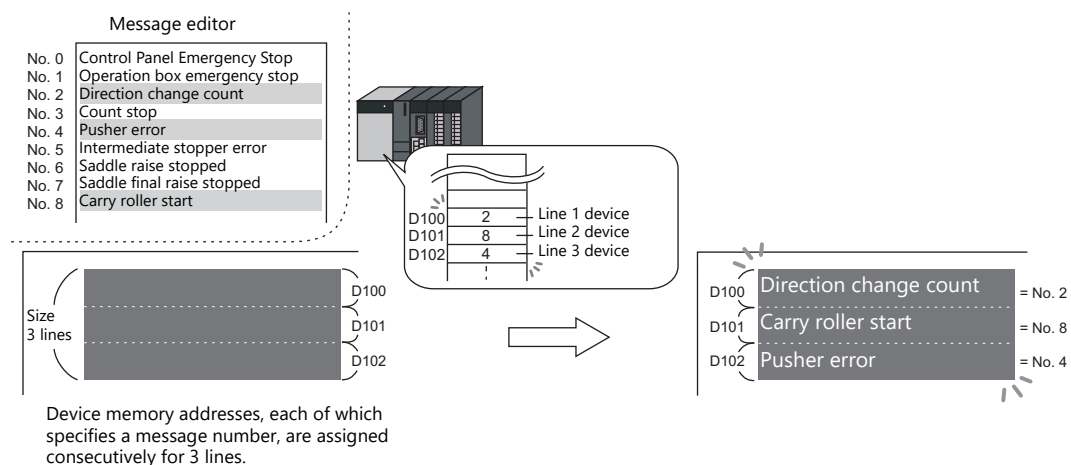
12.1.2 Setting Examples

Displaying Messages (Page Blocks)

Register a message to a page block and display the message by changing the block number using a switch.
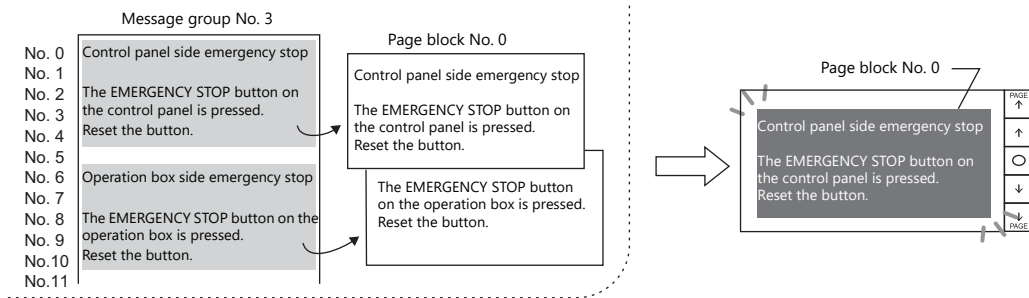
1. Click [Parts] → [Message] → [Message] and place a message mode part on the screen.
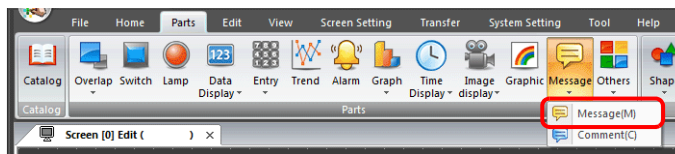
2. Double-click on the message mode part to display the settings window.
   Configure the [Operation Select] settings as shown below.
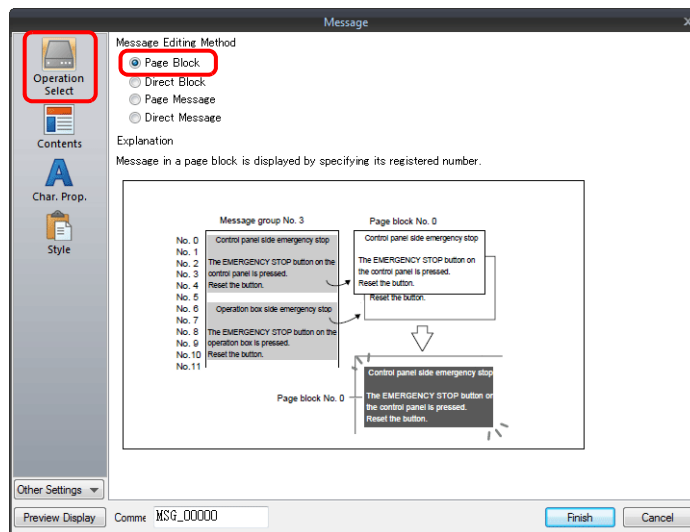
3. Click [Contents] and configure the settings as shown below.
    Click [Edit] to register a message for display.
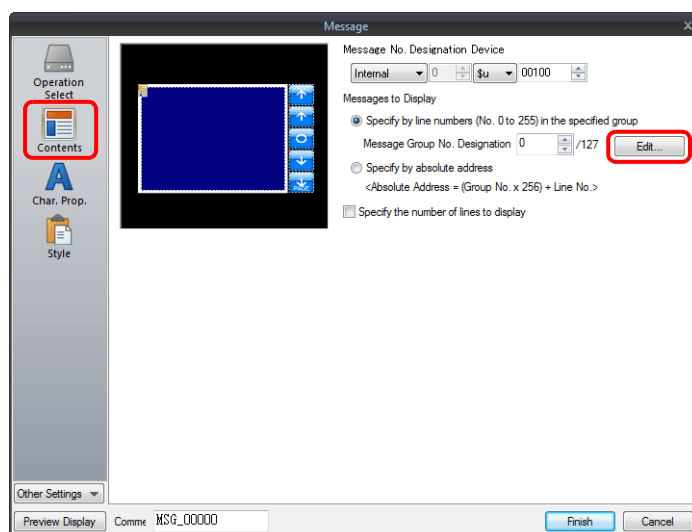
4. Click [Edit] in the [Page Block Edit] window to display the [Message Edit] window.
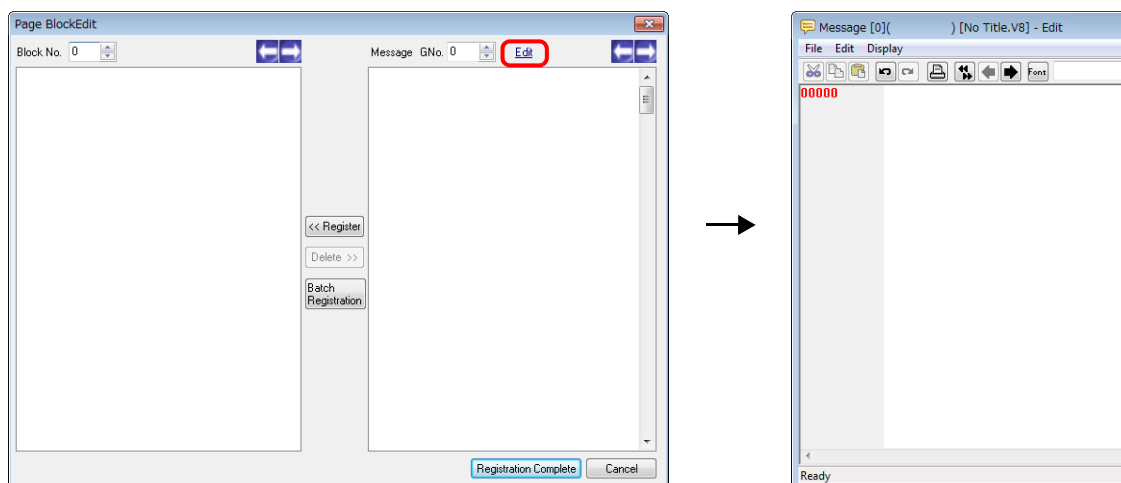
5. Register the following message and then close the [Message Edit] window.
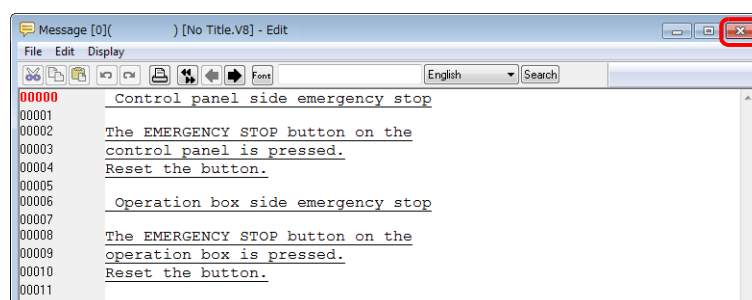
6. Register the message registered in the [Message Edit] window to page block number 0 as shown below.
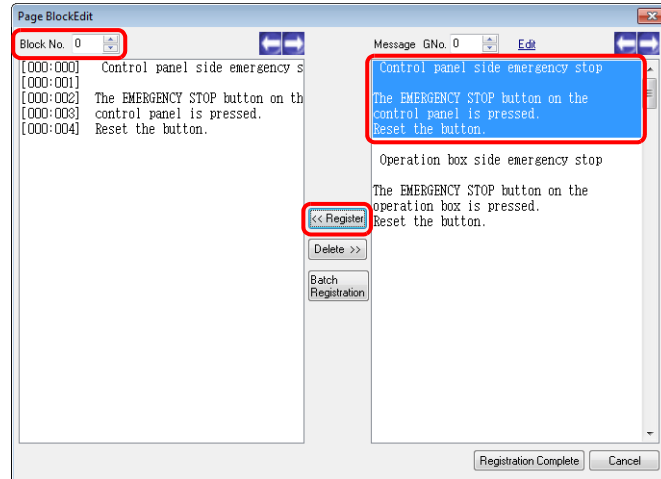
7. In the same manner, register the message again to page block number 1 as shown below and click [Registration Complete].
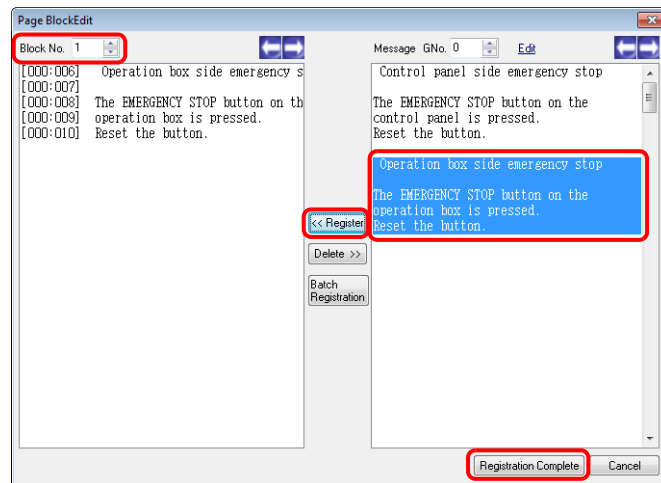
8. Configure the settings as shown below and click [Finish].
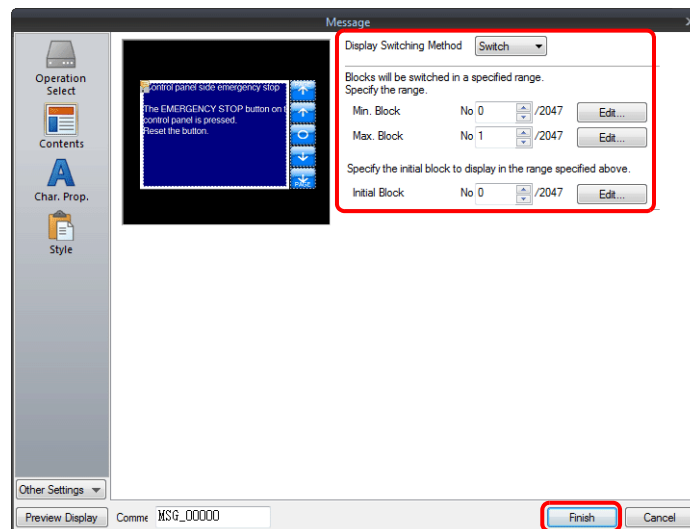
This completes the necessary settings.

12.1.3 Detailed Settings

Operation Select
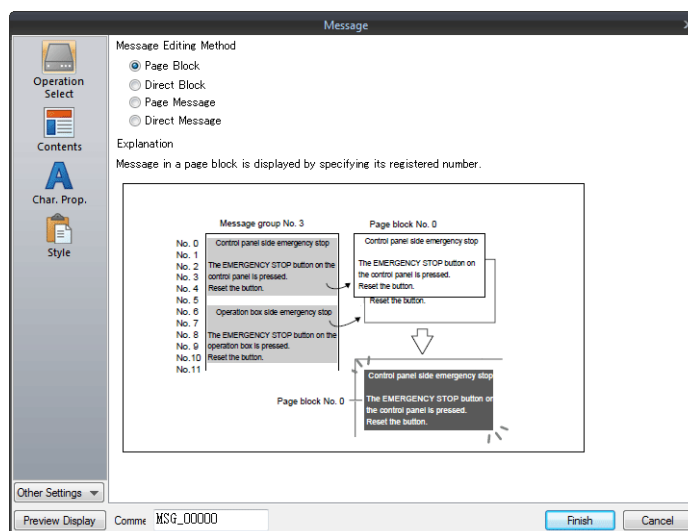
Item		Description
Message Editing Method		Select the display method for message mode.
	Page Block	Page blocks are displayed on the screen. There are two methods for changing the display: switches and device memory addresses
	Direct Block	Direct blocks are displayed on the screen. There are two methods for changing the display: switches and device memory addresses.
	Page Message	Specify the line number of the top message to display using [Message No. Designation Device] (described later). Several lines of the message, of the number specified, are continuously displayed within the area at the top of the screen.
	Direct Message	One device memory address is automatically assigned to each line in the message display area. Specify the message number to display for the assigned device memory address. A message specified by the device memory address is displayed on the screen.

Displayed information

[Operation Select]: Page block/direct block
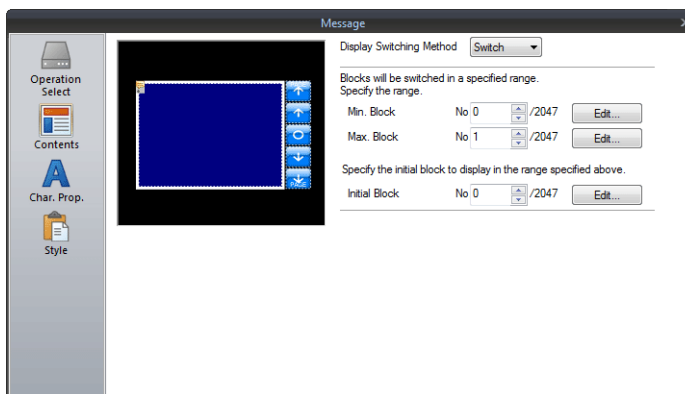
Item	Description
Display Switching Method	Select how to call up blocks. Switch: Change the block number to display using a switch placed on the screen. Device: Directly specify the block number using [Block No. Setting Device] (described later) to display the corresponding block.
Min. Block	Set the lowest block number for the page blocks or direct blocks to display. The page block or direct block can be edited by clicking [Edit].
Max. Block	Set the highest block number for the page blocks or direct blocks to display. The page block or direct block can be edited by clicking [Edit].
Initial Block	Set the initial block number to show when the screen is displayed. The page block or direct block can be edited by clicking [Edit].
Block No. Setting Device	Specify the block number to display on the screen. The page block or direct block can be edited by clicking [Block Edit].

[Operation Select]: Page message/direct message

Item		Description
Message No. Designation Device		Specify the message number to display on the screen. One device memory address is automatically assigned to each line for direct messages. Device memory addresses are allocated sequentially from the first device memory address specified for [Message No. Designation Device]. The number of words to use is based on the display area's Y size divided by the character enlargement factor value.
Messages to Display	Specify by line numbers (No. 0 to 255) in the specified group	Set a group number. The message displayed on the screen is limited to a message within the specified group number. Specify a message number (0 to 255) in a single group for [Message No. Designation Device].
	Specify by absolute address	Specify the message number to be displayed as an absolute address. Messages from more than one group can be specified. Specify a message number (0 to 32767) among all groups for [Message No. Designation Device].

Char. Prop.
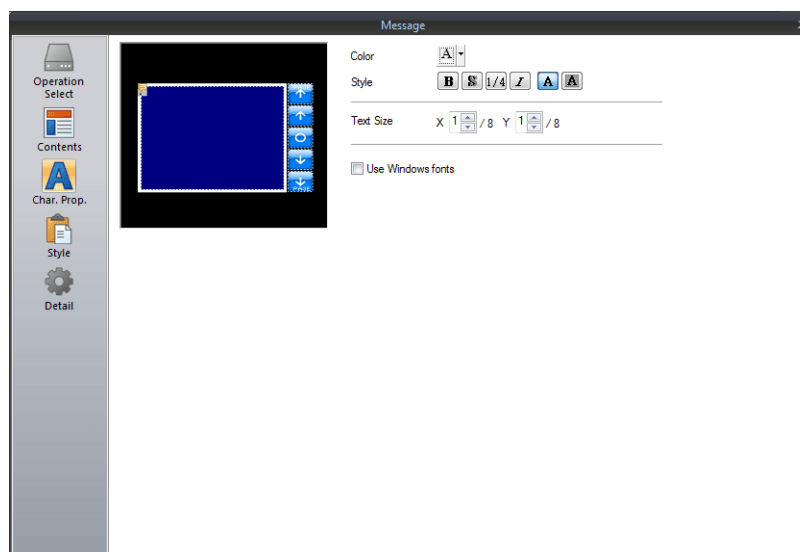
Item	Description
Color	Set the message color.
Background	Set the background color.
Style	Set the message style.
Character Size (1 - 8)	Set the character enlargement factor value of the message. (when using bitmap fonts) When [Switch] or [Lamp] is selected for [Others] → [Action Area] (described later), the enlargement factor values for X and Y are fixed to "1".
Point (8 - 72)	Set the text size. (when using stroke fonts, Gothic fonts, or Windows fonts) When [Switch] or [Lamp] is selected for [Others] → [Action Area] (described later), the point size is fixed to "12".
Use Windows fonts	Select this checkbox to use a Windows font. Message character properties are configured in the [Message Edit] window.

Style
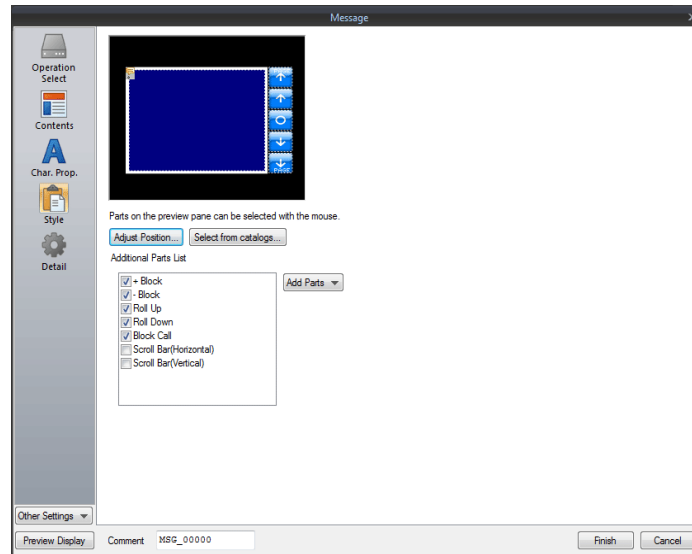
Item		Description
Adjust Position		Adjust the position and size of parts.
Select from catalogs		Select the part design.
Additional Parts List		Add and delete switch parts used in message mode. Each switch is used for page blocks or direct blocks.
	+ Block	Changes to the next message block.
	– Block	Changes to the previous message block.
	Roll Up	Scrolls up through messages.
	Roll Down	Scrolls down through messages.
	Block Call	Changes to the specified block number.
	Scroll Bar (Horizontal)	Scrolls messages horizontally.
	Scroll Bar (Vertical)	Scrolls messages vertically.

Editing parts

Select a part in the preview pane to change the part's style settings.
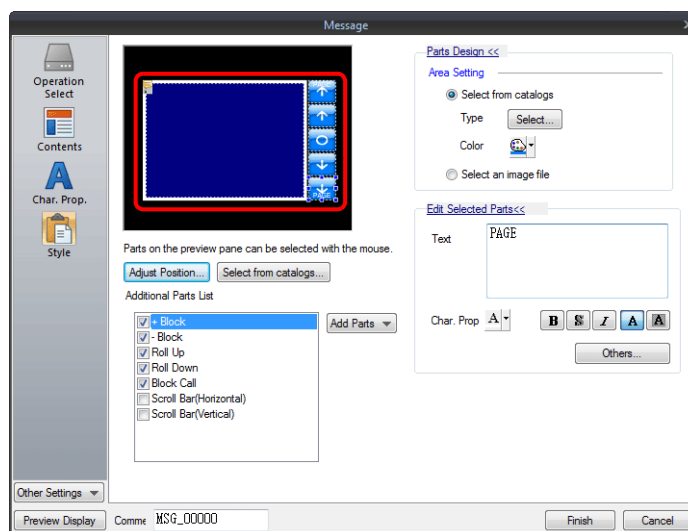
Item			Description
Parts Design	Area Setting	Select from catalogs	Select the part design. After selecting the part, select the part color.
		Select an image file	Select a bitmap file.
Edit Selected Parts	Text		Enter the text to be displayed on the switch. (Up to 4 lines can be registered. Text properties can be set for each line.) Text can be justified within the switch part.
	Char. Prop.		Set the text properties and style.
	Others		Edit switch settings other than those related to text and style. For details on switch settings, refer to "3.1 Switch" page 3-1.

Checking the display area size

Whether messages are displayed as intended in display areas can be checked on the screen.

With messages registered, click [View] → [Display Environment] → [Display] tab and select the [Display Message] checkbox.
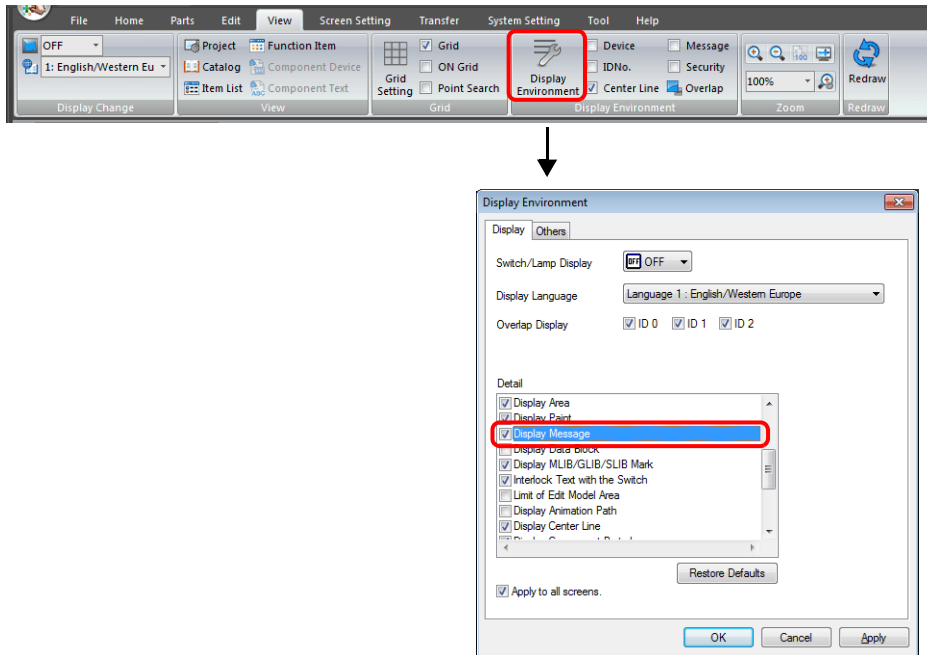
The registered messages are displayed on the screen.
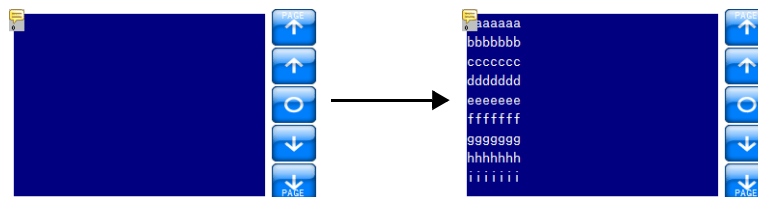
To adjust the size and other settings, perform adjustments via the [Adjust Position] button described in "Style" page 12-10.

Show/Hide

Item		Description
Show		Display the message mode part on the screen.
Hide		Do not display the message mode part on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

		Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
		Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the message mode part using X and Y coordinates.
	Width/Height	Set the size of the message mode part by specifying width and height.
Others	Action Area	Set the position to display the message on the screen. Display area: Display on provided display area parts. Switch: Display on provided switch parts. Switches are automatically set to "Mode" for [Function]. Each switch has [Display Order] (0 to 23) as an auxiliary setting where the message to display on each switch can be specified. When [Display Order] settings are all the same, messages are displayed in the same order that switches were placed. 　* **One switch part shows one message line.** Lamp: Display on provided lamp parts. Lamps are automatically set to "Mode" for [Function]. As with switch parts, each lamp has [Display Order] (0 to 23) as an auxiliary setting. 　* **One lamp part shows one message line.**
	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID (0 - 255)	Set the ID.

12.1.4 Registering Messages

There are two ways of registering messages.

- [Message] settings window → [Contents] → [Edit]
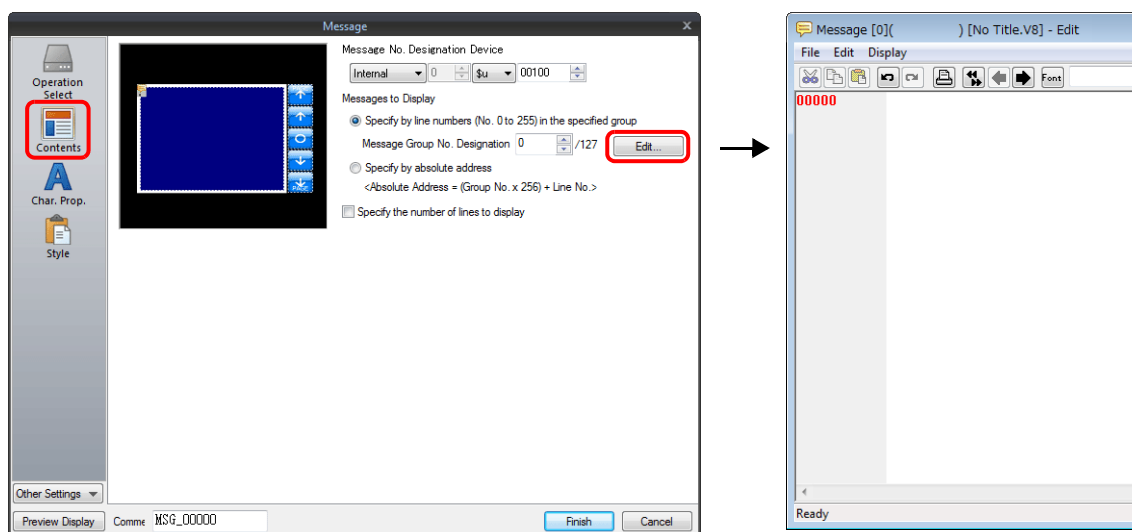
* When [Operation Select] is set to [Page Block] or [Direct Block], the [Message Edit] window cannot be displayed using this method.
* When a message group number is specified, the cursor appears at the start line of the group.

- [Home] → [Registration Item] → [Message] → (specify group number)
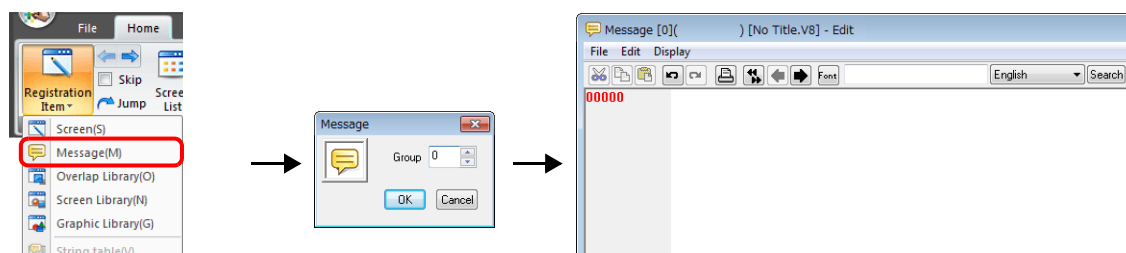
In the [Message Edit] window, line numbers denote absolute addresses as default.
When a message group number is specified, deselect [Display] menu → [Display Absolute Address as Line Number] before commencing editing.
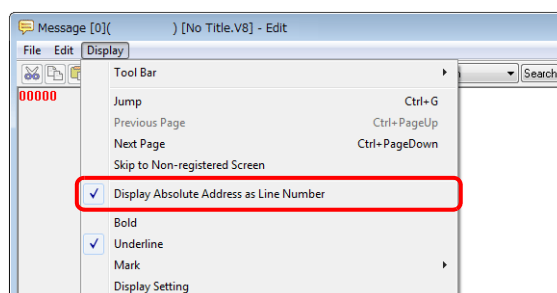
12.1.5 Registering Page Blocks

There are two ways of registering page blocks.

- [Message] settings window → [Contents] → [Edit]
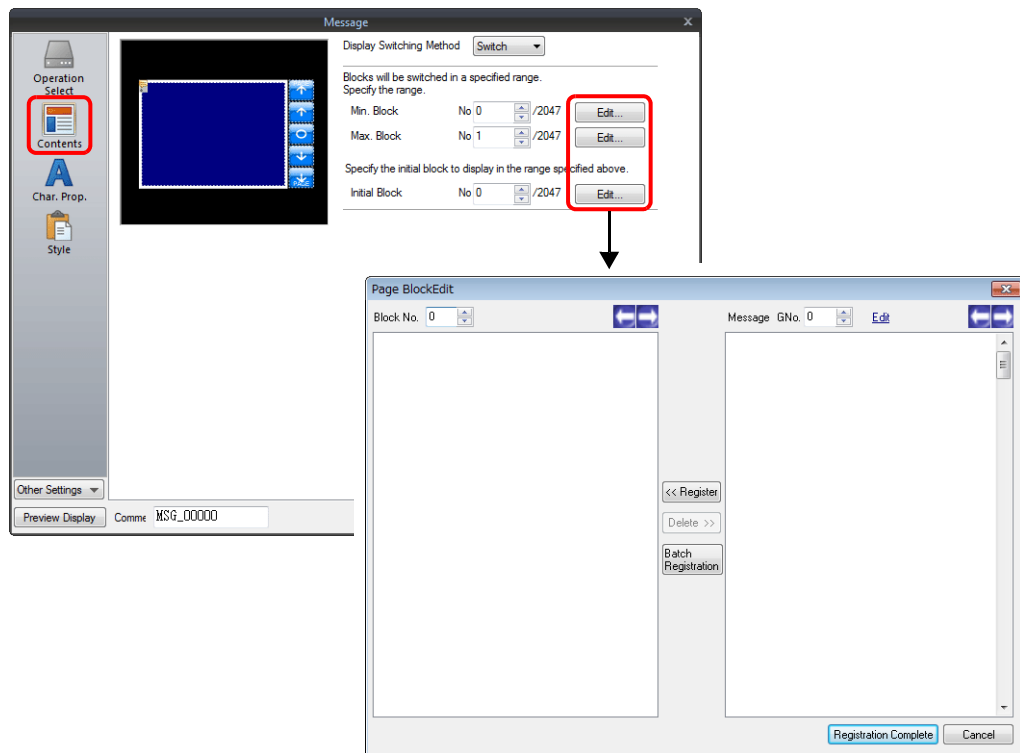
- [Home] → [Registration Item] → [Page Block] → (specify block number)
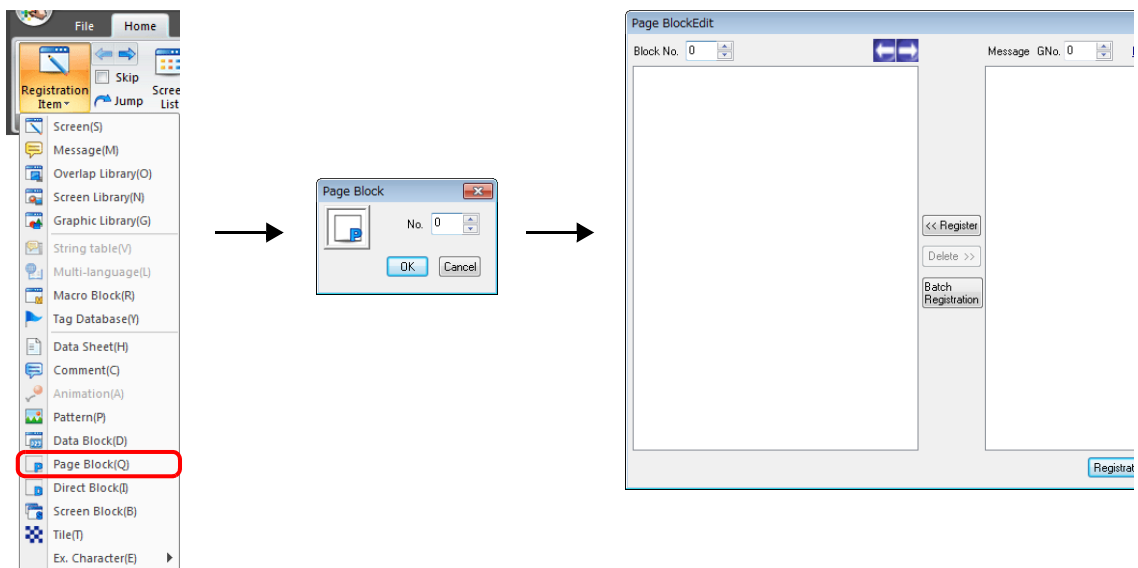
12.1.6 Registering Direct Blocks

There are two ways of registering direct blocks.

- [Message] settings window → [Contents] → [Edit]
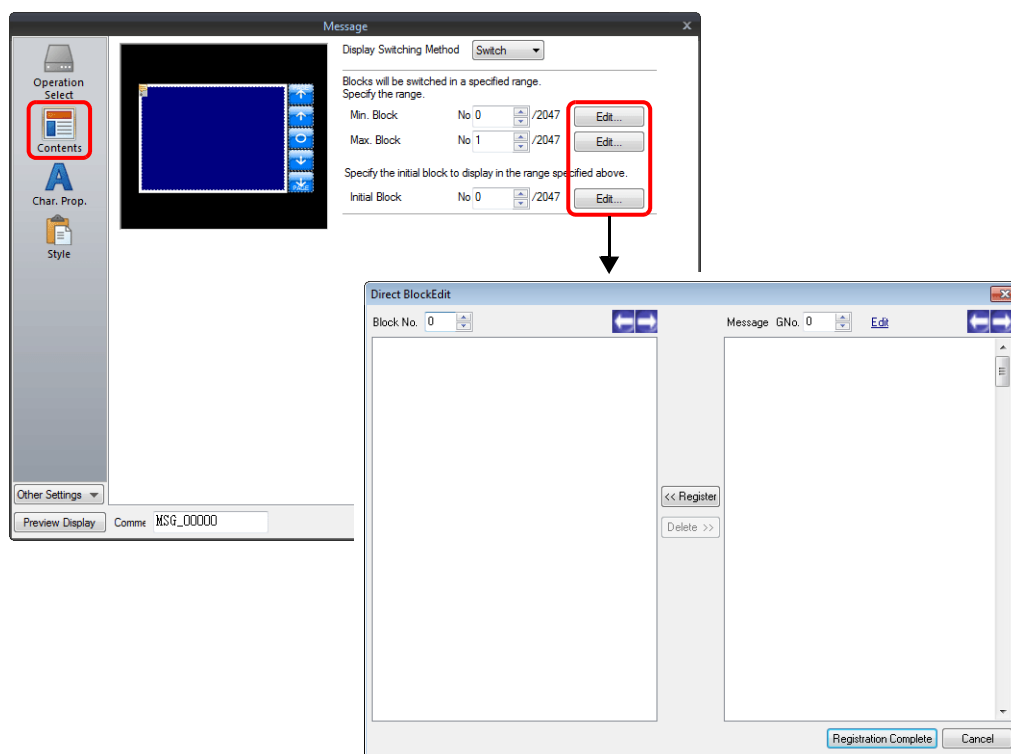
- [Home] → [Registration Item] → [Direct Block] → (specify block number)
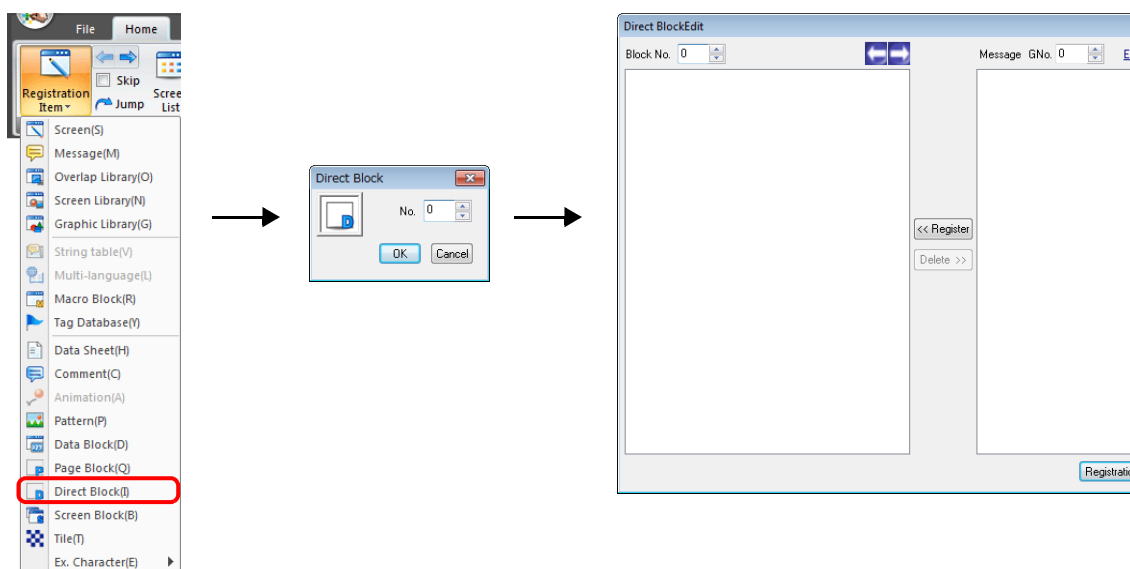
12.2 Displaying Comments

12.2.1 Overview

Register comments in advance and display them using bit designation or number designation.
A maximum of 32,767 comments can be registered. Character properties, such as color or size, can be set for each comment. One comment can include multiple lines.

Bit Designation

Display the comment that corresponds to bit ON of the assigned device memory address.
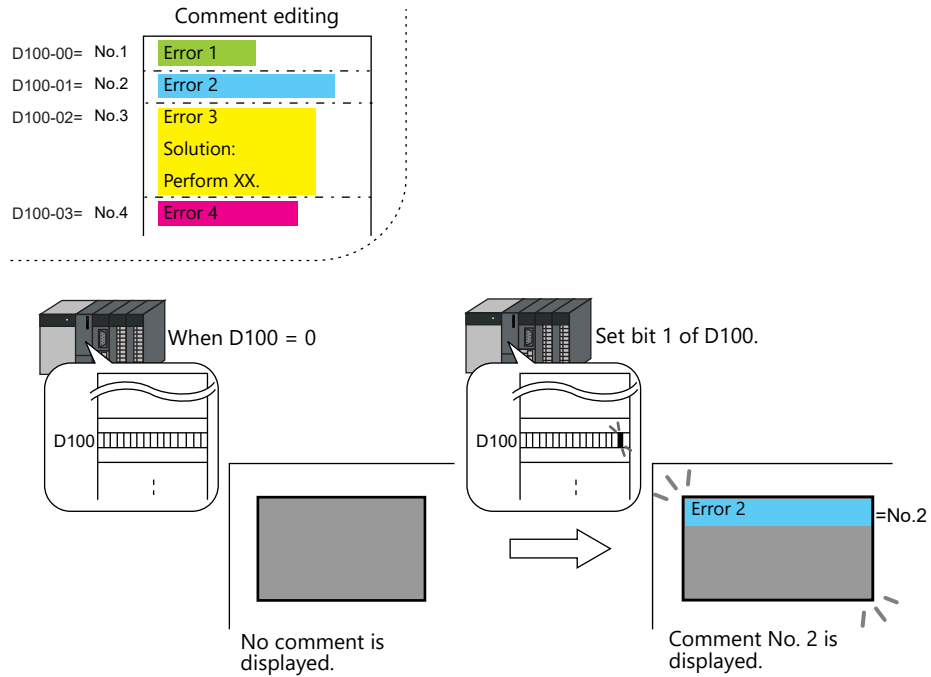
When multiple bits are set to ON, the least significant bit has priority.
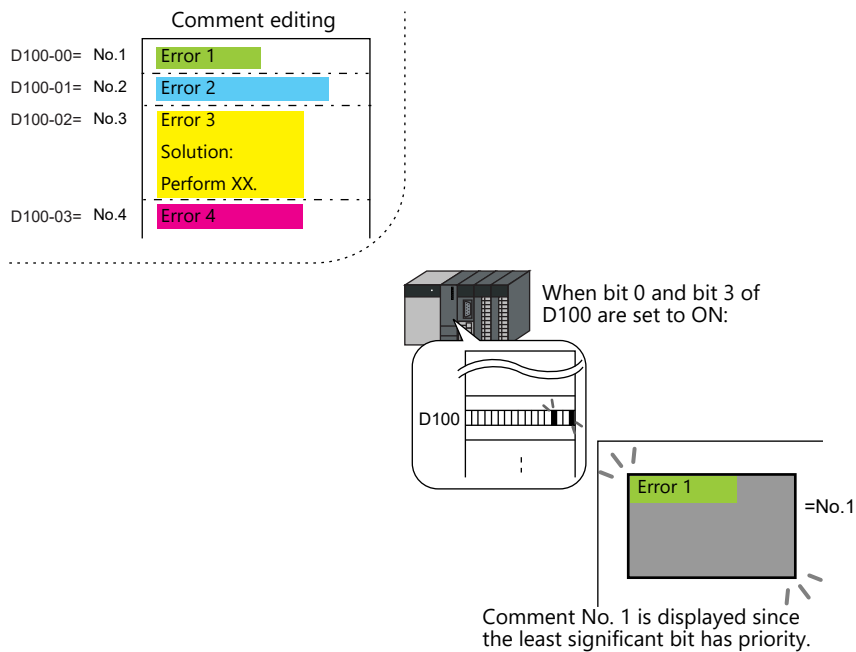
Number Designation

Set the comment number to the assigned device memory address and display the comment.

☞   For setting examples, refer to "Displaying Comments (Number Designation)" page 12-20.

Comment editing

No.1 Error 1
No.2 Error 2
No.3 Error 3
      Solution:
      Perform XX.
No.4 Error 4

When D100 = 0

D100   0

No comment is displayed.

Set "3" for D100.

D100   3

Error 3
Solution:
Perform XX.   =No.3

Comment No. 3 is displayed.

12
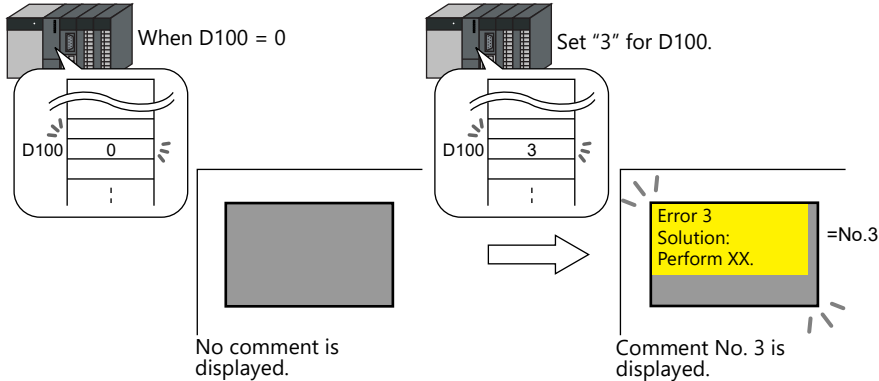
12.2.2 Setting Examples

Displaying Comments (Number Designation)

Register the comment to display in advance and specify the comment number to D100.
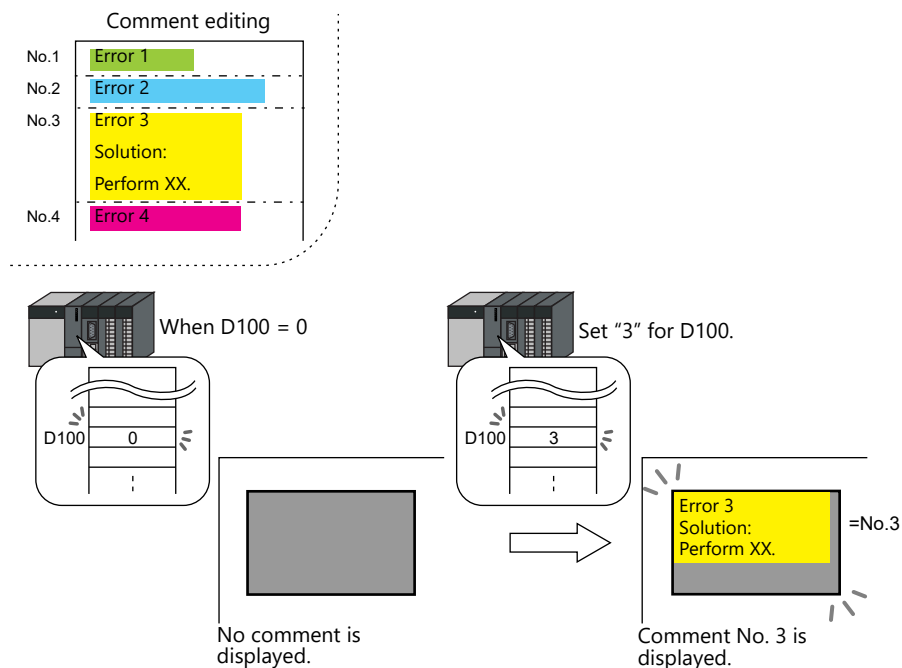
1. Click [Parts] → [Message] → [Comment] and place a comment display on the screen.
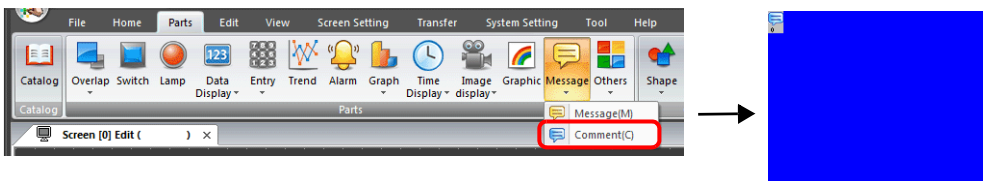
2. Double-click on the comment display to display the settings window.
   Configure the following settings for [Contents] and then click [Finish].
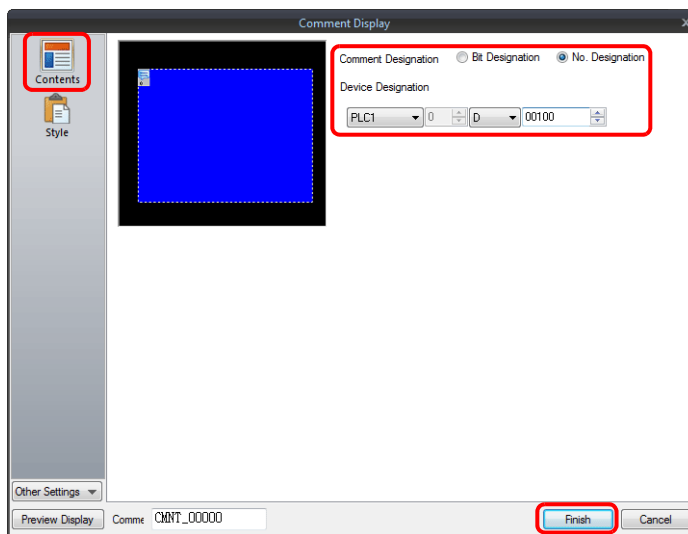
3.   Click [Home] → [Registration Item] → [Comment] → [OK] with group number 0.
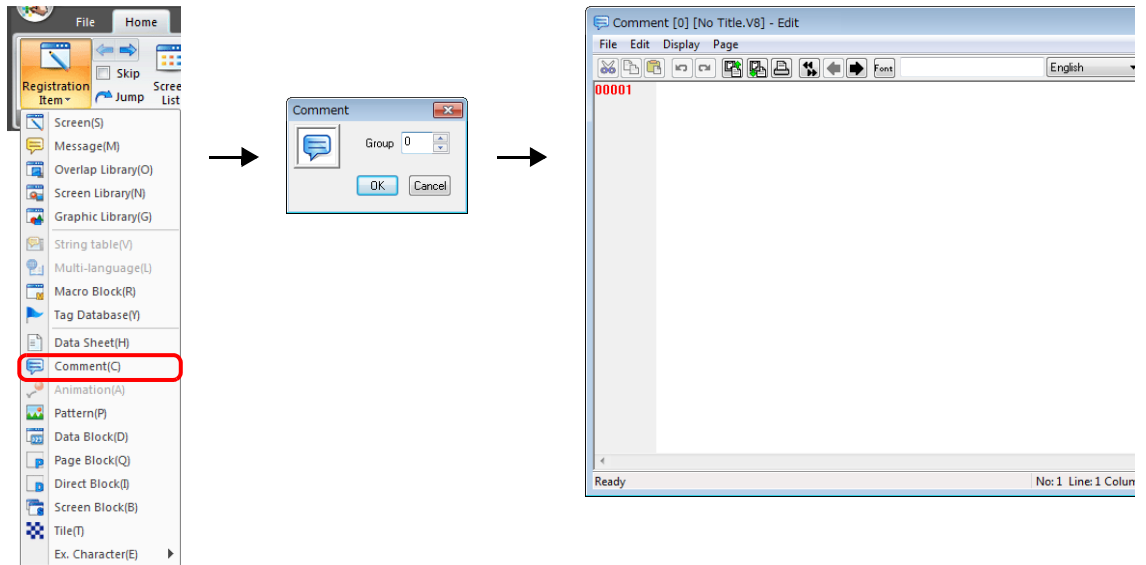
4.   Register a comment as shown below.
    Press the [Alt] and [Enter] keys together to enter a new line.
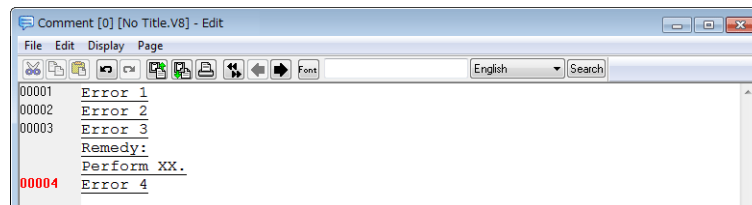
5.   Select the comment line for setting character properties, right-click, and click [Char. Prop.].
    Set the following character properties and then close the [Comment Edit] window.
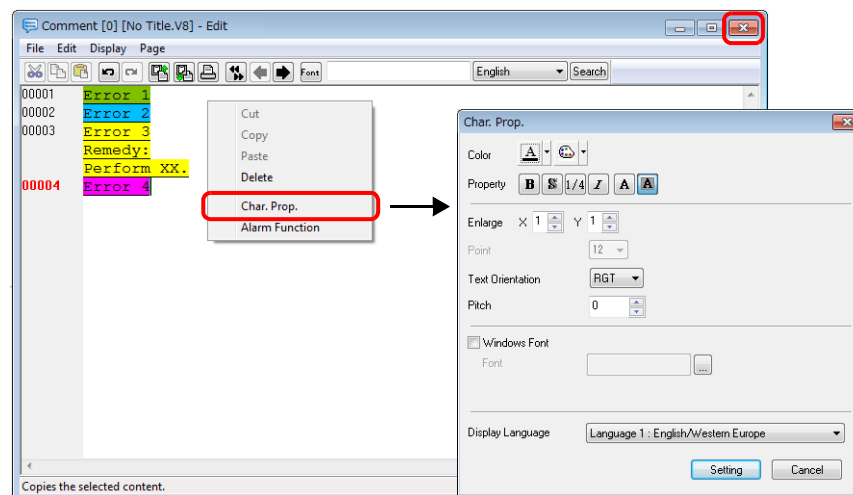
This completes the necessary settings.

12.2.3 Detailed Settings

Operation Select

Item	Description
Comment Designation	Select the comment display method. Bit Designation Select this option to display the comment using bit activation. No. Designation Select this option to display the comment by specifying the comment number.
Device Designation	Specify the command device memory address to use for displaying comments on the screen. The setting should vary depending on which of [Bit Designation] or [No. Designation] was selected. Bit Designation: Set the device memory address (1 bit) to display the comment set for [Top Line No.]. When multiple bits are set to ON, the least significant bit has priority. No. Designation: Set the device memory address (1 word) for specifying the comment number. When "0" is specified, no comment is displayed. When "1 to 32767" is specified, the corresponding comment is displayed. However, if the BCD code is used on the PLC, the available range is limited to "0 to 9999".
Bits to Use (1 - 512)	Set the number of bits to use for comment display (total number of comments to be displayed). From the bit set for [Device Designation], as many bits as set for [Bits to Use] are consecutively allocated to the comment specified for [Top Line No.] and later.
Top Line No. (1 - 32767)	Specify the top comment number for display by activation of the bit set for [Device Designation]. Click [Edit] to display the [Comment Edit] window.

Style
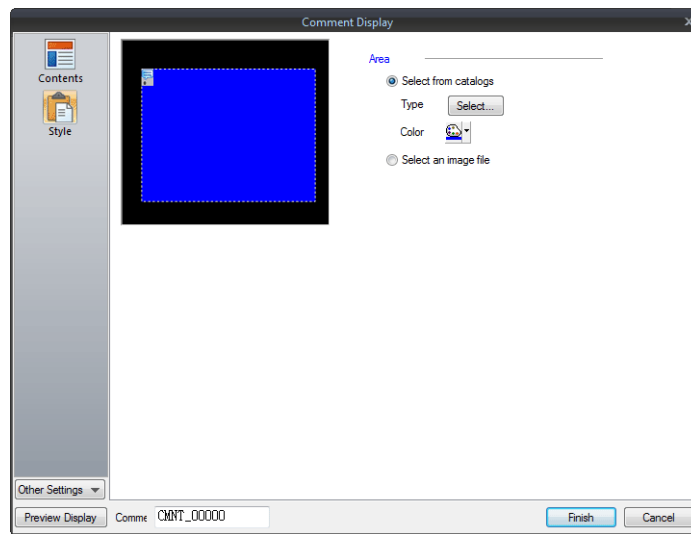
Item		Description
Area	Select from catalogs	Select the part design. After selecting the part, select the part color.
	Select an image file	Select a bitmap file.

Show/Hide

Item		Description
Show		Display the message mode part on the screen.
Hide		Do not display the message mode part on the screen.
Show/hide according to the condition	Bit device	Show the part if the specified bit device memory is ON and hide the part if it is OFF.
	Word Device	Show the part if the conditional expression of the specified word device memory is satisfied and hide the part if the expression is not satisfied.

		Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
		Condition expression	Set a comparison sign, value, and device memory address as the conditions for comparison.

	Security Level	This setting is available when using the security function. Show or hide the part according to the security level of the user that is currently logged in. For details, refer to "5 Security" in the TS Series Reference Manual 2.

Detail

Item		Description
Coordinates	Start X/Start Y	Set the display position of the comment display using X and Y coordinates.
	Width/Height	Set the size of the comment display by specifying width and height.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID (0 - 255)	Set the ID.

Checking the display area size

Whether comments are displayed as intended in display areas can be checked on the screen.
The procedure is the same as described for the message mode. Refer to page 12-12.

12.2.4 Registering Comments

There are two ways of registering comments.

- [Comment] settings window → [Contents] → [Edit]
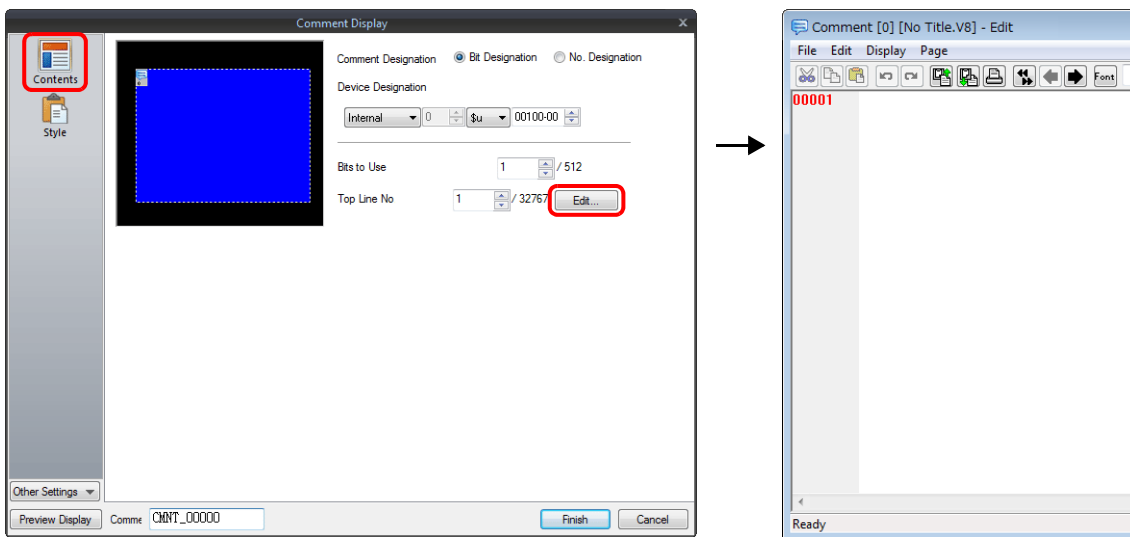
* When [No. Designation] is selected, the window for comment registration will not be displayed in this way.

* The cursor is displayed at the start line of the group that includes the line number specified for [Top Line No.].

- [Home] → [Registration Item] → [Comment] → (specify group number)

MEMO

MONITOUCH
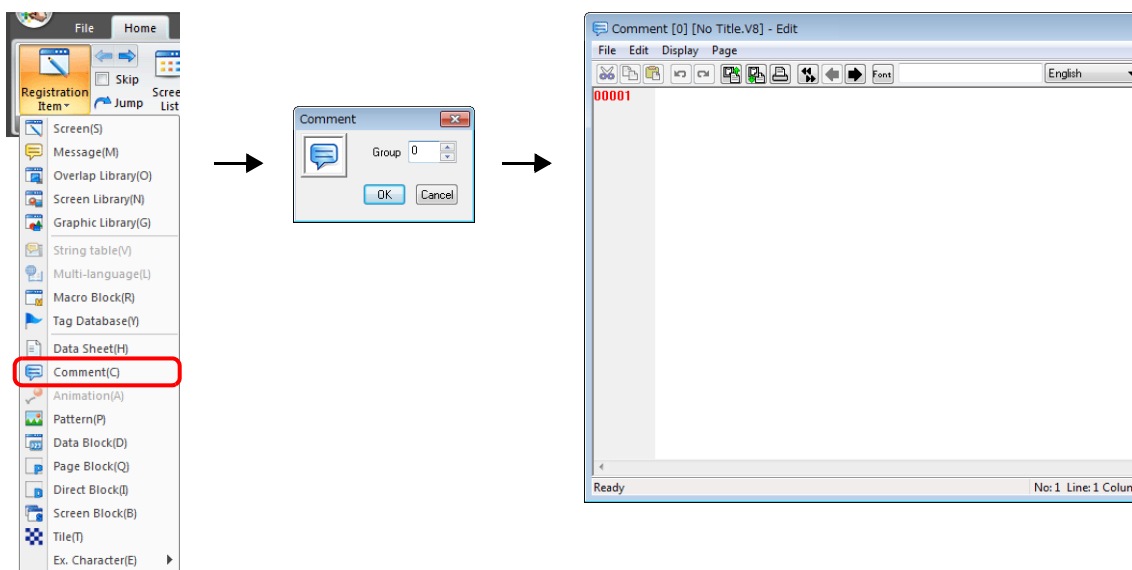
13　Others

13.1   Data Block Area

13.1.1 Overview

When there are several entry targets to be displayed on the screen and they cannot be displayed at one time, data blocks can be used. Place a data block area on the screen and register the necessary entry targets in the "data block." The block number can be switched to display many entry targets.

A maximum of four data block areas can be set per screen.

If you set four data block areas on the base screen, you cannot set any more data blocks on the overlap IDs 0 to 2.

Data block change switches
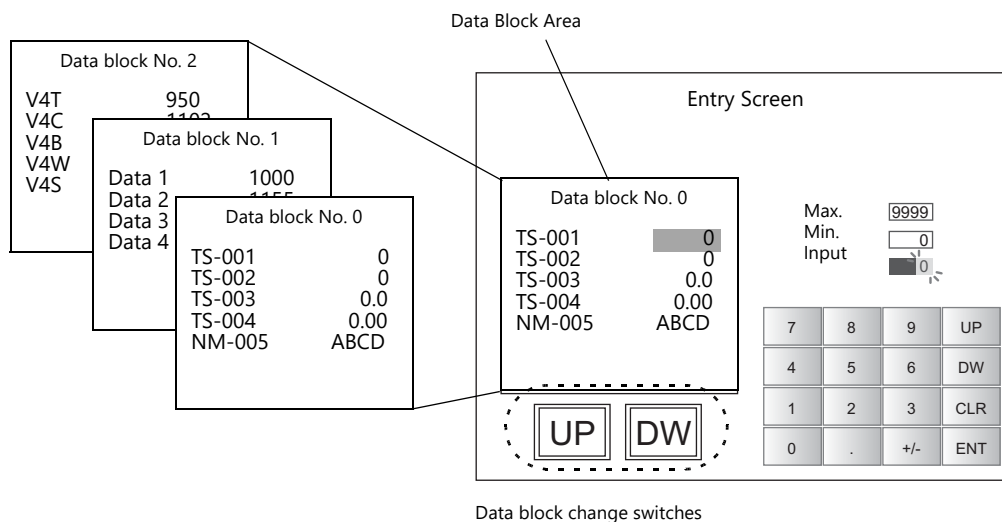
13.1.2 Detailed Settings

Click [Parts] → [Others] → [Data Block Area] and place a data block area.
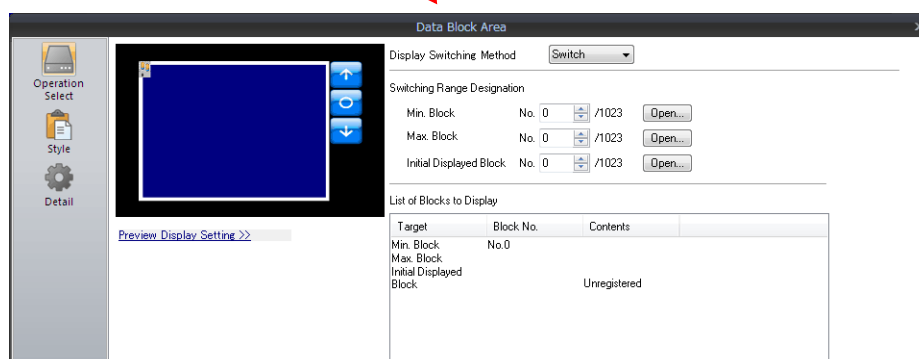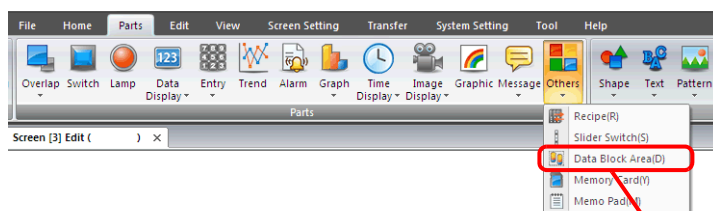
Operation Select

Settings differ depending on the [Display Switching Method] setting in the [Operation Select] settings.

Display Switching Method: Switch
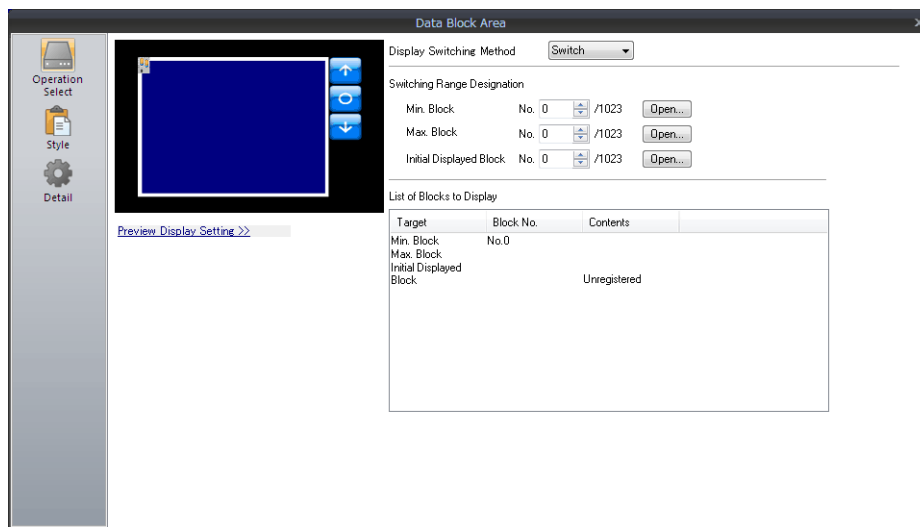
Item		Description
Display Switching Method		Select [Switch] to change over the displayed data block area using switches.
Switching Range Designation	Min. Block	Set the smallest block number among the blocks to be displayed. * Click [Open] to browse the registered data blocks.
	Max. Block	Set the largest block number among the blocks to be displayed. * Click [Open] to browse the registered data blocks.
	Initial Displayed Block	Set the initial block number to show when the screen is displayed.
List of Blocks to Display		The configured data block contents are displayed.

Display Switching Method: Device
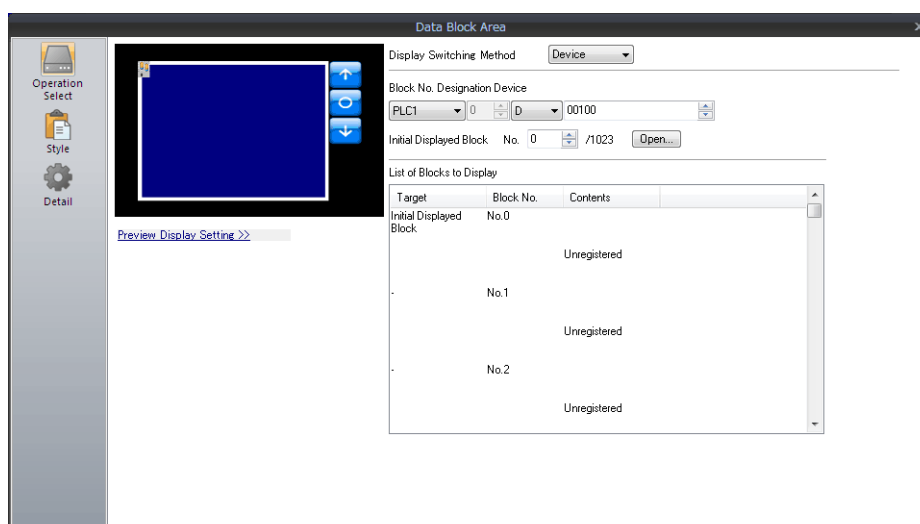
Item	Description
Display Switching Method	Select [Device] to specify data block numbers using [Block No. Designation Device] described below.
Block No. Designation Device	Specify the device memory address used for specifying a block number.
Initial Displayed Block	Set the initial block number to show when the screen is displayed.
List of Blocks to Display	The configured data block contents are displayed.

Style
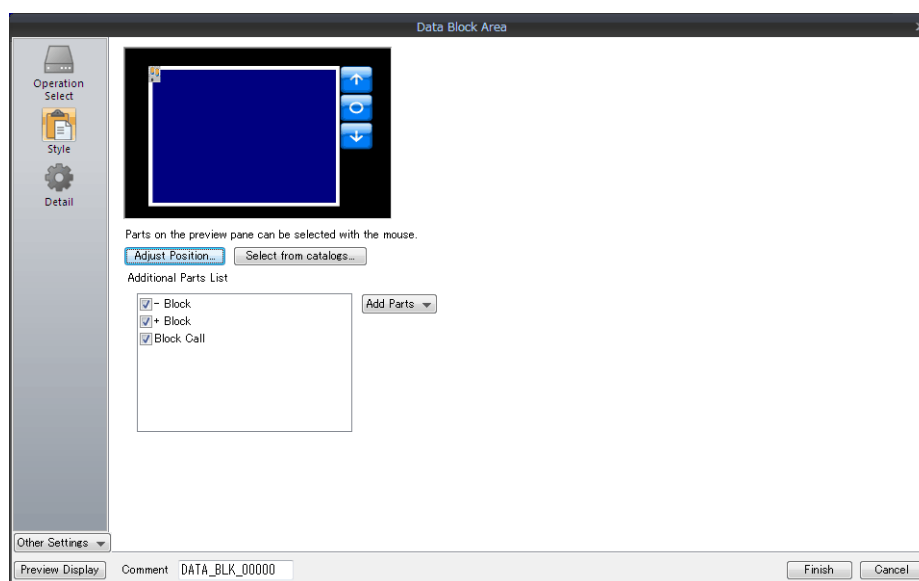
Item		Description
Additional Parts List		Displays a list of data block area-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
	+ Block	Brings up the next data block area within the range of the specified maximum and minimum data block numbers.
	– Block	Brings up the previous data block area within the range of the specified maximum and minimum data block numbers.
	Block Call	Brings up the data block area of the specified number.
Adjust Position		Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs		Set the part design from the catalog.
Parts Design		Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane.

Show/Hide

Set the show and hide settings of data block items.

☞   For details, refer to "14 Item Show/Hide Function".

Detail

Item		Description
Device Setting	Block No. Output Device	Select this checkbox to specify the device memory address for writing the currently displayed block number.
	Input Cursor Movement Control Device	Select this checkbox to use the input cursor movement control device memory. For details on using the input cursor movement control device memory, refer to "Item Select with [Input Cursor Movement Control Device]" page 6-34.
	Word Count	This setting is available when [Input Cursor Movement Control Device] is selected. For details on using the input cursor movement control device memory, refer to "Item Select with [Input Cursor Movement Control Device]" page 6-34.
Coordinates	Start X, Start Y	Specify the coordinates of the display area.
	Width, Height	Set the size of the display area.
Others	Order INC	Up to four data block areas can be placed on one screen. When multiple data block areas are placed, this option determines the order in which the cursor moves to each data block area.
	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	GD-80 Compatible	Select this checkbox when a GD-80 series screen program is converted into a TS screen program. For details, refer to the File Conversion Manual.
	ID	Set an ID number.

13.1.3 Data Blocks

Numerical data displays and character displays must be placed on a data block to be displayed in a data block area.
They cannot be placed on the base screen or in the overlap library.

Location of Settings
Start data block configuration by clicking [Home] → [Registration Item] → [Data Block] and specifying a block number.
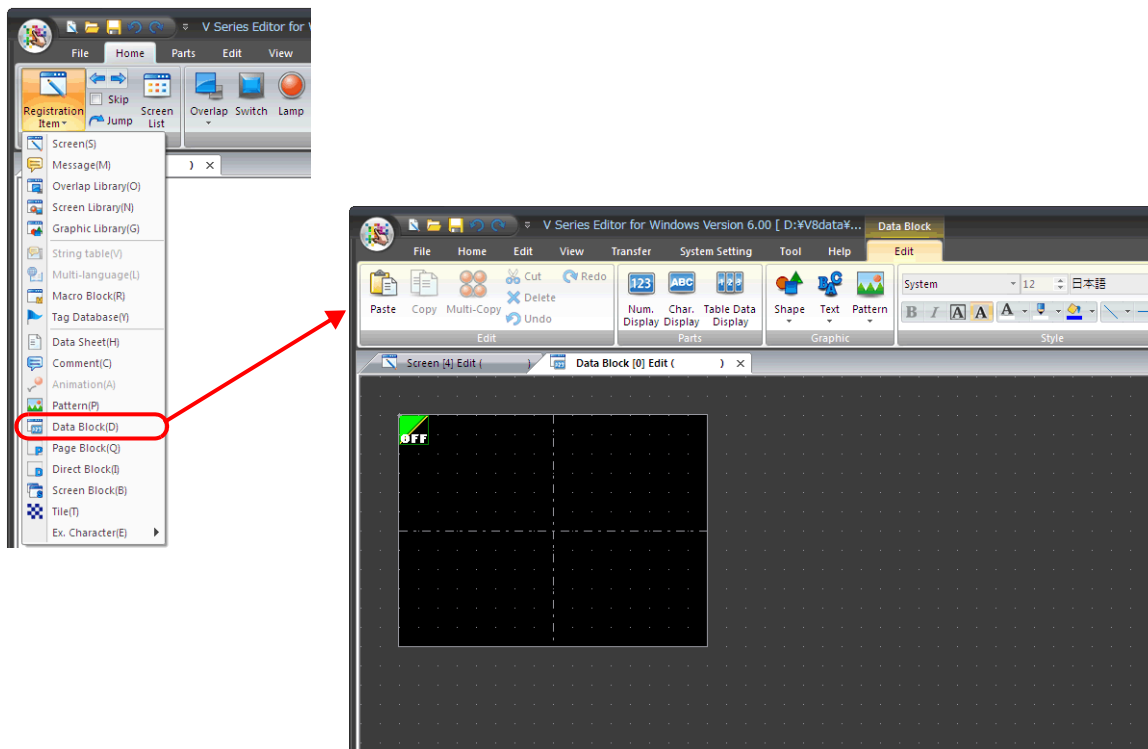
13.2 Memory Card

13.2.1 Overview

About the Memory Card Function

- Internal SRAM or a storage device[*] can be used as external storage media to read data whenever necessary and save PLC data.

  The memory card emulation area of internal SRAM or a storage device[*] is divided into a maximum of 16 files. Each file is divided into a maximum of 4095 records. Data is stored in each record.
- * The TS2060 does not support storage devices.
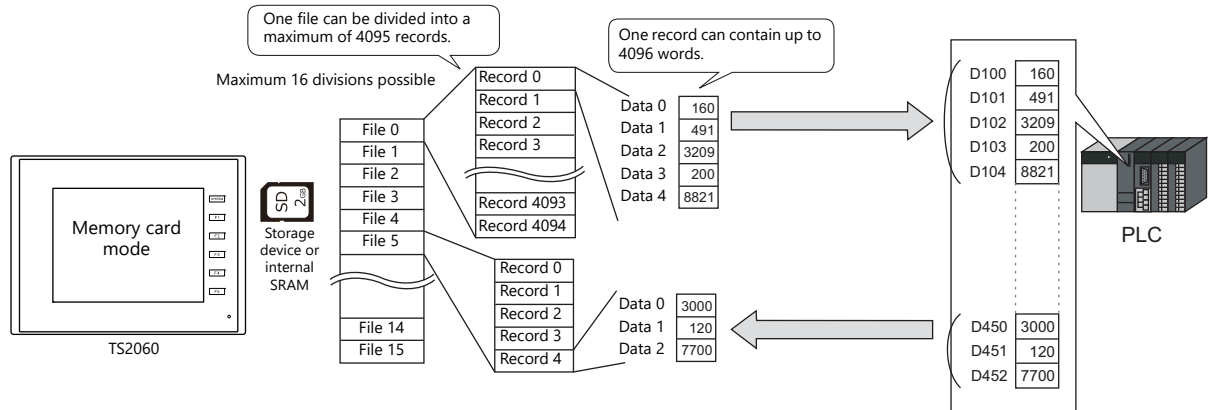
- Data can be read or saved in units of "records". Since a large capacity of data can be stored, it is not necessary to secure a device memory area in the PLC for storage purposes.
- * When a storage device is used, the recipe function can be used without using the memory card function.
  For details, refer to "15 Recipes".
- The memory card function can be used by placing a memory card part which transfers data in units of records, as well as by using memory card device memory for reading/writing data individually.
  By directly allocating such addresses to placed items enables operation like PLC device memory.
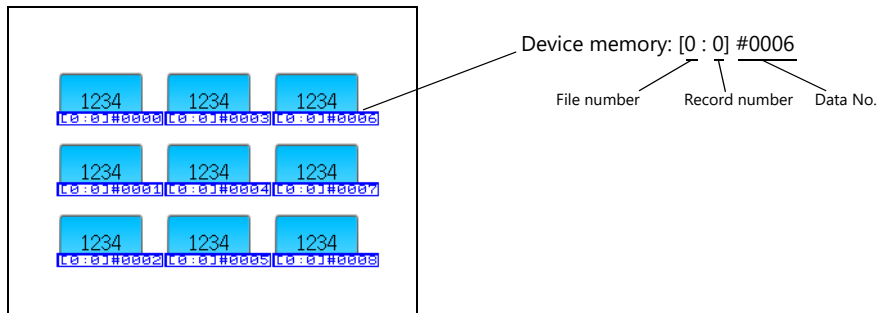
Applicable Media

In order to use the memory card function, use of internal SRAM or a storage device is necessary.
Settings differ depending on which is used.

Model	[System Setting]		Media
	[Unit Setting] → [SRAM/Clock] → [Memory Card Emulation Area]	[Other] → [Storage Setting]	
TS2060i TS1000Si TS1070Si TS1070S	Configured	-	Internal SRAM
	Not configured	Built-in socket	SD card (TS2060i only)
		USB port	USB flash drive
TS2060	Configured	-	Internal SRAM
	Not configured	-	None (memory card function not available)

Memory Card Editor (Under Development)

By using Hakko Electronics' memory card editor (M-CARD SFT), data stored in internal SRAM or a storage device can be read on a computer, and data edited or input on the computer can be written to internal SRAM or a storage device.
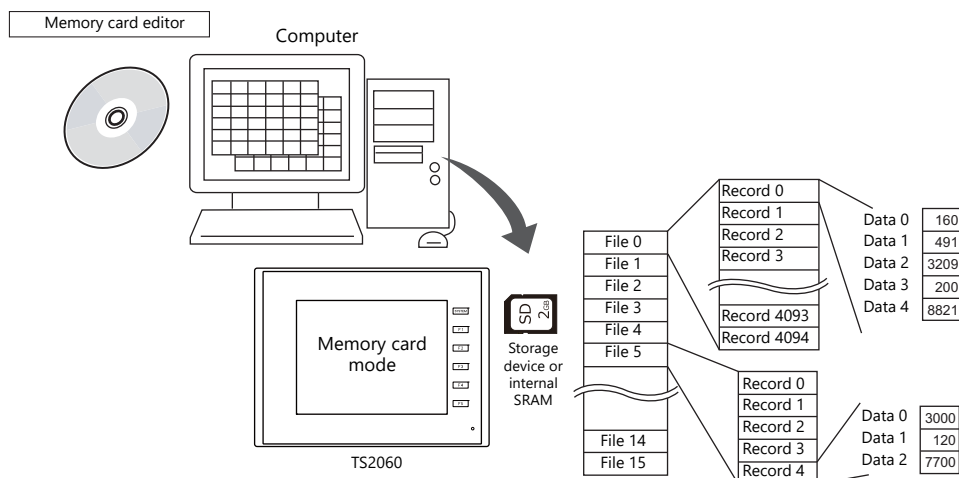
For information on the usage of the memory card editor, refer to the memory card editor M-CARD SFT Instruction Manual.

Procedures on TS

To use the memory card function, perform the following procedures on MONITOUCH:
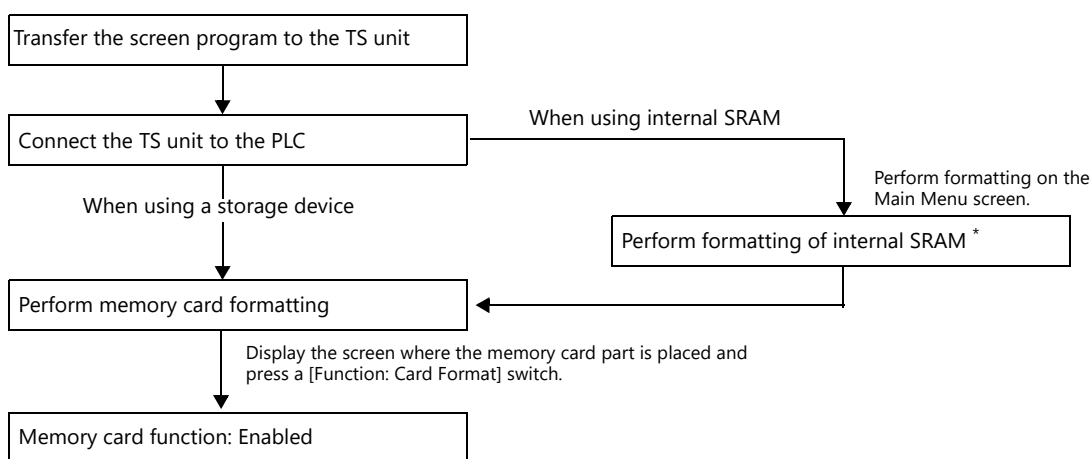
*   Formatting is automatically performed if [System Setting] → [Unit Setting] → [SRAM/Clock] → [SRAM Auto Format] is selected.

If the memory card function does not work, check the status of [I/F Device] set in the [Memory Card Setting] window (refer to page 13-16), and take appropriate actions.

13.2.2 Setting Example: Memory Card Settings

When the [Memory Card Setting] window is set as shown below, the memory card area is divided and PLC device memory is allocated as illustrated below.

Item	File No. 0	File No. 1
Type	Data File	Data File
No. of Records	3	2
Data Count	5	2
No. of Bytes for Record	8	4
Device	D130	D505
Transfer Mode	Data Only	Data + Record Name
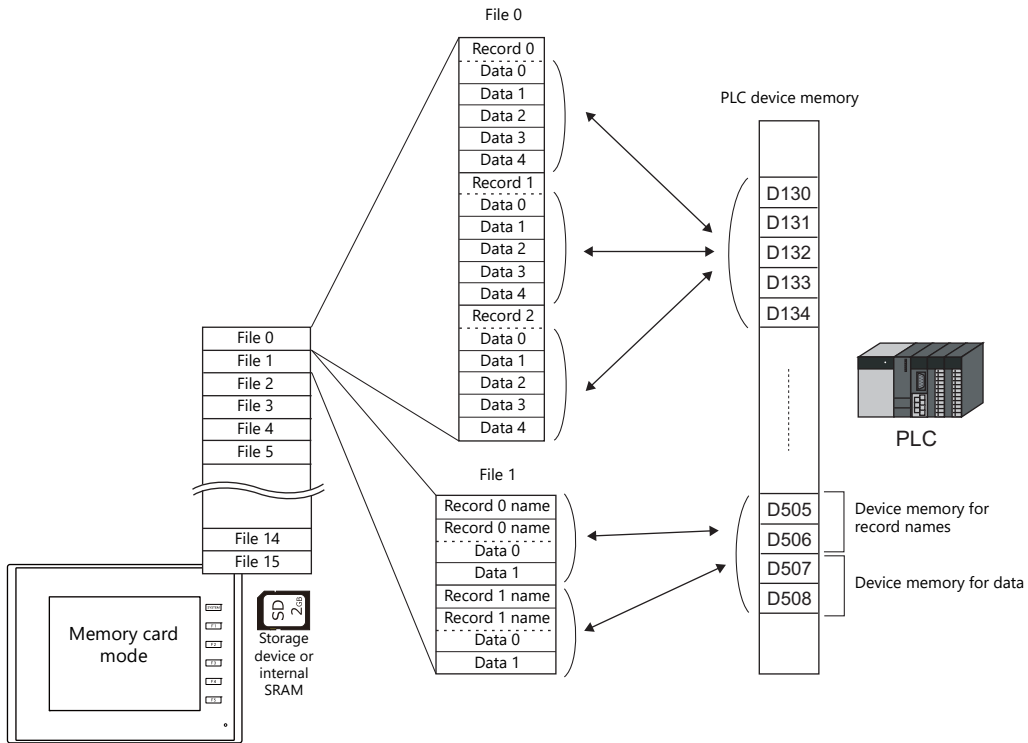
Memory Card Area Map

Excluding header information, the memory card emulation area is allocated as shown below:
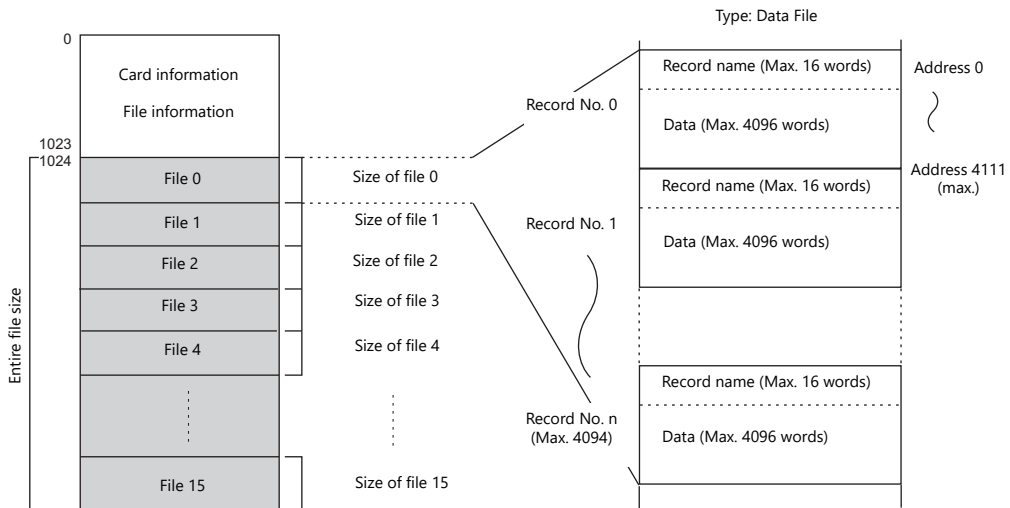
13.2.3 Detailed Settings

Click [Parts] → [Others] → [Memory Card] and place a memory card part.

Memory Card

Data Definition
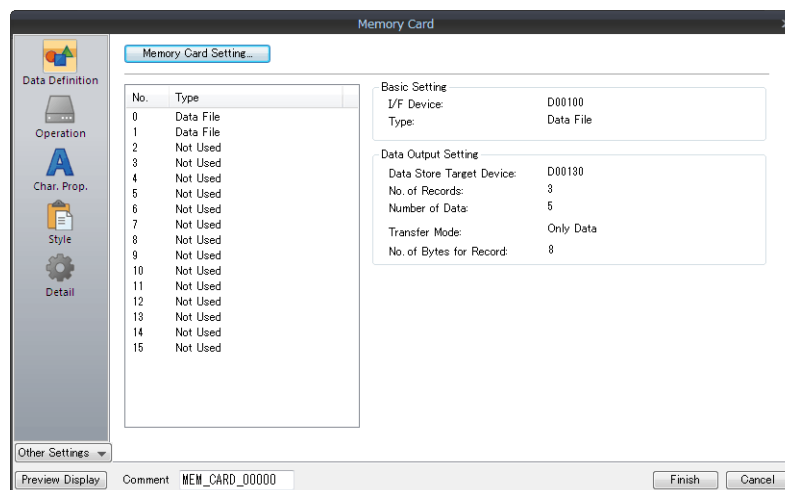
Item	Description
Memory Card Setting	Displays the [System Setting] → [Other] → [Memory Card Setting] window.
No. 0 to 15	Displays the [Memory Card Setting] configurations. Click a number to display its details in the right pane.

Operation

Item	Description
Control Device [*1]	When transferring data between the TS and the PLC, specify the top device memory address for controlling operation. Three words are occupied consecutively. The contents are shown below:
Location	When placing the entry keys for editing of card numbers, card names, filenames, or record names, choose the location from overlap IDs 0 to 2 or the base screen. Only one location (base, overlap ID 0 to 2) can be chosen for the entry keys (entry mode). [*2]

	Device	Action	
A	n	Mode operation designation	
B	n + 1	File number designation	PLC → TS
C	n + 2	Record number designation	

*1 Control device memory details

A. n (Mode operation designation)

Bit No.	Description	Details
0	Record name edit prohibited	Record name edit is prohibited.
1	Filename edit prohibited	Filename edit is prohibited.
2	Card number/name edit prohibited	Card number and name edit is prohibited.
3	Format prohibited	Memory card formatting is prohibited.
4	Data transfer prohibited	Data transfer between the memory card and the PLC is prohibited.
5 to 7	Not used	This bit must be reset to "0".
8	Record lock	The use of a [Record Select] switch is prohibited.
9	File lock	The use of a [File Select] switch is prohibited.
10	File selection	In a display area part: [0]: Only the files for [Type: Data File] are displayed. [1]: All files are displayed.
11	Not used	This bit must be reset to "0".
12	Quick selection	When bit 14 or bit 15 is set to "1" with this bit ON, data is transferred on completion of record selection on the TS unit.
13	Not used	This bit must be reset to "0".
14	TS series → PLC transfer	Data is transferred from the TS unit (functioning as a memory card) to the PLC at the edge of [0 → 1]. When transferring is completed, bit 14 of "CFM_TRFIN" (I/F device memory "n + 5") is set to "1". Reset this bit to "0" after the completion of data transfer. For details on the I/F device memory, refer to page 13-16.
15	PLC → TS series transfer	Data is transferred from the PLC to the TS unit (functioning as a memory card) at the edge of [0 → 1]. When transferring is completed, bit 15 of "CFM_TRFIN" (I/F device memory "n + 5") is set to "1". Reset this bit to "0" after the completion of data transfer. For details on the I/F device memory, refer to page 13-16.

B. n + 1 (File number designation)
This area is used to specify a file number from the PLC and is valid when bit 9 (file lock) or bit 8 (record lock) of "n" is set to "1". Set the file number to this area when specifying file numbers from the PLC instead of on the screen.

* When [Not Used] or [Buffering File] is chosen for [Type] of the file number specified from the PLC, the file cannot be selected.

C. n + 2 (Record number designation)
This area is used to specify a record number from the PLC and is valid when bit 8 (record lock) of "n" is set to "1". Set the record number to this area when specifying record numbers from the PLC instead of on the screen. Unlike selection using a [Record Select] switch, the record number specified from this address is displayed from the top of the display area part.

*2 If an attempt is made to place entry keys in two locations, the following error message is displayed.
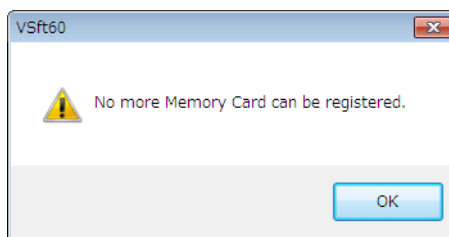
Character Properties
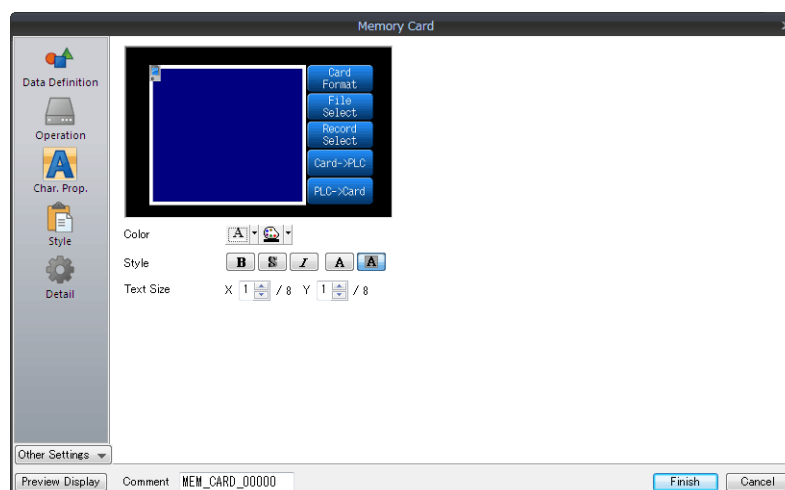
Item	Description
Color	Set the text color and area background color.
Style	Set the text style.
Text Size	Set the text size.

Style

Item	Description
Additional Parts List	Displays a list of memory card-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button. For details on each part, refer to "Memory Card Part Switches" page 13-13 and "Data Display Parts for Memory Card Part" page 13-14.
Adjust Position	Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs	Set the part design from the catalog.
Parts Design	Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts	Configure the part selected in the [Additional Parts List] or preview pane.

Show/Hide

Set the show and hide settings of memory card items.

☞   For details, refer to "14 Item Show/Hide Function".
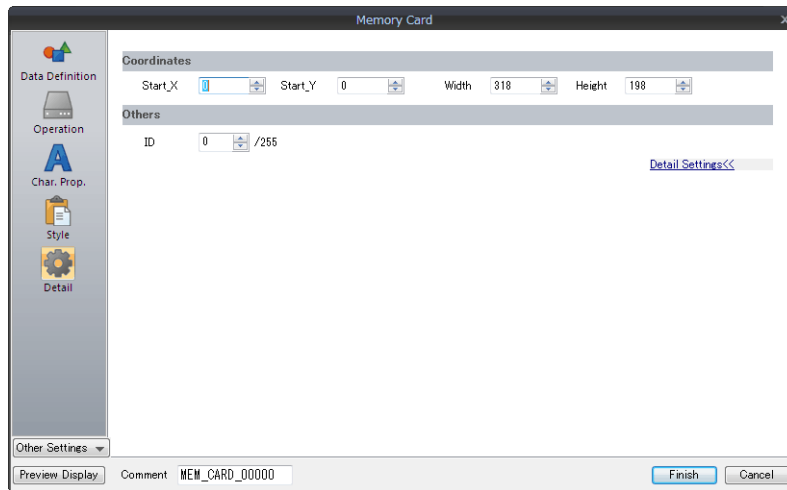
Detail

Item		Description
Coordinates	Start X, Start Y	Specify the coordinates of the display area.
	Width, Height	Set the size of the display area.
Others	Process Cycle	Set the process cycle. For details, refer to "1.2 Process Cycle".
	ID	Set an ID number.

Display Area

Press a file or record in the display area to choose it. Since the display area part is automatically furnished with a switch function, pressing a file or record name selects that file or record.
The Y size of each switch is determined based on the "Y" magnification of text shown on the display area.
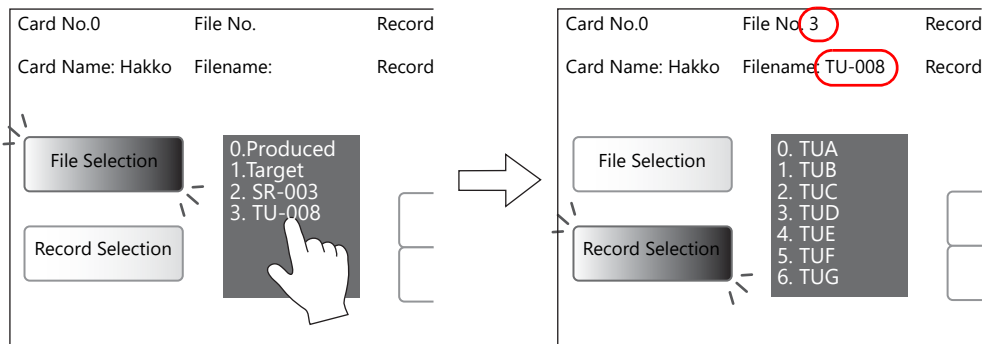
Memory Card Part Switches

List of Switches

Switch Function	Details of Operation
File Selection	When filenames in the memory card are displayed, this switch starts flashing. Pressing a filename while this switch is flashing selects that file.
Record Selection	This switch is valid when a file is chosen. Pressing this switch immediately after selecting a file or pressing this switch with a file selected displays record names in the display area. The switch starts flashing. Pressing a record while this switch is flashing selects that record. The switch keeps flashing.
Card Number Edit Card Name Edit (Auxiliary setting item: [Overlap Library No])	Pressing these switches allows editing of card numbers or names respectively. When the entry keys (entry mode) are placed on the base screen, these keys will be automatically enabled. When keys are placed on an overlap display, these switches will function as an overlap call switch. At the same time, the use of the entry keys is enabled. * For the auxiliary setting item [Overlap Library No], register the entry keys (entry mode) in the overlap library.
File Name Edit (Auxiliary setting item: [Overlap Library No])	Pressing this switch puts it in the ON state. At the same time, the [File Select] switch starts flashing, indicating that a file can be selected. When a file is selected while the [File Name Edit] switch is in the ON state, the filename can be edited using entry keys. This is an alternate action switch: pressing once activates the switch (ON) and pressing again deactivates the switch (OFF). (The switch is deactivated during filename or record name editing.) * For the auxiliary setting item [Overlap Library No], register the entry keys (entry mode) in the overlap library.
Record Name Edit (Auxiliary setting item: [Overlap Library No])	Pressing this switch puts it in the ON state. When a record is selected while this switch is in the ON state, the record name can be edited using entry keys. This is an alternate action switch: pressing once activates the switch (ON) and pressing again deactivates the switch (OFF). (The switch is deactivated during filename or record name editing.) * For the auxiliary setting item [Overlap Library No], register the entry keys (entry mode) in the overlap library.
Card Format	Pressing this switch formats a memory card as specified in the [Memory Card Setting] window.
Transfer Card → PLC	This switch is valid only when a record is selected. The selected record is transferred from the memory card to the PLC. The data is stored in the address specified for [Device] in the [Memory Card Setting] window.
Transfer PLC → Card	This switch is valid only when a record is selected. Data is transferred from the PLC to the selected record. The data source is the address specified for [Device] in the [Memory Card Setting] window. The amount of data to be transferred is determined by [Data Count].
Roll Up	Pressing this switch scrolls up file or record names one by one in the display area.
Roll Down	Pressing this switch scrolls down file or record names one by one in the display area.
+ Block	Pressing this switch scrolls up pages of file or record names in the display area.
- Block	Pressing this switch scrolls down pages of file or record names in the display area.
Reset	When "11" or "12" is stored in the I/F device memory address "n + 1" (specified in the [Memory Card Setting] window), pressing this switch clears the data in "n + 1". (The error bit of "n" remains set.) For details on the I/F device memory, refer to page 13-16.

   * Be sure to set the same ID number as the memory card part for each switch.

Examples of Switch Operations

- [File Selection] and [Record Selection] switches
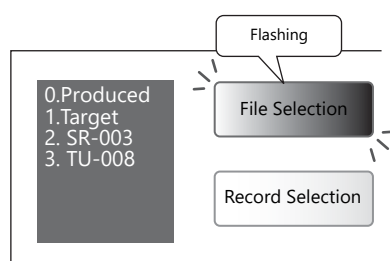
Filenames are displayed in the display area while the [File Selection] switch is flashing.
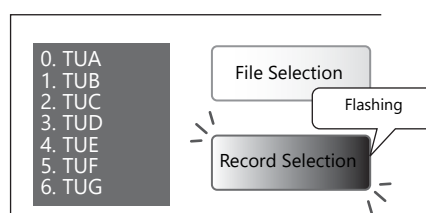
Record names are displayed in the display area while the [Record Selection] switch is flashing.

Data Display Parts for Memory Card Part

List of Data Display Parts

Set [Function] to [Memory Card].

Function	Details of Operation
Memory Card No. Display	Displays the card number currently being used.
Memory Card File No. Display	Displays the file number currently being used or selected.
Memory Card Record No. Display	Displays the record number currently being used or selected.
Memory Card Name Display	Displays the card name currently being used.
Memory Card File Name Display	Displays the filename currently being used or selected.
Memory Card Record Name Display	Displays the record name currently being used or selected.

* Be sure to set the same ID number as the memory card part for each display part.

13.2.4 Memory Card Setting

When using the memory card function, configure settings for file divisions and definition in the [Memory Card Setting] window. The memory card emulation area is formatted according to the settings, and the memory card function is enabled.

Click [System Setting] → [Other] → [Memory Card Setting].
The [Memory Card Setting] window is displayed.

Detailed Settings

Item	Description
Tab windows [0] to [15]	The memory card emulation area can be divided into 16 divisions (0 to 15). Click the desired number tab and configure settings.
I/F Device	The I/F device memory is used commonly for divisions No. 0 to 15. Specify it on the [0] tab window. The I/F device memory is the address where the memory card status is written. Six words are occupied consecutively. Specify the top device memory address. The contents are shown below.

Device Memory	Description
n	CFM_STAT
n + 1	CFM_ERRNo
n + 2	CFM_CARDNo
n + 3	CFM_FILENo
n + 4	CFM_RECDNo
n + 5	CFM_TRFIN

For details on the I/F device memory, refer to page 13-16.

Item	Description
Type (Not Used, Data File, Buffering File)	Not used Files are not used. Data File Select this option when using the memory card function. Buffering File Select this option when using the data logging function. * The following options become available when [Data File] is chosen for [Type].
No. of Records (1 to 4095)	Specify the number of records into which each file is divided.
Data Count (1 to 4096)	Specify the number of data to be stored in a record in units of words.
No. of Bytes for Record (0 to 32)	Specify the maximum number of characters that can be used for a record name. When displaying or editing record names, consider the available number of bytes set here.
Device	When transferring data from the memory card to the PLC, specify the top device memory address for storing data in the PLC device memory.
Use Device Memory Map	This option is available when using device memory maps. For details on device memory maps, refer to the TS2060 Connection Manual or the TS1000 Smart Connection Manual.
Transfer Mode	When transferring data between the memory card and the PLC, the minimum transferable unit is a "record." Choose either [Data Only] or [Data + Record Name] when transferring data stored in a record.

I/F Device Memory

Regardless of the memory card function configurations, the newest data is written into "n" (CFM_STAT) and "n + 1" (CFM_ERRNo).
Other device memory addresses are valid only when a memory card part is placed on the currently displayed screen.

- A. n (CFM_STAT)

MSB															LSB
15	14	13	12	11	10	09	08	07	06	05	04	03	02	01	00
	0	0	0	0	0	0	0		0	0	0	0	0	0	

Sample data operation — Battery voltage — Error
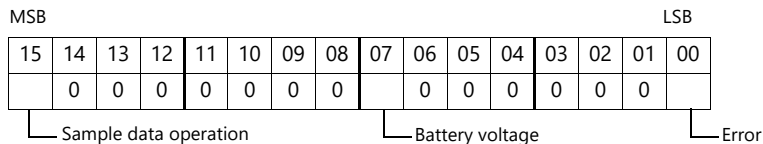
Bit No.	Description	Details
0	Error	When a memory card-related error occurs, this bit is set to "1" (ON). Error details are stored in "n + 1" (CFM_ERRNo).
1 to 6	Not used	This bit must be reset to "0".
7	Battery voltage	When the battery voltage of the memory card has dropped, this bit is set to "1" (ON). Replace the battery as soon as possible.
8 to 14	Not used	This bit must be reset to "0".
15	Sample data operation	This bit is valid when [Use a Calculation Operation] is selected in the [Buffering Area Setting] window for the data logging function. If data in the buffering area is being calculated when reading memory card data, this bit is set to "1" (ON).

- B. n + 1 (CFM_ERRNo)
  When bit 0 of "n" (CFM_STAT) is set to "1" (an error has occurred), the error details are stored in "n + 1" (CFM_ERRNo). Respective error numbers indicate the following contents:

Error number	Description
1	There is an error in the memory card I/F board.
2	The memory card recorder is not connected.
3	A communication error has occurred between the TS and the recorder.
4	No memory card is inserted.
5	Memory card format is different from the setting data. (Or the memory card is not formatted.)
6	Memory card capacity is smaller than the setting data.
7	The memory card is not compatible.
10	Attempted to write to a memory card of flash ROM.
11	The memory card is write-protected.
12	There is an error in writing data to the memory card.

- C. n + 2 (CFM_CARDNo)
  The current memory card number is stored.
- D. n + 3 (CFM_FILENo)
  The selected or transferred file number is stored.
- E. n + 4 (CFM_RECDNo)
  The selected or transferred record number is stored.

- F. n + 5 (CFM_TRFIN)

Statuses of formatting and data transfer between the TS (= SRAM area or SD card) and the PLC are stored. The contents are shown below:
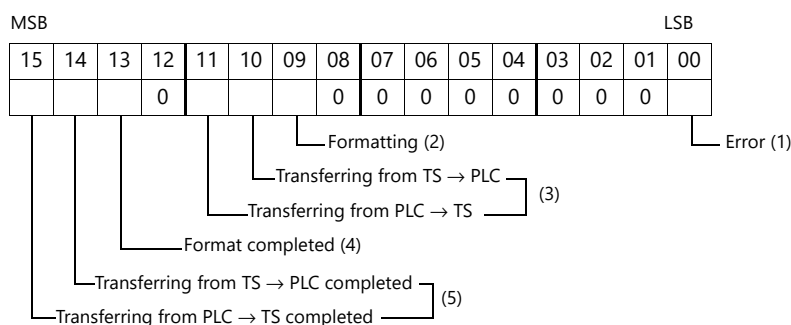
Bit No.	Description	Details
0	Error	When an error has occurred during formatting or transferring, this bit is set to "1". Bits for (2) "formatting" and (3) "transferring" remain ON. Bits for (4) "format completed" or (5) "transferring completed" remain OFF.
1 to 8	Not used	This bit must be reset to "0".
9	Formatting	While formatting, this bit is set to "1".
10	Transferring from TS → PLC	While transferring, this bit is set to "1".
11	Transferring from PLC → TS	While transferring, this bit is set to "1".
12	Not used	This bit must be reset to "0".
13	Format completed	When formatting has been completed, this bit is set to "1".
14	Transferring from TS → PLC completed	When transferring has been completed, this bit is set to "1". The file or record number transferred can be checked with "n + 3" (CFM_FILENo) or "n + 4" (CFM_RECDNo) respectively. After checking that transferring has been completed, reset this bit.
15	Transferring from PLC → TS completed	When transferring has been completed, this bit is set to "1". The file or record number transferred can be checked with "n + 3" (CFM_FILENo) or "n + 4" (CFM_RECDNo) respectively. After checking that transferring has been completed, reset this bit.

13.2.5 Editing Numbers and Names

When using the memory card function, card numbers and filenames can be edited on screen. To enable editing, an entry mode part must be set.

Place the entry keys in the overlap library or on the base screen.

* The entry keys can be placed in one location for one memory card part.

[File Name Edit] switch

The [File Name Edit] switch remains in the ON state.

When the [File Name Edit] switch is pressed, the [File Selection] switch starts flashing.

Select a file to start editing the filename.

[Record Name Edit] switch

Press the [Record Name Edit] switch. (The switch is put in the ON state.)

Select a record to start editing the record name. (The [Record Name Edit] switch remains in the ON state.)
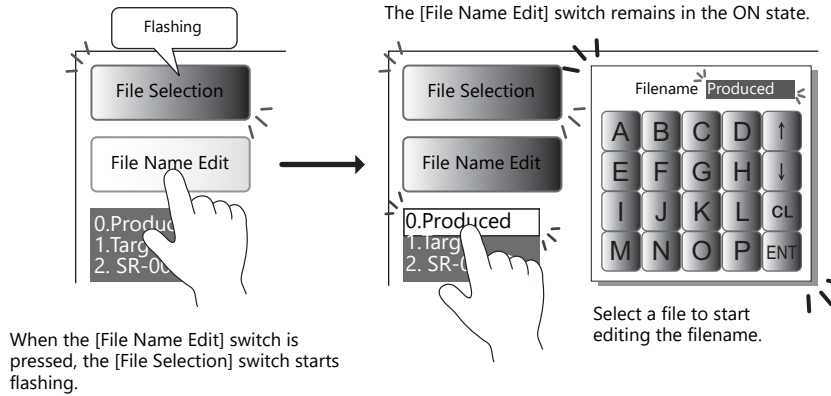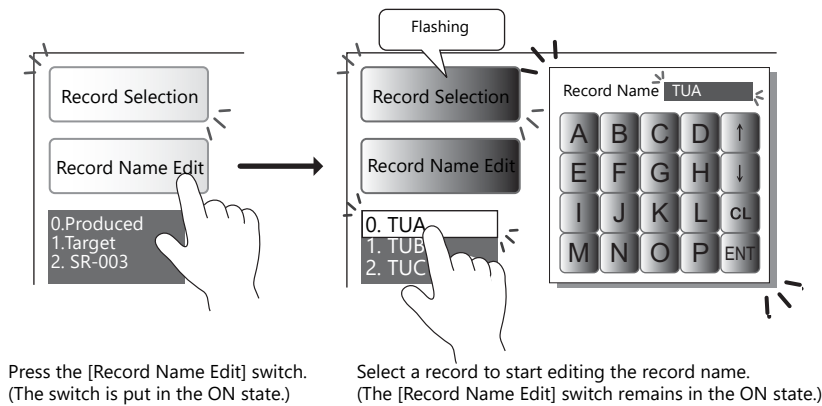
Placing Entry Keys in the Overlap Library

When the [Card Number Edit] or [File Name Edit] switch is pressed, an overlap screen with entry keys registered in the overlap library is automatically called. This overlap screen can be closed automatically when editing has been completed.

In this case, an overlap screen including an entry mode must be set on the [Overlap Library Edit] tab window.
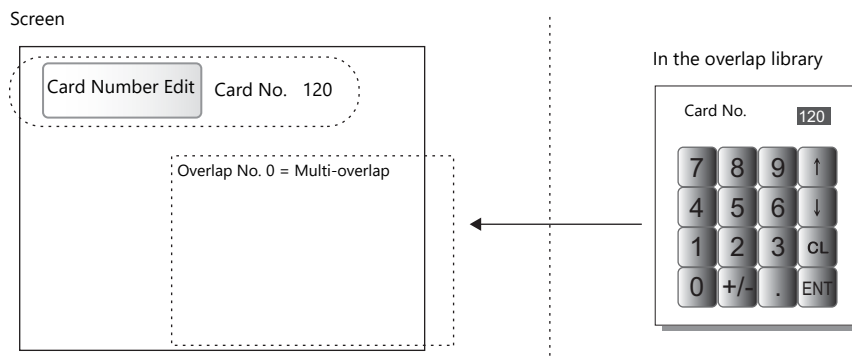
Notes on Overlap Library Editing

Entry mode part	Select [Memory Card] for [Entry Target].
	* Select the [Show [Data Block], [Memory Card], [Recipe Item] and [Direct] under [Entry Target]] checkbox in the [Detail] settings in advance.
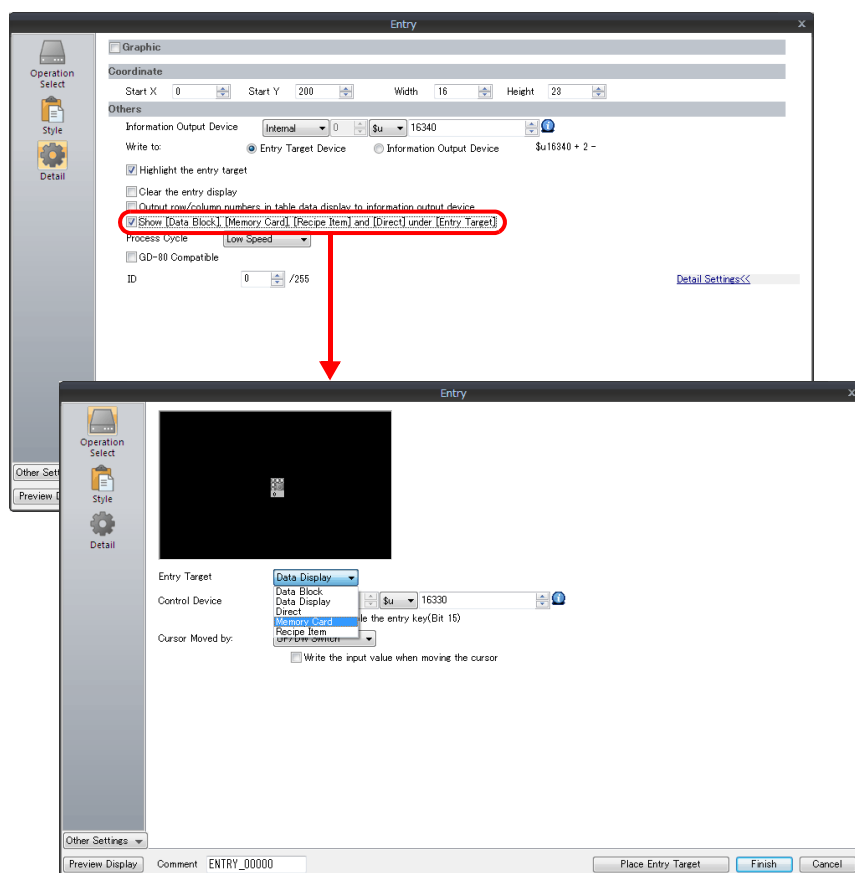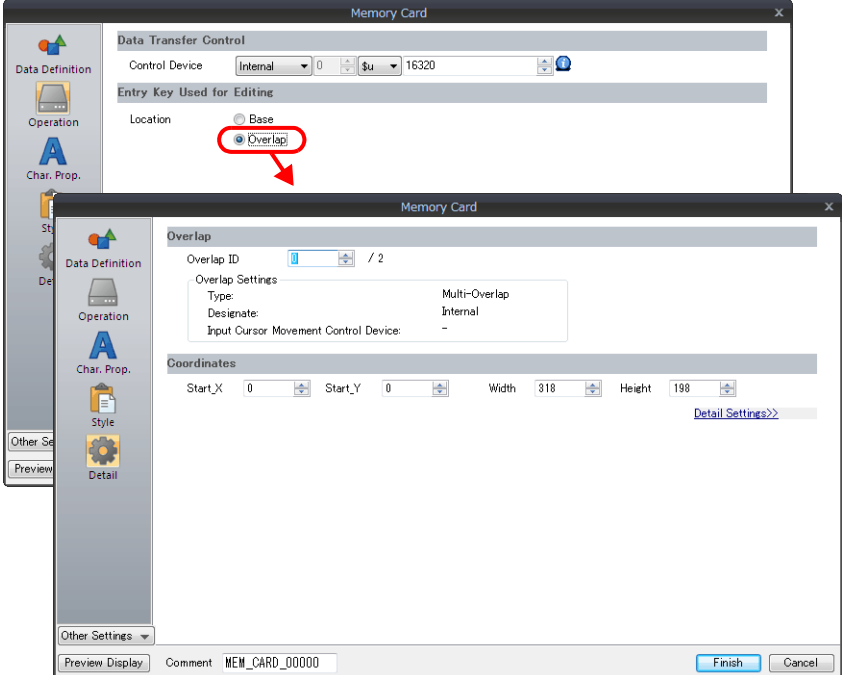
Entry display part	Set as shown below:
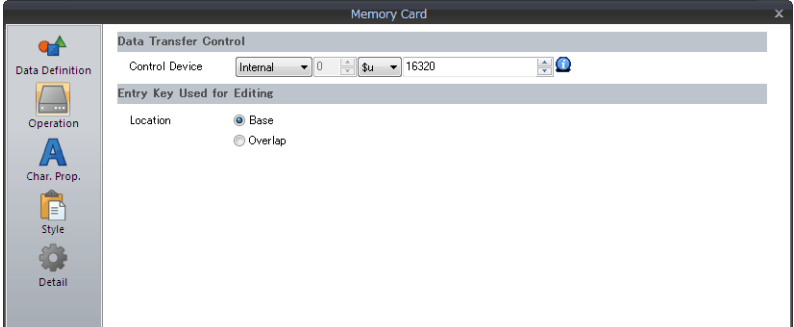
For card number editing	Numerical data display part Set the same number of digits as the memory card number display part.
For name editing	Character display part Set the same number of bytes as the memory card name, memory card filename, or memory card record name display part.
ID	Set the same ID as specified in the entry mode settings window.

Notes on Screen Configuration

Memory card mode	Choose the ID which is set as a multi-overlap from [Overlap ID 0], [Overlap ID 1], or [Overlap ID 2]. Entry keys can be placed only in one location for one memory card part. (It is not possible to use the entry keys on both the base screen and an overlap display area for a memory card part.)
Memory Card Part Switches	Set the same ID as the memory card part. When the entry keys are placed on a multi-overlap display, the [Card Number Edit], [Card Name Edit], [File Name Edit] or [Record Name Edit] switch functions as a "multi-overlap call" switch. Each switch has [Overlap ID] as an auxiliary setting item. * When [Register] is clicked, the overlap display with an entry mode is automatically registered under the specified overlap library number.

Placing Entry Keys on the Base Screen

The entry keys become available when the [Card Number Edit] or [File Name Edit] switch is pressed.
Entry mode and memory card parts are set on the same screen.
Note the setting items described below.

Entry mode part	Set an entry mode part. Settings are the same as that for when placing on an overlap display.
Entry display part	For numerical data or character display parts placed on the screen, select [Function: Entry Display Part]. Settings are the same as that for when placing on an overlap display.
Memory card mode	Select [Base].
Memory Card Part Switches	Set the same ID as the memory card part. The [Card Number Edit], [Card Name Edit], [File Name Edit] or [Record Name Edit] switch functions as a switch that enables the use of an entry mode part. Each switch has [Overlap Library No.] as an auxiliary setting item; however, this is not valid.

13.3   Memo Pad

13.3.1 Overview

- Message board function
  The message board function is available for leaving daily messages in a workshop, etc.
  This is particularly useful for exchanging messages among operators working in shifts.
- Pen input
  Message entry is made simple by writing on the screen directly with a special pen.
- A maximum of eight memo pad areas
  Memo pad areas are common to every screen. Up to 8 memo pad areas can be registered.
- Saved in the SRAM area
  When a memo pad area is secured in the built-in or separate SRAM area, the data is retained even after the power is turned off.
- Also, it is possible to use a storage device to save memo pad data without using the SRAM area.
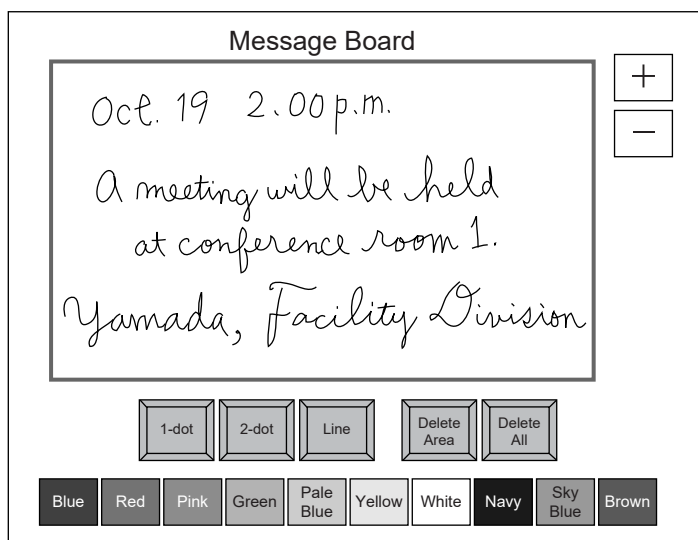
⚠️   Only one memo pad function can be used on one screen.

13.3.2 Usage Example

Suppose that the following screen is created.
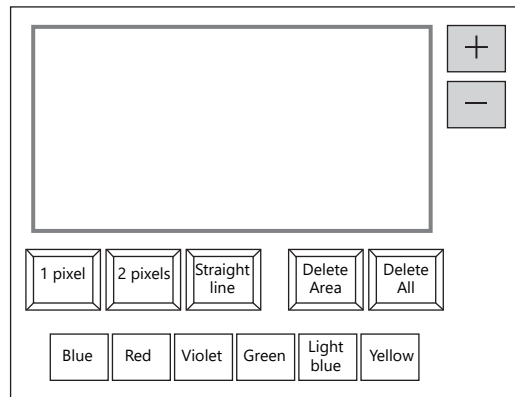
1. When the screen is first opened, the following settings are set as default.

    Pen size: 1 pixel
    Pen color: White
    Pen state: Free
    To change the setting, press the corresponding switch and set the desired option.

2. Write a message within the memo pad area.
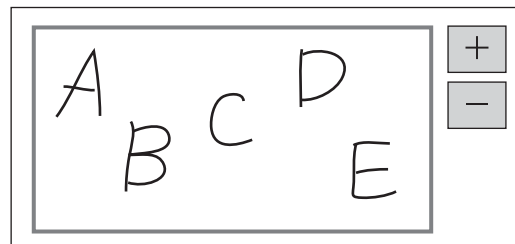
    Use the dedicated pen when writing messages.

3. When deleting the message, press the [Delete All] switch.
4. When deleting part of the message, press the [Delete Area] switch (ON display), and enclose the desired data.
    The enclosed data is deleted.
    On completion, press the [Delete Area] switch (OFF display).
5. When drawing a straight line, press the [Straight line] switch (ON display).
    Moving the pen on the memo pad area draws a straight line.
    To cancel the function that draws straight lines, press the [Straight line] switch again (OFF display).
6. Pressing the [+] switch brings up a new memo pad area (up to 8 areas).
    Pressing the [–] switch brings up the previous memo pad area.

13.3.3 Detailed Settings

Style
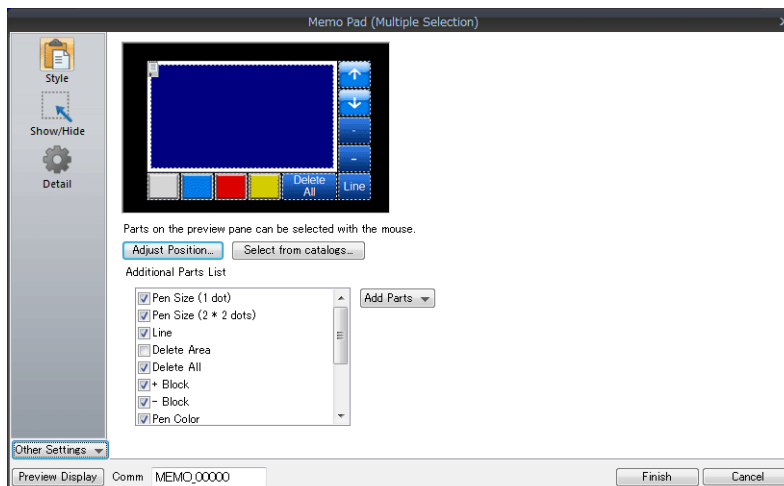
Item		Description
Additional Parts List	Pen Size (1 dot)	Add a [Pen Size (1 dot)] switch. Selects the pen thickness.
	Pen Size (2 × 2 dots)	Add a [Pen Size (2 × 2 dots)] switch. Selects the pen thickness.
	Line	Add a [Line] switch. Select the pen state. This is an alternate switch. ON: Line OFF: Free
	Delete Area	Add a [Delete Area] switch. This switch deletes the selected memo pad area. This is an alternate switch. ON: Delete the rectangular area selected on the display area. OFF: Deletion is not possible.
	Delete All	Add a [Delete All] switch. This switch deletes data from the displayed memo pad area.
	+ Block	Add a [+ Block] switch. Brings up the next memo pad area (up to 8).
	− Block	Add a [− Block] switch. Brings up the previous memo pad area (up to 8).
	Pen Color	Add a [Pen Color] switch. This switch is used to select the pen color.
	Block Call	Add a [Block Call] switch. Brings up the memo pad area of the specified number.
Add Parts	Switch	Add a switch.

Detail
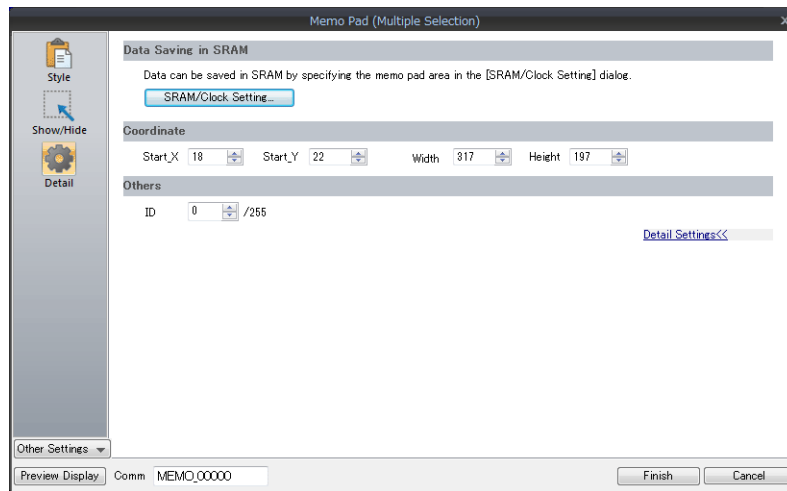
Item	Description
SRAM/Clock Setting	Configure the settings to save memo pad data to the SRAM area. For details, refer to "13.3.4 Memo Pad Data Storage" page 13-25.
Coordinate	Set the Start X/Start Y (top left coordinates).
ID	Set the ID.

13.3.4 Memo Pad Data Storage

Memo pad data can be saved to the internal RAM, SRAM, or a storage device.
Data saved to RAM is cleared when the TS is turned off or when the Main Menu screen is displayed.
To retain data even when the power is turned off, save data to SRAM or a storage device.

Memo Pad Storage Area Size

Storage Target	Capacity (Words)			
	TS2060i	TS2060	TS1000Si/TS1070Si	TS1070S
RAM	65,536	65,536	65,536	65,536
SRAM [*1]	262,000	65,392	65,392	65,392
Storage device	65,536	Not available	65,536	65,536

*1 This is the maximum capacity available provided that the entire SRAM area is used for the memo pad function.

☞ For details of the procedure for dividing the SRAM area, etc., refer to "1.1 System Settings".

Saving to RAM

No settings are required.

Saving to SRAM

To save data to the SRAM area, settings must be configured in the [SRAM/Clock Setting] window.

[SRAM/Clock Setting] window

- Storage area for memo pad
  Set the storage area size for the memo pad function in the SRAM area.
  Refer to the list shown above to set an appropriate size.
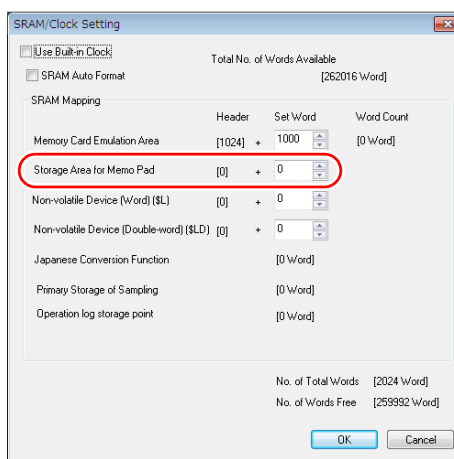
☞ For details on other settings, refer to "1.1 System Settings".

Saving to a Storage Device

No settings are required. Insert the storage device into MONITOUCH.
Note that when the memo pad area is configured in the [SRAM/Clock Setting] window, data is stored in the SRAM area even if a storage device is inserted.
- Filename: MEMxxxx.png (xxxx=0000 to 0007)

Timing for Saving Data

The memo pad data is saved to the memo pad area at the following timing.
- When switching pages using the [Function: + Block, − Block] switches
- When changing the screen
- When switching from RUN mode to the Main Menu screen (only for SRAM)

If data cannot be saved due to insufficient memory, the memo pad display area flashes and the unit beeps. Reduce the memo pad data.
The remaining space of the memo pad data storage area is stored in the system memory addresses $s108 and 109.

* **Notes on SRAM usage**
  - If the power is shut down before data is saved, the data is lost.
  - If the power is shut down while data is being saved, all the data may be lost.
    The data save status is stored in the system memory address $s720.

System Memory

Memo pad data is stored in system memory $s.

Address ($s)	Description	Device Type
106	Memo pad number (0 to 7)	← TS Data is written from the TS unit.
107	 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 Page 0 (bit 00) Page 1 (bit 01) Page 2 (bit 02) Page 3 (bit 03) Page 4 (bit 04) Page 5 (bit 05) Page 6 (bit 06) Page 7 (bit 07) 0: Data not registered 1: Data registered	
108 109	Remaining space of memo pad data storage area (unit: bytes)	
720	Result of SRAM area save 0: Successfully saved 1: Error in data. The previous data is cleared.	
727	0: Save possible 1: Save impossible due to insufficient memory	

14 Item Show/Hide Function

14.1   Overview

- The switch or numerical data display parts registered on the screen can be shown or hidden according to its operating status.
  The "show/hide" attribute can be set using methods including device memory bit activation in the PLC, bit/word designation, or commands.

The numerical data display group on the right side is only displayed when M200 is ON in the PLC.
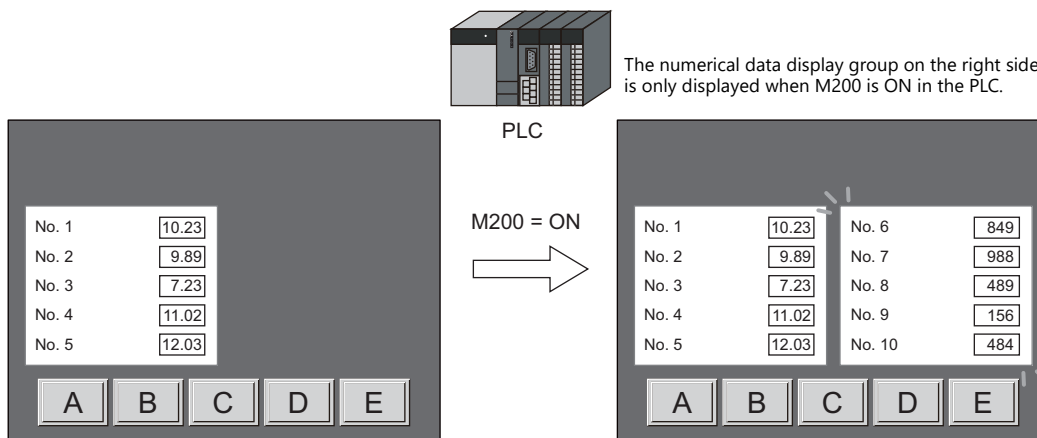
☞   Refer to "14.2 Setting Examples" page 14-2

- Registered items can be set with the show/hide attribute even if they will not be actually used. For example, if future additions of items are planned, the items to be added can be registered in advance and set with the hide attribute, which will make future programming easier.

The switches with [Hide] set will not be displayed.
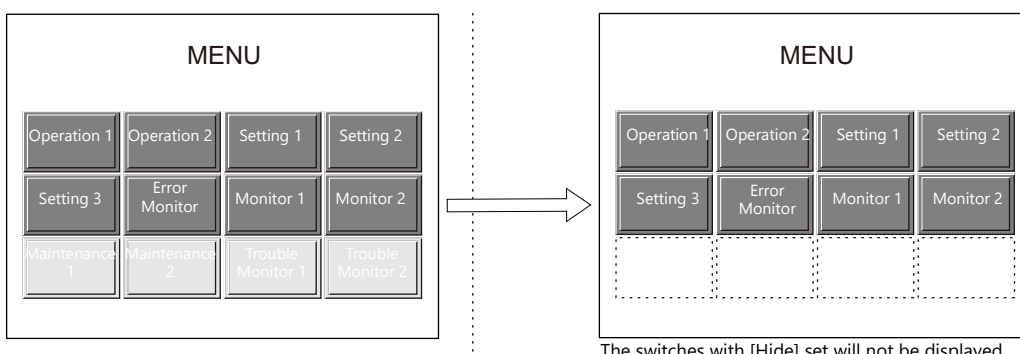
- Items which were placed overlapping will be displayed in the same order that they were placed even if they are hidden and shown again.
  *1   The items with [Process Cycle: High Speed] that are updated every cycle or those with status change will be displayed in the foreground.

When a switch is turned ON, it is displayed in the foreground.
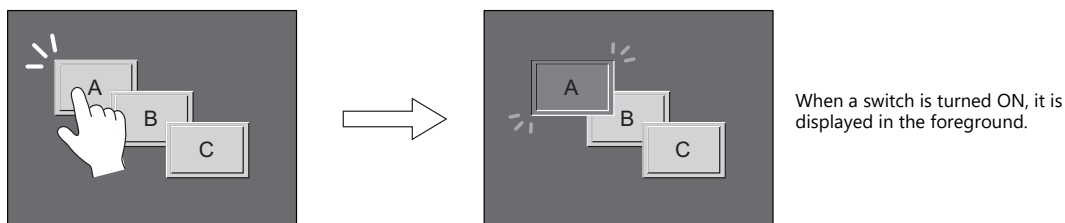
Applicable items

Switch	
Lamp	
Data display	Numerical data display, character display, message display
Graph	Graphs, statistical graphs, closed area graphs
Linked parts	Keypads, character keys, trend parts, alarm parts, JPEG display, network camera display, remote desktop display, graphic parts, message parts, comment parts, recipes, data blocks, and memo pads
Grouped items	Including graphic items

Locations for registration

Screen, overlap, screen library, data block

14.2   Setting Examples

14.2.1 Displaying Items when the Corresponding Bit Turns ON

Screen Creation

1.   Place a numerical data display and character display on the screen.
2.   Configure the [Bit device] settings via [Show/Hide].
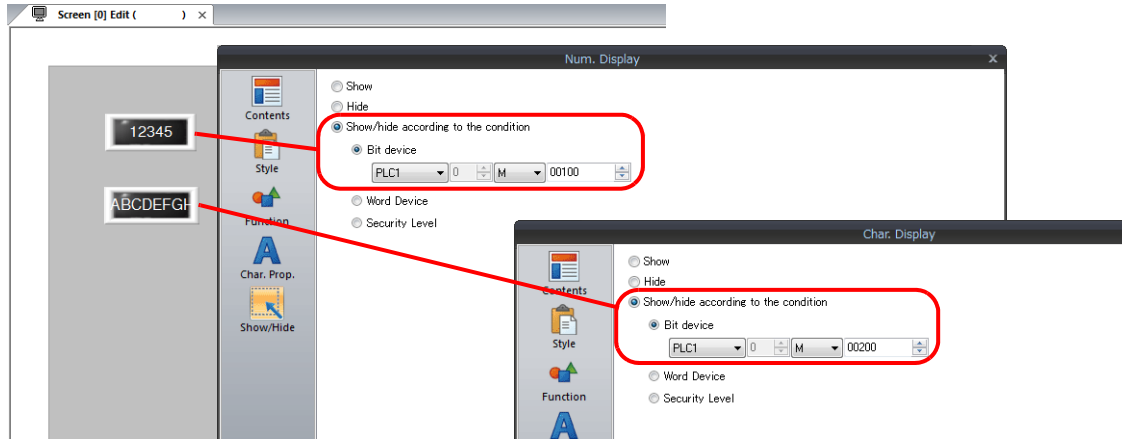
Unit Operation

1.   When M100 is set to ON via the PLC, the numerical data display is shown.
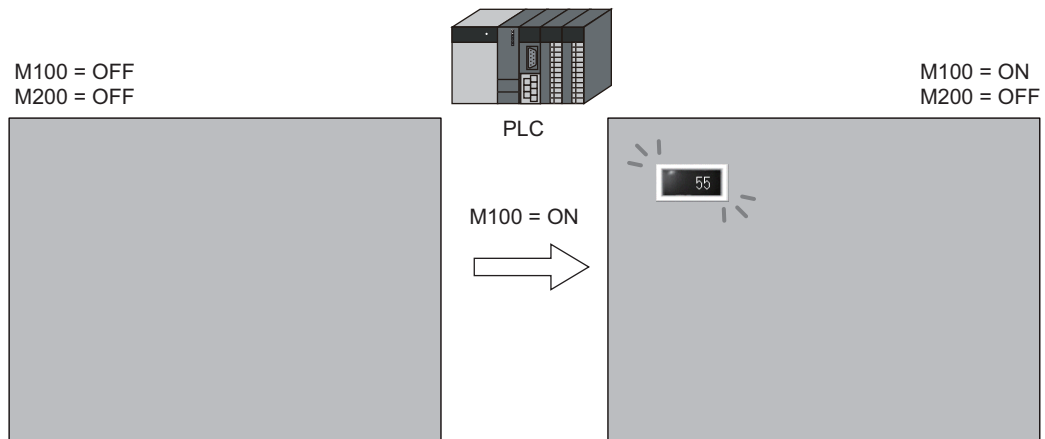
2.   When M200 is set to ON via the PLC, the character display is shown.
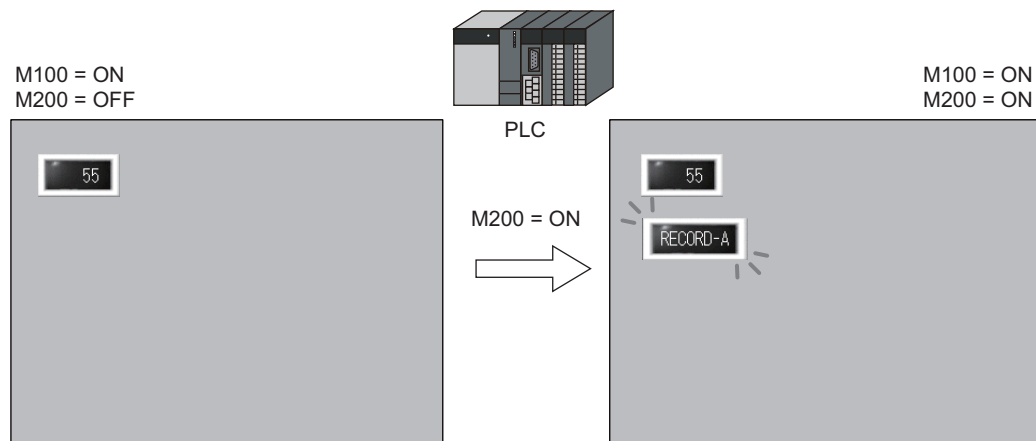
3.   When M100 and M200 are set to OFF, the numerical data display and character display are hidden.

☞   For details on the timing of screen drawing, refer to "14.4 Timing of Drawing (Device Memory Designation)" page 14-6.

14.2.2 Displaying Items Using Device Memory Values

Screen Creation

1. Place a switch.
2. Configure the [Word Device] settings via [Show/Hide].
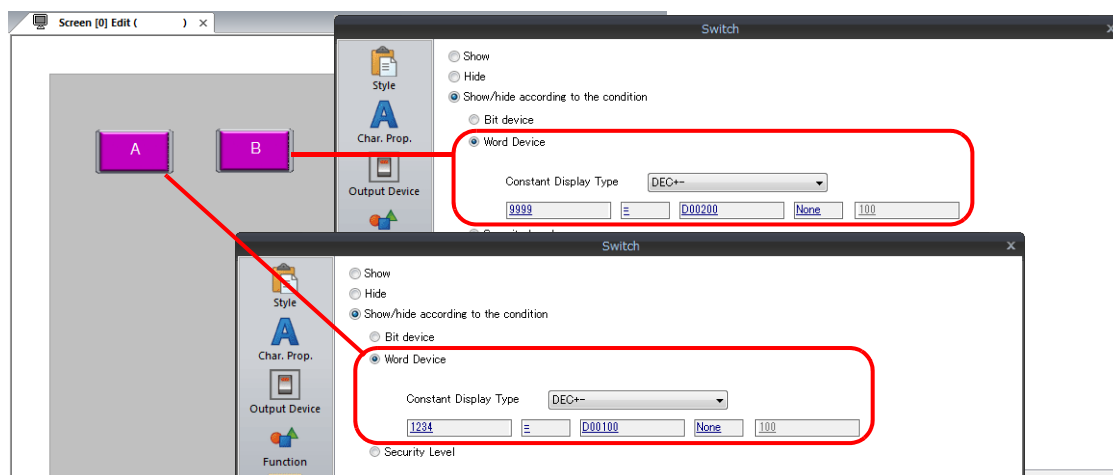
Unit Operation

1. When D100 is set to "1234" via the PLC, switch A on the left is shown.
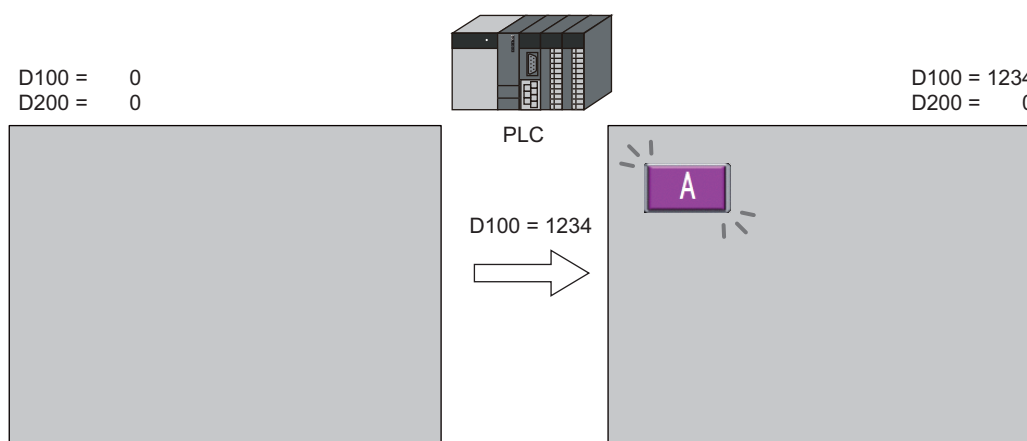
2. When D100 is left as "1234" and D200 is set to "9999" via the PLC, switch B on the right is shown.
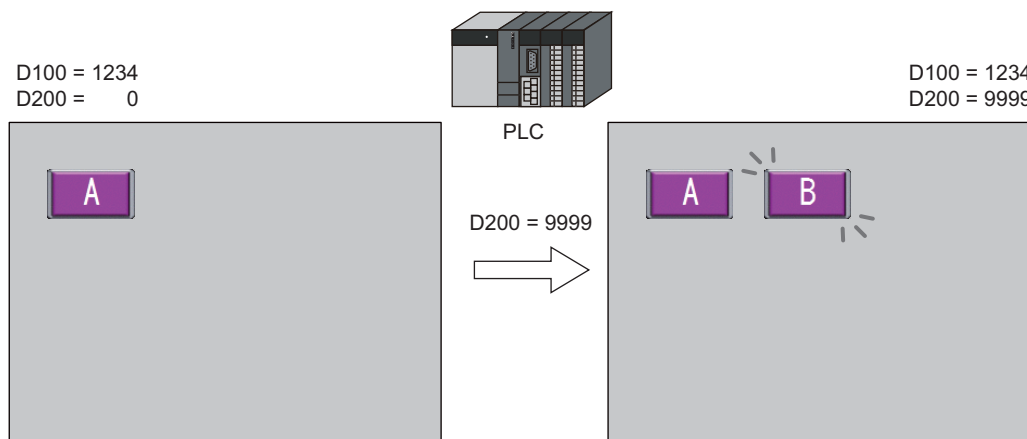
3. When D100 and D200 are both set to "0", the switches are hidden.

☞   For details on the timing of screen drawing, refer to "14.4 Timing of Drawing (Device Memory Designation)" page 14-6.

14.2.3 Displaying Items Using the Level of the Security Function

Screen Creation

1. Place a switch that initiates operation.
2. Set the level of [Security Level] to "2" via [Show/Hide].
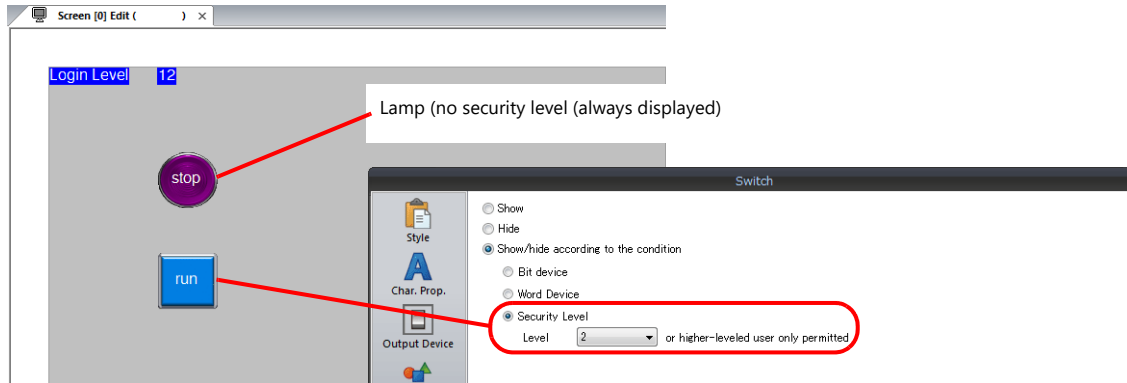
* Always turn on the security function. Items with security levels will not be displayed if the security function is not turned on.

Unit Operation

1. A lamp is displayed on the screen (security level 0).
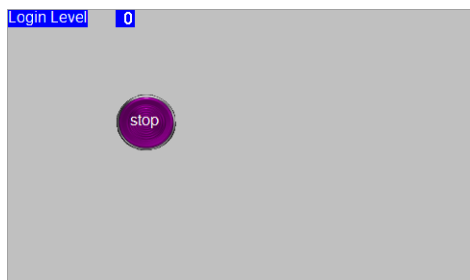
2. Enter the ID and password for level 2 on the login screen of the security function.
    The login level changes to level 2 and the operation switch is displayed.
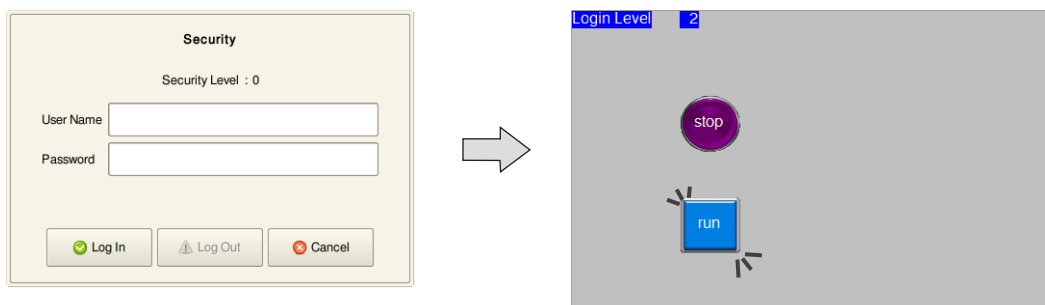
3. Users with a login level of 2 to 15 can operate the operation switch.
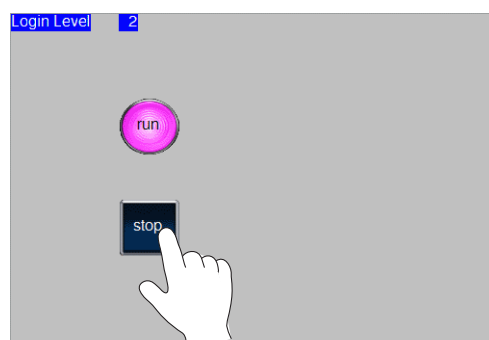
4. When a user logs off, the login level changes to 0 and the operation switch becomes hidden.

14.3   Detailed Settings

Show/Hide

Configure the [Show/Hide] settings for each item.

Item		Description
Show		Always show the item on the screen.
Hide		Always hide the item on the screen.
Show/hide according to the condition		Items are shown or hidden depending on the specified condition.
	Bit device	The item is shown or hidden according to the activation at the address specified in a bit device memory. Bit ON: Item shown Bit OFF: Item hidden
	Word Device	The item is shown or hidden according to the status at the address specified in a word device memory.
			Constant Display Type	Select the data type of the conditional expression. [DEC+-]/[DEC]/[BCD]/[HEX]
			Condition expression	Set an equal sign, value, and device memory address as the conditions for comparison.
	Security Level	Used in conjunction with the security function. Items are shown or hidden according to the login level. For details on the security function, refer to the TS Reference Manual 2.

14.4 Timing of Drawing (Device Memory Designation)

When [Bit device] or [Word Device] is selected, the item will be shown or hidden according to the settings in the [Screen Setting] window. The entire screen is redrawn according to the timing of hiding/showing items.

Screen Setting

Click [Screen Setting] → [Screen Setting].
The [Screen Setting] window is displayed. Display the [Show/Hide Item] tab window.
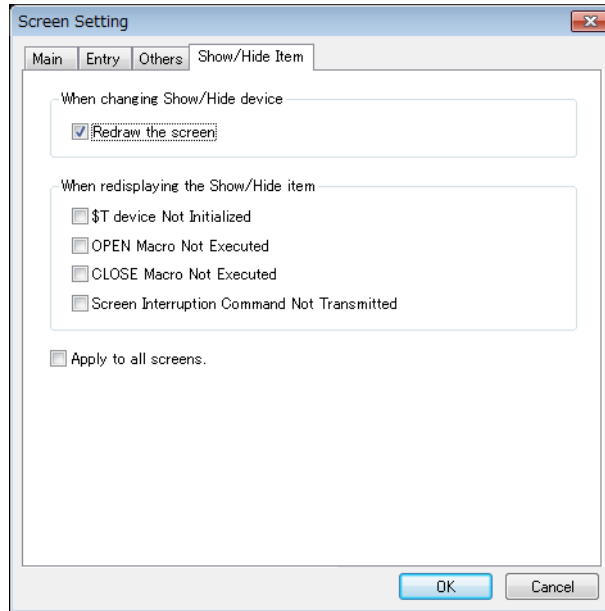
Item		Description
When changing Show/Hide device		Set the timing for redrawing when hiding/showing items.
	Redraw the screen	Selected 　Redraw the screen when the [Show/Hide] state of an item on a screen, normal overlap display, or call-overlap display changes.* Unselected 　Redraw the screen immediately after changing screens or only when executing the "SYS (RESET_SCRN)" macro.
When redisplaying the Show/Hide item		When the screen is redrawn, other operations are also performed at the same time. Select a checkbox to disable an operation.
	$T device Not Initialized	Select this checkbox when not clearing the $T device memory (screen) to "0".
	OPEN Macro Not Executed	Select this checkbox when not executing an open or close macro for a screen or multi-overlap.
	CLOSE Macro Not Executed	
	Screen Interruption Command Not Transmitted	Select this checkbox when not sending a screen interruption command when [Universal Serial] is selected as the PLC model.
Apply to all screens.		Apply the above settings to all screens.

* When the [Show/Hide] state of an item placed on a multi-overlap display or data block changes, only the respective multi-overlap display or data block is redrawn. Select checkboxes to disable certain operations at redraw at the following location.
　Location of settings: [Registration Item] → [Overlap Library] → [Screen Setting] → [Screen Setting]
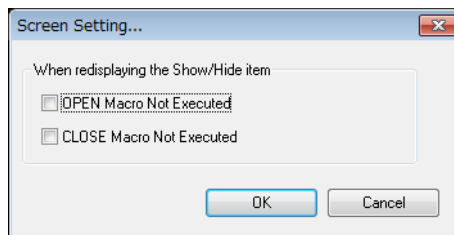
⚠ When [Redraw the screen] is selected, show/hide device memory addresses are monitored at all times and therefore may affect screen processing speeds.

Blinking during Screen Redrawing

When the screen is being redrawn, blinking may occur.
To prevent such blinking, click [System Setting] → [Unit Setting] → [General Settings], and select [Perform Drawing in the Background].
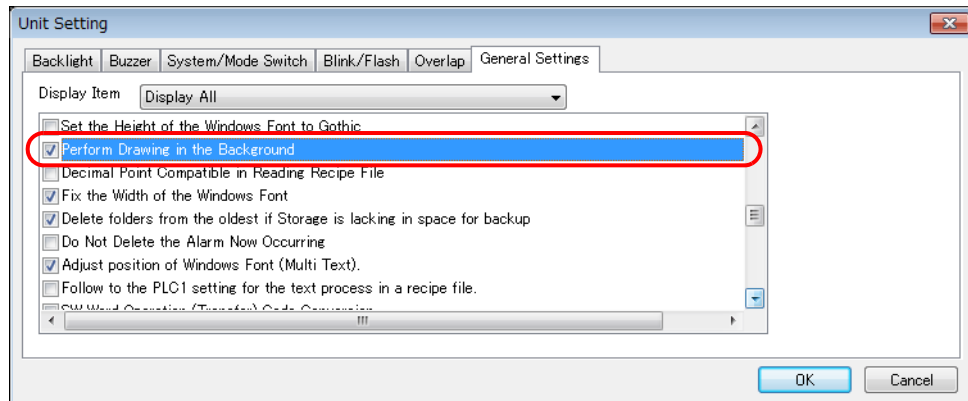
14.5   Checking Settings

Use the following method to check the [Show/Hide] settings of items.

Item List

Display the [Item List] window from the [View] menu.
Items with [Show/Hide] settings are shown in green, yellow or light blue. Uncolored items correspond to items for which [Show] is selected.

Yellow: security level

Light blue: hidden

Green: device memory designation
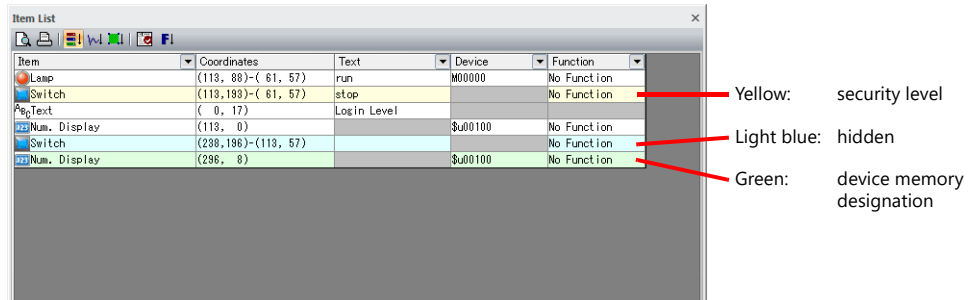
Display Environment Settings

Select [View] → [Display Environment].
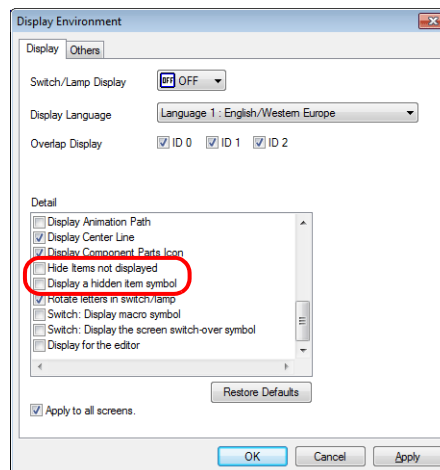
Item	Description
Hide Items not displayed	Items with [Show/Hide] settings are not displayed on the screen.
Display a hidden item symbol	Display a hidden item symbol for items with [Show/Hide] settings.

Symbol		Setting
None		Show
Light blue		Hide
Green		Show/hide according to the condition
Yellow		Security Level

*   The same settings can be made via the right-click menu on the screen.

15   Recipes

15.1 Overview

15.1.1 Recipes

In manufacturing, the conditions and data that are critical for making products are collectively referred to as a "recipe".
For example, when beverages are produced on the factory floor of a beverage manufacturer, the conditions for producing apple juice and orange juice differ with respect to ingredients and production processes for each type of beverage.
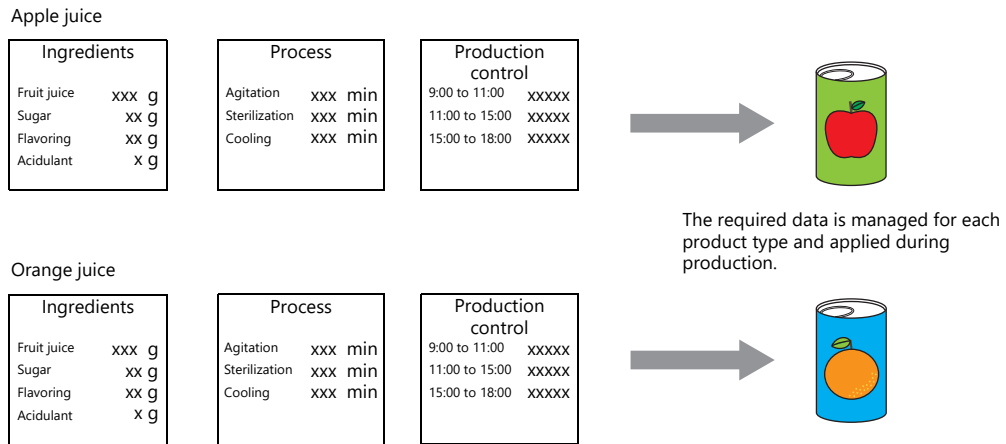
In order to produce and deliver products at a constant quality, the use of recipe information specific to each product is very important.
Recipes for products to be made on a particular day are managed on the factory floor, and smoothly changing between recipes according to the production conditions results in efficient production of higher quality products.
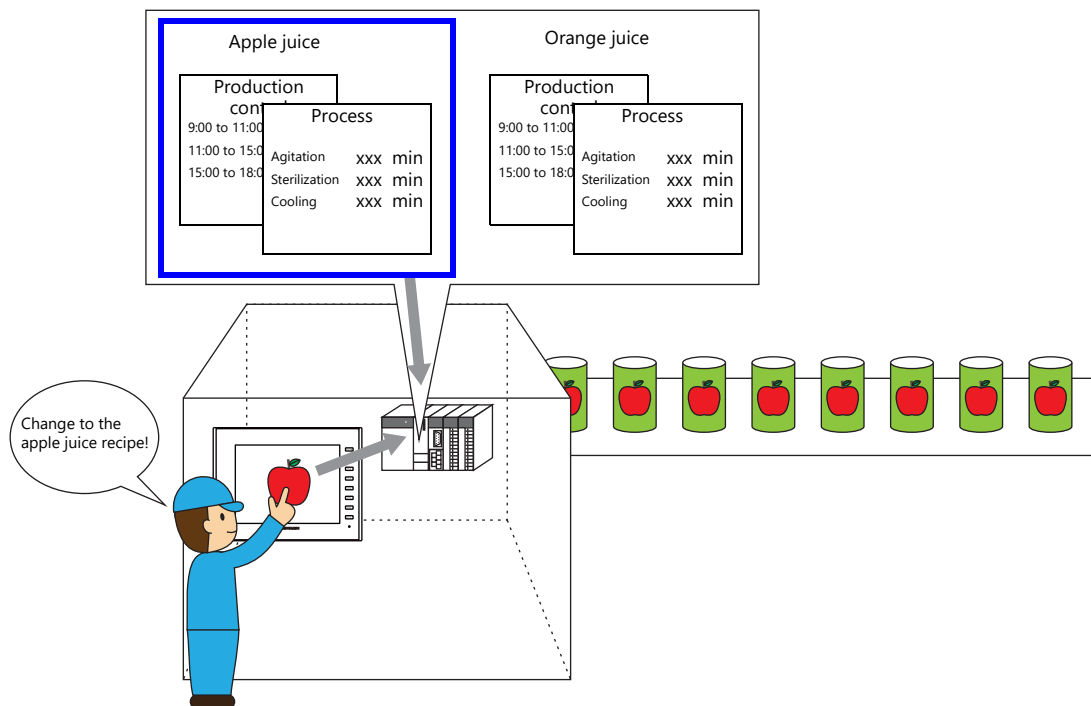
15.1.2 Recipe Function

Precise and easy management of recipes, as described in the previous section, on the factory floor is a requirement.
Recipes comprise different information depending on product type and may undergo modification on the factory floor.
Recipe data can be managed without stress by managers on the factory floor if data on a PLC can be substituted or changed according to circumstance.
The advantages of using the recipe function of the TS unit can be realized in various situations.

Applicable Models

TS2060i, TS1100Si, TS1070Si, TS1070S
A storage device (SD/SDHC card or USB flash drive) is necessary.

Structure
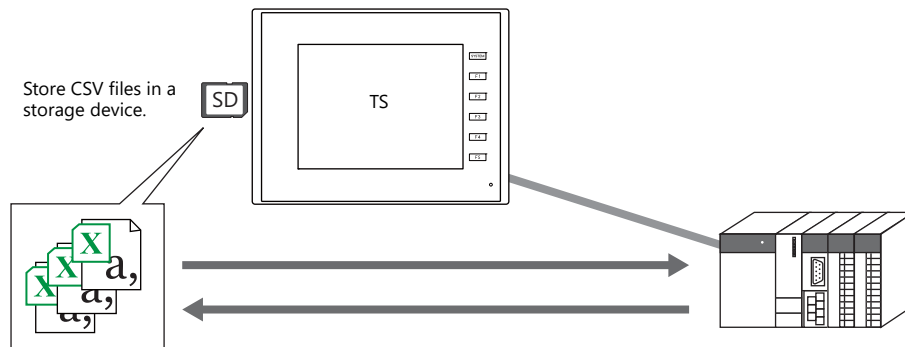
- Recipe data can be stored in CSV file format in a storage device for reading/writing from MONITOUCH.
  A storage device is required to store files.
- Data can be read and written in units of files or records.

- Not only can data in a storage device be read or written, additions to data and new data can also be created.

Operation

There are two methods for reading/writing recipes.
- By macro command

  ☞   For details on macro commands, refer to the Macro Reference Manual.

- Through operation on a screen with a recipe part
  CSV file data and titles as well as records can be changed directly from a recipe part.

  ☞   For details on MONITOUCH operations, refer to "15.4.4 MONITOUCH Operation" page 15-24.

15.2   Setting Example

This section explains the procedure for creating recipe files as follows and displaying them on the TS unit.
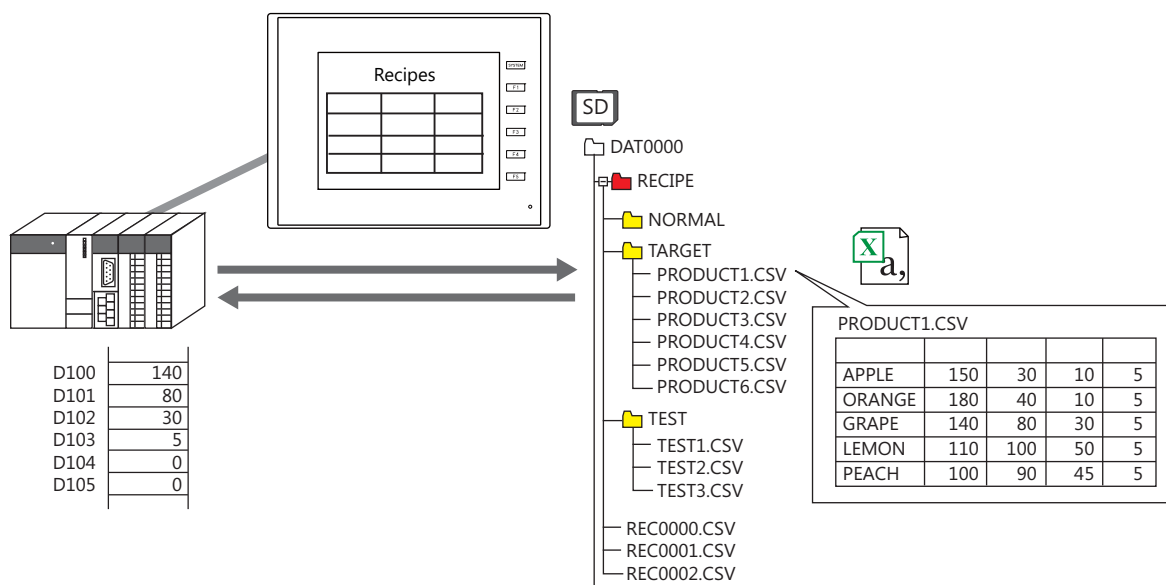
Creating Recipe Parts

1. Click [Parts] → [Others] → [Recipe] and place a recipe part.
2. Set [Display Area] for [Operation Area] in the [Contents] settings on the recipe settings window. Also configure the number of lines/columns and color settings.
3. Configure the data format settings of CSV files in the [Attribute Setting] window by clicking [Add] in the [CSV File Data Format] settings.
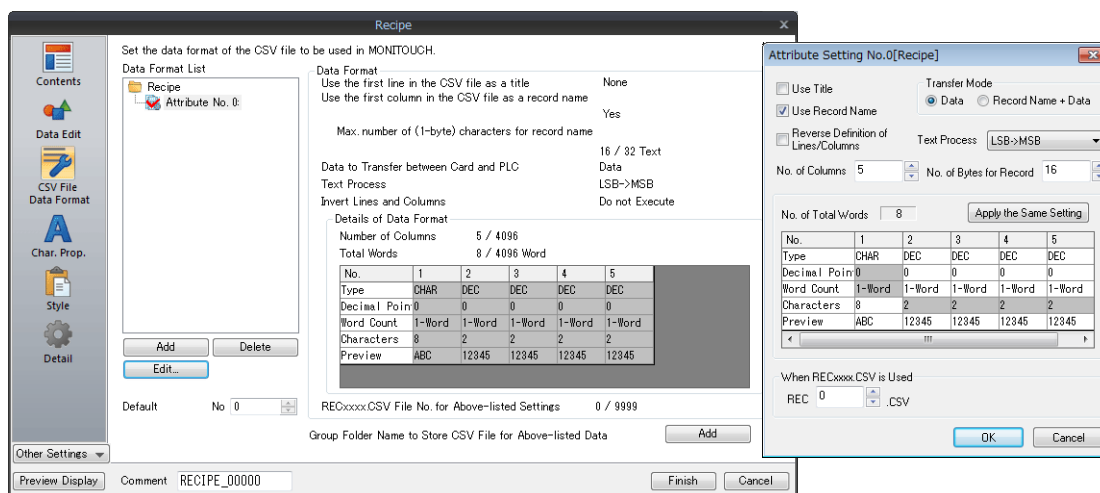
4. Click [Add] for [Group Folder Name to Store CSV File for Above-listed Data] and register the "TARGET" folder for saving CSV files.
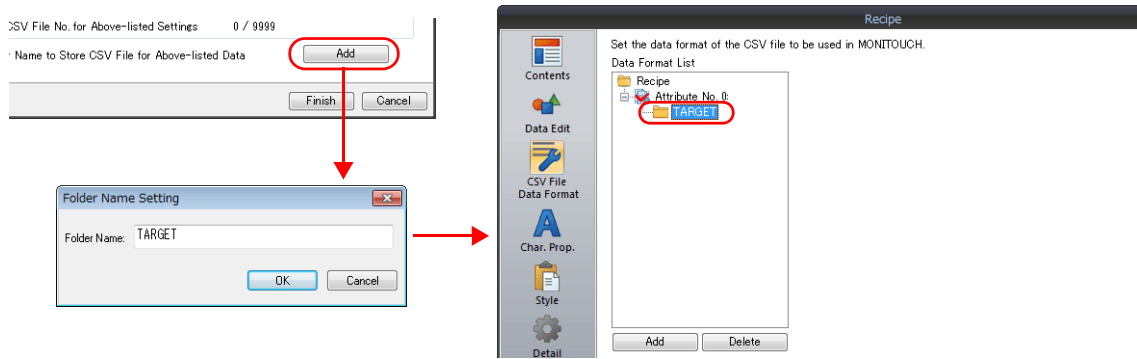
5. Specify "D100" for [Transfer Device] under [Device Settings] in the [Detail] settings.
6. Click the [Finish] button to exit settings.

Creating CSV Files

1. Start Excel.
   Edit the data in Excel in the intended format.
2. Save the data. Click [File] → [Save As].
   Select "CSV (Comma delimited) (*.csv)" for [Save as type], specify a filename, and save the file.

Saving to a Storage Device

1. Connect an a storage device to your computer.
2. Click [File] → [Storage Manager]. The [Storage Drive Select] window is displayed.
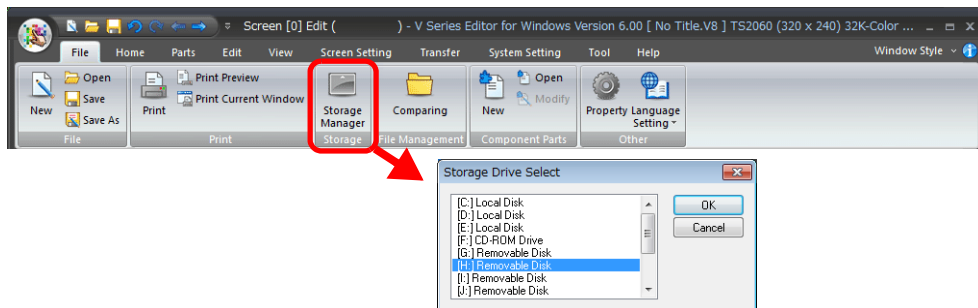
3. Specify the storage device drive and click [OK]. The [Storage Manager] tab window is displayed.
4. Click [Write to Storage].
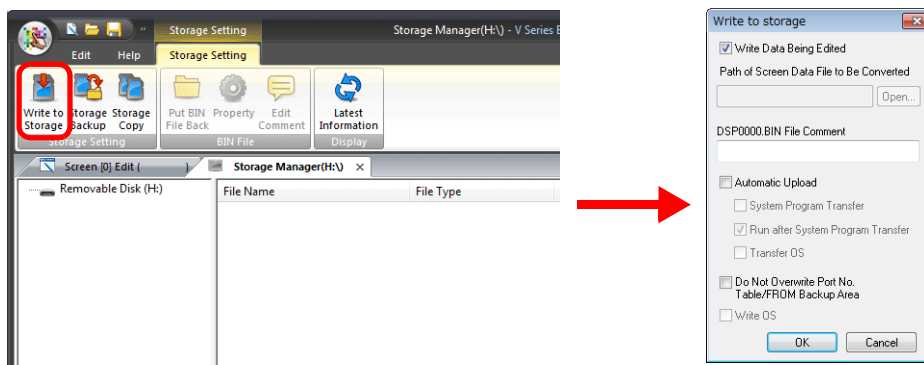
5. In the [Write to storage] window, check that the [Write Data Being Edited] checkbox is selected and click [OK].
6. Check that an access folder with a "RECIPE\TARGET" folder is created on the storage device. Then close the [Storage Manager] tab window.
7. Start Windows Explorer and save the created CSV files to the "TARGET" folder that was confirmed to exist in step 6.

MONITOUCH Operation

1. Insert an SD card into the SD card slot on the TS unit and display the screen with a recipe part. The folders and files in the "RECIPE" folder are displayed.
2. Tap "TARGET". The files in the "TARGET" folder are displayed in a list.
3. Tap "PRODUCT1.csv". The CSV file contents are displayed.
4. Select a record and tap [SD → PLC]. Data is written to [Transfer Device] "D100" and on.
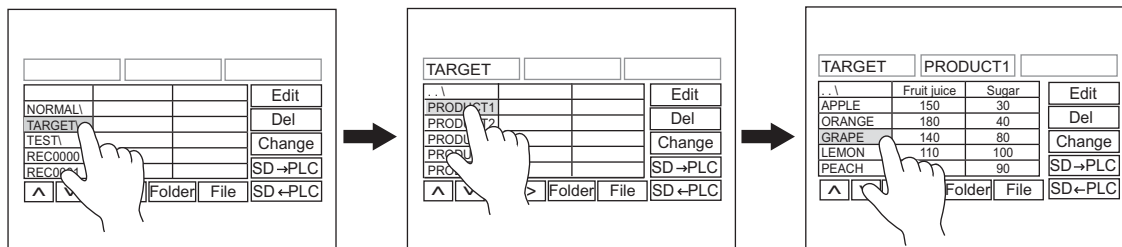
5. Tap [SD ← PLC] to read data from "D100" and on into the CSV file.

15.3   Detailed Settings

15.3.1 Recipe Part

Contents

Operation Area: Display Area

Item			Description
Operation Area	Display Area		Display folder names, filenames, record names, and data on a display area part.
Display the title and recipe data			Set data to be displayed in the display area. Selected The folder name, filename, record name, title, and recipe data are displayed. Example: Folder name display
			 NORMAL\ TARGET\ TEST0\ REC0000 REC0001
			Unselected The folder name, filename, and record name are displayed. Example: Folder name display
			NORMAL\ TARGET\ TEST REC0000
Data Display	Number to Display	Lines (1 to 30)	Specify the number of lines of data to display. When displaying more lines than the specified number, use the scroll switches [↑] and [↓].
		Columns (1 to 100)	Specify the number of columns of data to display in the display area. When displaying more columns than the specified number, use the scroll switches [←] and [→].
	Number of (1-byte) Characters to Display per Data (1 to 100)		Specify the number of one-byte characters to display in a cell. When there are more characters than the specified number, only the specified number of characters are displayed in a cell.
Ruled Line	Color, Line Type		Specify the color and line type of the grid lines.

Item		Description
Display Order	Display in ascending order Descending order	Select the sort order for displaying the names of recipe folders and CSV files. Ascending order: AAA\ GROUP\ TEST\ REC0000 REC0001 REC0002 Descending order: REC0002 REC0001 REC0000 TEST\ GROUP\ AAA\ Recipe folders are displayed at the top in ascending order, and at the bottom of the list in descending order.

Operation Area: Switch

Item		Description
Operation Area	Switch	Display folder names and filenames on switches.
Data Display	Number of Lines to Display (1 to 24)	Specify the number of switches to use.
Display Order	Display in ascending order Descending order	Select the sort order for displaying the names of recipe folders and CSV files.

Ascending order: AAA\, GROUP\, TEST\, REC0000, REC0001, REC0002

Descending order: REC0002, REC0001, REC0000, TEST\, GROUP\, AAA\

Recipe folders are displayed at the top in ascending order, and at the bottom of the list in descending order.

Data Edit

Configure these settings when using the recipe edit function.
When using the edit function, you can edit the CSV file data, the CSV filename and record name.

Item	Description
Edit data (recipe data, record name and file name)	Select this checkbox when using the edit function.
Overlap Library No. for Numerical Data Editing	Press the [Registration/Change] button to register a keypad for numerical entry in the overlap library.
Overlap Library No. for Character Data Editing	Press the [Registration/Change] button to register a keyboard for character entry in the overlap library.

CSV File Data Format

The CSV file is a text file delimited with commas. Therefore, it can be edited using various software. However, since the text file does not contain any information about the numerical values, text, and DEC/HEX notation within the file, the TS unit cannot tell what each data is for when reading or writing data.
For this reason, the data attributes of each cell must be configured so that the TS unit will read from and write to CSV files according to those settings.
Settings can also be configured from [System Setting] → [Attribute Setting].
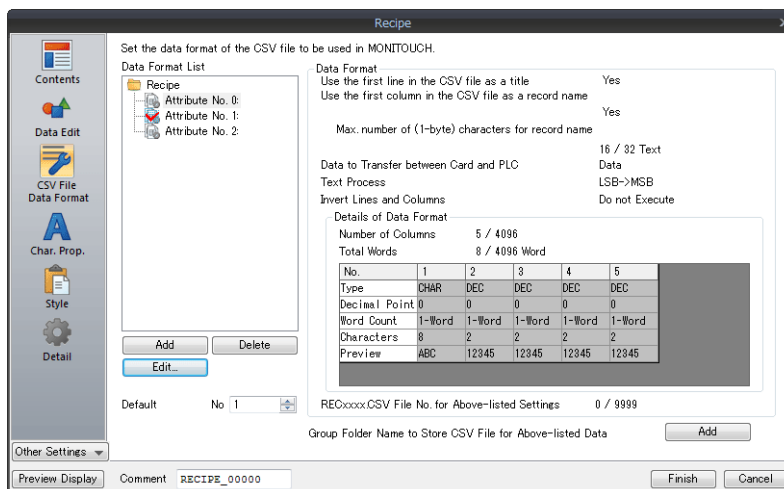
Item		Description
Data Format List	Add	Adds a new attribute table.
	Delete	Deletes a registered attribute table.
	Edit	Click to edit a registered attribute table. Refer to page 15-17.
Group Folder Name to Store CSV File for Above-listed Data	Add	Adds a new group folder.
Default		Specify the attribute settings number to use when attribute settings for a specific CSV file do not exist.

Character Properties
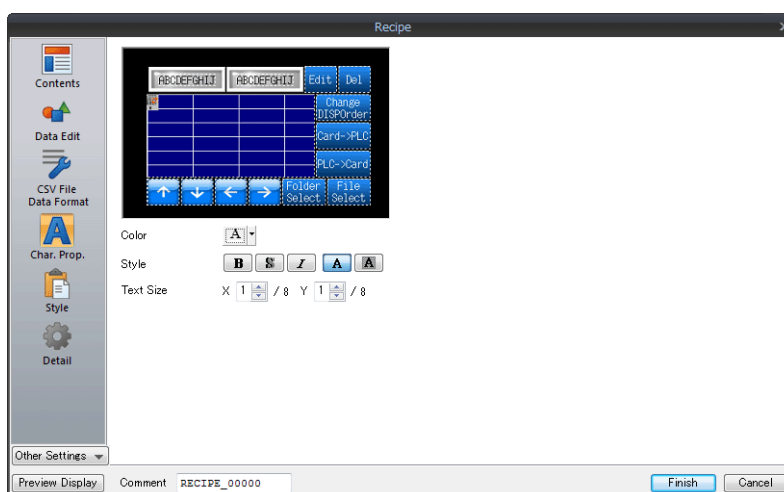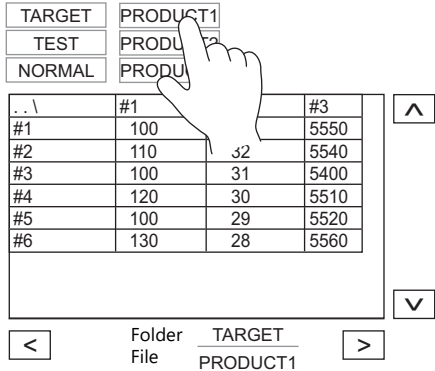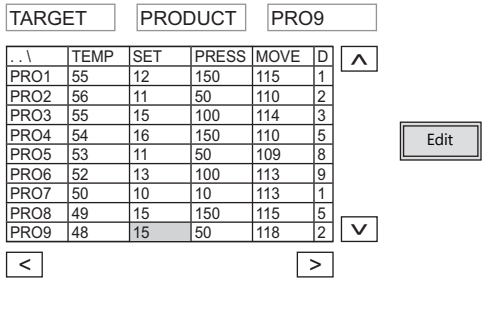
Item	Description
Color	Set the text color of the display area.
Style	Set the text properties of the display area.
Text Size	Set the text size of the display area.

Style

Item	Description
Additional Parts List	Displays a list of recipe-related parts. Selected: Displayed on MONITOUCH. Unselected: Not displayed on MONITOUCH. Parts can be added to the list using the [Add Parts] button.
Transfer Card → PLC	This switch is available when a record or a file has been chosen. This switch transfers the selected record or file data from the storage device to the specified [Transfer Device].
Transfer PLC → Card	This switch is available when a record or a file has been chosen. This switch transfers the selected record or file data from the specified [Transfer Device] to the storage device.
Folder Select *1	The specified [Folder Name] or the string stored in the address specified for [Device Designation] is automatically displayed on this switch. When the switch is pressed, the folder indicated on the switch is selected and its contents are displayed on the screen. * If the folder indicated on the switch does not exist, the contents of the root folder (\RECIPE) are displayed.

Item		Description
Additional Parts List	File Select *1	The specified [File Name] or the string stored in the address specified for [Device Designation] is automatically displayed on this switch. When the switch is pressed, the file indicated on the switch is selected and its contents are displayed on the screen. TARGET PRODUCT1 TEST PRODU... NORMAL PRODU... ..\ #1 #3 #1 100 5550 #2 110 32 5540 #3 100 31 5400 #4 120 30 5510 #5 100 29 5520 #6 130 28 5560 Folder TARGET File PRODUCT1 * If the file indicated on the switch does not exist in the folder (or if a different folder is selected), the switch does not work. (An error buzzer sounds.)
	File Delete	This switch deletes a selected recipe file. (Available with [Operation Area: Display Area] only) * When data in the selected file is currently displayed, the switch does not work. (An error buzzer sounds.)
	Edit	This switch is used for editing CSV file data, CSV filenames, and record names or titles (only when configured). Tap a data or name for editing. The selected item is displayed highlighted. Pressing this switch with an item selected puts the switch in the ON state and a keypad for editing (overlap display) appears. When a value is keyed in and the [ENT] key is pressed, it is input and the keypad disappears. TARGET PRODUCT PRO9 ..\ TEMP SET PRESS MOVE D PRO1 55 12 150 115 1 PRO2 56 11 50 110 2 PRO3 55 15 100 114 3 PRO4 54 16 150 110 5 PRO5 53 11 50 109 8 PRO6 52 13 100 113 9 PRO7 50 10 10 113 1 PRO8 49 15 150 115 5 PRO9 48 15 50 118 2 Edit To quit editing, press this switch again to turn it off.
	Display Order Change (Recipe)	Pressing this switch sorts the list of recipe folders and CSV files in ascending or descending order alternately. Ascending order Descending order AAA\ REC0002 GROUP\ REC0001 Recipe folders are displayed at the top in ascending order, and at the bottom of the list in descending order. TEST\ REC0000 REC0000 TEST\ REC0001 GROUP\ REC0002 AAA\
	LFT, RGT, UP, DW	These switches scroll the display area contents.
	Recipe Folder Name Display	The currently selected folder name is displayed.
	Recipe File Name Display	The currently selected filename is displayed.

Item		Description
Recipe Display [*1] Display Order (0 to 23)		This switch is available when [Operation Area: Switch] is selected. Folder names, CSV filenames, and record names in the storage device are displayed on switches instead of display areas. When this switch is pressed, the folder, file, or record indicated on the switch is selected. Folder 0. 1. TARGET\ 2. TEST\ 3. NORMAL\ 4. 5. Records . . \ #1 #2 #3 #4 #5 Files . . \ PRODUCT1 PRODUCT2 PRODUCT3 PRODUCT4 PRODUCT5 Each time a switch is pressed, the strings indicated on the switches change accordingly. The position where each folder, file, and record is displayed is determined by the [Display Order] setting for each switch. A maximum of 24 switches can be placed for one recipe part.
Scroll Bar (Horizontal)		These switches scroll the display area contents.
Scroll Bar (Vertical)		
Adjust Position		Display the window for adjusting the placement position of each part. Part size can also be changed.
Select from catalogs		Set the part design from the catalog.
Parts Design		Set the design and color of the part selected in the [Additional Parts List] or preview pane.
Edit Selected Parts		Configure the part selected in the [Additional Parts List] or preview pane.

*1 Character properties are dependant on the settings in the recipe settings window. Note however that the enlargement factor is fixed to "1".

Detail

Item		Description
Device Settings	Command Device	Specify the device memory for controlling the recipe part. Eleven words are occupied consecutively. For details, refer to "15.3.2 Command Device" page 15-14.
	Transfer Device	Specify the device memory address for storing data to be transferred, or the destination address. 　CSV file → [Transfer Device] 　[Transfer Device] → CSV file
	Information Output Device	Specify the device memory for storing the recipe part status. 28 words are occupied consecutively. For details, refer to "15.3.3 Information Output Device" page 15-16.
Text Process	Text Process Type	Set the order of the first and second bytes within one word. LSB → MSB　　15　　　　　0　　　MSB → LSB　　15　　　　　0 	MSB	LSB		MSB	LSB | 　　　　　2nd byte　1st byte　　　　　1st byte　2nd byte
Entry Key Used for Editing	Overlap ID	Specify the overlap ID to be used for showing the keyboard.
Coordinates	Start X/Start Y	Set the placement position and size of the display area.
	Width/Height	
Others	ID	Set the ID of the recipe part.

15.3.2 Command Device

This device memory is for controlling the recipe part. 11 words are occupied consecutively.

Address	Description
n	For control

(1) Record name edit	[0]: Record name edit enabled [1]: Record name edit disabled
(2) Filename edit	[0]: Filename edit enabled [1]: Filename edit disabled
(3) Title name edit	[0]: Title name edit enabled [1]: Title name edit disabled
(4) Recipe data edit	[0]: Recipe data edit enabled [1]: Recipe data edit disabled
(5) Data transfer	[0]: Data transfer enabled [1]: Data transfer disabled

(6) Folder lock	[0]: Folder selection switch enabled
	[1]: Folder selection switch disabled
	Folder selecting procedure to be taken when the switch is disabled
	    1. Store the folder name in [Command Device] "n + 3" to "n + 6".
	    2. Set this bit to "1".
	    3. The corresponding folder is selected.
	  * Even when the bit is "1" (ON), files and records in the folder can be selected as
	    desired.

(7) Record lock	[0]: Record selection switch enabled
	[1]: Record selection switch disabled
	Record selecting procedure to be taken when the switch is disabled
	    1. Store the folder name in [Command Device] "n + 3" to "n + 6".
	    2. Store the filename in [Command Device] "n + 7" to "n + 10".
	    3. Store the record number in [Command Device] "n + 2".
	    4. Set this bit to "1".
	    5. The corresponding record is selected.
	  * If the folder name specified in [Command Device] "n + 3" to "n + 6" does not exist
	    when this bit is set (ON), no record is selected and the contents of the "RECIPE"
	    folder are displayed instead.
	  * If the filename specified in [Command Device] "n + 7" to "n + 10" does not exist,
	    no record is selected and the contents of the folder specified in "n + 3" to "n + 6"
	    are displayed instead.
	  * When this bit is set (ON), all selection switches do not work.

(8) File lock	[0]: File selection switch enabled
	[1]: File selection switch disabled
	File selecting procedure to be taken when the switch is disabled
	    1. Store the folder name in [Command Device] "n + 3" to "n + 6".
	    2. Store the filename in [Command Device] "n + 7" to "n + 10".
	    3. Set this bit to "1".
	    4. The corresponding file is selected.
	  * If the folder name specified in [Command Device] "n + 3" to "n + 6" does not
	    exist, the "RECxxxx.CSV" file specified in "n + 1" is selected. If the file
	    "RECxxxx.CSV" also does not exist, nothing is selected, and the contents of the
	    "RECIPE" folder are displayed instead.
	  * When this bit is set (ON), records can be selected from the selected file. However,
	    the file selection and folder selection switches are disabled.

Address	Description	
n	(9)　Quick transfer	When bit 14 or bit 15 is set to "1" with this bit ON, data is transferred on completion of record selection in MONITOUCH.
	(10)　Transfer mode	[0]:　By record basis When records exist, a record is transferred. [1]:　Entire CSV file The entire data of a file is transferred. Even if a record is selected, the entire data of the file including the record is transferred. When selecting other than the record name part (title or data), no file transfer will be performed.
	(11)　Storage device → PLC transfer	Data is transferred from the storage device to the [Transfer Device] at the edge of [0 → 1]. When a record is selected and bit 13 is reset (OFF), one record is transferred to the [Transfer Device]. When no record is selected, or when a record is selected and bit 13 is set (ON), the entire data of the file is transferred to the [Transfer Device]. On completion of data transfer, bit 14 of [Information Output Device] "n + 28" is set (ON). Reset this bit to "0" after the completion of data transfer.
	(12)　PLC → storage device transfer	Data is transferred from the [Transfer Device] to the storage device at the edge of [0 → 1]. When a record is selected and bit 13 is reset (OFF), one record is transferred from the [Transfer Device] to the storage device. When no record is selected, or when a record is selected and bit 13 is set (ON), the entire data of the file is transferred from the [Transfer Device] to the storage device. On completion of data transfer, bit 15 of [Information Output Device] "n + 28" is set (ON). Reset this bit to "0" after the completion of data transfer.
	(13)　Not used	This bit must be reset to "0".
n + 1	File number designation Used to designate a file from the PLC instead of a switch on the screen. This is valid when the following conditions are satisfied. 　•　CSV file "RECxxxx.CSV" 　•　Bit 9 (file lock) or bit 8 (record lock) of "n" is set to "1".	
n + 2	Record number designation Used to designate a record from the PLC instead of a switch on the screen. This is valid when the following conditions are satisfied. 　•　CSV file "RECxxxx.CSV" 　•　Bit 8 (record lock) of "n" is set to "1".	
n + 3 ~ n + 6	Folder name designation (8 one-byte characters: 4 words) Used to designate a folder from the PLC instead of a switch on the screen. This is valid when the following conditions are satisfied. 　•　CSV file other than "RECxxxx.CSV" 　•　Bit 7 (folder lock) of "n" is set to "1". 　•　Bit 8 (record lock) of "n" is set to "1". 　•　Bit 9 (file lock) of "n" is set to "1".	
n + 7 ~ n + 10	Folder name designation (8 one-byte characters: 4 words) Used to designate a filename from the PLC instead of a switch on the screen. This is valid when the following conditions are satisfied. 　•　CSV file other than "RECxxxx.CSV" 　•　Bit 9 (file lock) or bit 8 (record lock) of "n" is set to "1".	

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15.3.3 Information Output Device

This is the memory address that outputs the recipe function status. 29 words are occupied consecutively.

Address	Description
n	Storage device status MSB ... LSB (bit table: 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 / 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 _) (2) Not used (always "0") (1) Storage device error 0: Normal 1: Error
n + 1	Error number When bit 0 of "n" is set to "1", the error number is stored. Error numbers denote errors as follows: | Error number	Description | |---|---|
4	Storage device not installed or access stopped
12	Storage device writing error
16	Storage device reading error	
n + 2	File number Valid when CSV file is "RECxxxx.CSV". The selected or transferred file number is stored.
n + 3	Record number The selected or transferred record number is stored.
n + 4 ~ n + 7	Folder name (8 one-byte characters: 4 words) Valid when CSV file is other than "RECxxxx.CSV". The folder name that contains the selected file or record is stored.
n + 8 ~ n + 11	Filename (8 one-byte characters: 4 words) Valid when CSV file is other than "RECxxxx.CSV". The selected or transferred filename is stored.
n + 12 ~ n + 27	Record name (32 one-byte characters: 16 words) Valid when CSV file is other than "RECxxxx.CSV". The selected or transferred record name is stored.
n + 28	Transfer status The status of data transfer between the storage device and the [Transfer Device] is stored. MSB ... LSB (bit table: 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 / _ _ 0 0 _ _ 0 0 0 0 0 0 0 0 _ _) (7) Not used (3) Storage device → PLC transfer in progress (4) PLC → storage device transfer in progress (5) Storage device → PLC transfer complete (6) PLC → storage device transfer complete (7) Not used (1) Error (2) Max. transfer

Transfer status detail (n + 28):

(1) Error	[0]: Normal [1]: An error has occurred during transfer. When an error occurs, bit 10 or 11 (transferring) remains "1". Bit 14 or 15 (transfer complete) remains "0".
(2) Max. transfer	[0]: 4096 words or less to be transferred [1]: 4097 words or more to be transferred The number of transferable words is limited to 4,096. When this bit is set (ON), 4096 words from the top are transferred and the rest (from the 4097th word) are not transferred.
(3) Storage device → PLC transfer in progress	[1]: Transferring
(4) PLC → storage device transfer in progress	[1]: Transferring
(5) Storage device → PLC transfer complete	[1]: Transfer complete Reset this bit to "0" after confirming completion.
(6) PLC → storage device transfer complete	[1]: Transfer complete Reset this bit to "0" after confirming completion.
(7) Not used	Always "0"

15.4 Attributes

15.4.1 Overview of Attributes

The CSV file is a text file delimited with commas. Therefore, it can be edited using various software. However, since the text file does not contain any information about the numerical values, text, and DEC/HEX notation within the file, the TS unit cannot tell what each data is for when reading or writing data.

For this reason, the data attributes of each cell must be configured in the [Attribute Setting] window so that the TS unit will read from and write to CSV files according to the set attributes.

Since the recipe function uses CSV files, attribute settings are required. [1]

Function and Setting			CSV Filename
Recipe part			RECxxxx.CSV xxxxxxxx.CSV
Macro [2]	Read (Number designation)	LD_RECIPE	RECxxxx.CSV 0000~9999
		LD_RECIPE2	
		LD_RECIPESEL	
		LD_RECIPESEL2	
	Write (Number designation)	SV_RECIPE	
		SV_RECIPE2	
		SV_RECIPESEL	
		SV_RECIPESEL2	
	Read (Name designation)	RD_RECIPE_FILE	xxxxxxxx.CSV Max 8 one-byte numerals or uppercase alphabetic characters
		RD_RECIPE_LINE	
		RD_RECIPE_COLUMN	
	Write (Name designation)	WR_RECIPE_FILE	
		WR_RECIPE_LINE	
		WR_RECIPE_COLUMN	

*1 A maximum of 256 (No. 0 to 255) attributes can be set.

*2 When using a macro command with a recipe part, ensure that the CSV filename is correctly specified. The available filenames, storage destinations, or designation methods vary depending on the macro command. For details, refer to the Macro Reference Manual.

15.4.2 Edit

Starting and Exiting

1. Click [System Setting] → [Attribute Setting]. The [Attribute] tab window is displayed.
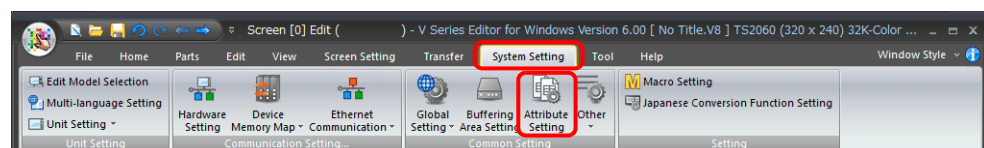
2. Right-click on the "Recipe" folder, and select [New Attribute].
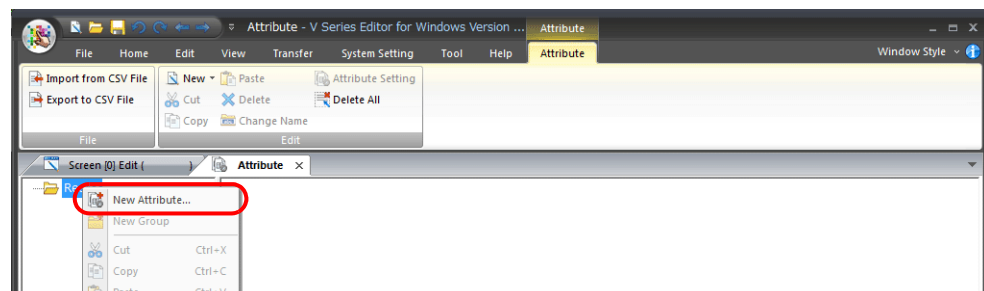
3. Configure attributes. Refer to page 15-18.

4. Click the [×] on the window tab to exit.

Attribute Setting

Item	Description

Use Title [*1]	Determine the usage of the first line in the CSV file.
	• Unselected
	  The first line in the CSV file is treated as "data."
	
	CSV file
	<table><tr><td>6000</td><td>15</td><td>200</td><td></td></tr><tr><td>6100</td><td>15</td><td>201</td><td></td></tr><tr><td>6200</td><td>20</td><td>202</td><td></td></tr><tr><td>6300</td><td>20</td><td>203</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
	Display on the screen
	<table><tr><td>..\</td><td>#1</td><td>#2</td><td>#3</td></tr><tr><td>#1</td><td>6000</td><td>15</td><td>200</td></tr><tr><td>#2</td><td>6100</td><td>15</td><td>201</td></tr><tr><td>#3</td><td>6200</td><td>20</td><td>202</td></tr><tr><td>#4</td><td>6300</td><td>20</td><td>203</td></tr></table>
	• Selected
	  The first line in the CSV file is treated as a "title."
	
	CSV file
	<table><tr><td>Title1</td><td>Title2</td><td>Title3</td><td></td></tr><tr><td>6000</td><td>15</td><td>200</td><td></td></tr><tr><td>6100</td><td>15</td><td>201</td><td></td></tr><tr><td>6200</td><td>20</td><td>202</td><td></td></tr><tr><td>6300</td><td>20</td><td>203</td><td></td></tr></table>
	Display on the screen
	<table><tr><td>..\</td><td>Title1</td><td>Title2</td><td>Title3</td></tr><tr><td>#1</td><td>6000</td><td>15</td><td>200</td></tr><tr><td>#2</td><td>6100</td><td>15</td><td>201</td></tr><tr><td>#3</td><td>6200</td><td>20</td><td>202</td></tr><tr><td>#4</td><td>6300</td><td>20</td><td>203</td></tr></table>

Use Record Name [*1]	Determine the usage of the first column in the CSV file.
	• Unselected
	  The first column in the CSV file is treated as "data."
	
	CSV file
	<table><tr><td>6000</td><td>15</td><td>200</td><td></td></tr><tr><td>6100</td><td>15</td><td>201</td><td></td></tr><tr><td>6200</td><td>20</td><td>202</td><td></td></tr><tr><td>6300</td><td>20</td><td>203</td><td></td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
	Display on the screen
	<table><tr><td>..\</td><td>#1</td><td>#2</td><td>#3</td></tr><tr><td>#1</td><td>6000</td><td>15</td><td>200</td></tr><tr><td>#2</td><td>6100</td><td>15</td><td>201</td></tr><tr><td>#3</td><td>6200</td><td>20</td><td>202</td></tr><tr><td>#4</td><td>6300</td><td>20</td><td>203</td></tr></table>
	• Selected
	  The first column in the CSV file is treated as "record names."
	
	CSV file
	<table><tr><td>ITEM1</td><td>6000</td><td>15</td><td>200</td></tr><tr><td>ITEM2</td><td>6100</td><td>15</td><td>201</td></tr><tr><td>ITEM3</td><td>6200</td><td>20</td><td>202</td></tr><tr><td>ITEM4</td><td>6300</td><td>20</td><td>203</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
	Display on the screen
	<table><tr><td>..\</td><td>#1</td><td>#2</td><td>#3</td></tr><tr><td>ITEM1</td><td>6000</td><td>15</td><td>200</td></tr><tr><td>ITEM2</td><td>6100</td><td>15</td><td>201</td></tr><tr><td>ITEM3</td><td>6200</td><td>20</td><td>202</td></tr><tr><td>ITEM4</td><td>6300</td><td>20</td><td>203</td></tr></table>

Transfer Mode	The options become available when [Use Record Name] is selected.
	• [Data]
	  Only transfer data.
	• [Record Name + Data]
	  Transfer record names and data.

Item	Description
Text Process	Set the order of the first and second bytes within one word.
No. of Bytes for Record (0 to 32)	This option is available when [Transfer Mode: Record Name + Data] is selected. Set the number of bytes used for a record name.
Reverse Definition of Lines/Columns	This does not apply to the display on a recipe part. Keep this box unselected. For details, refer to the Macro Reference Manual.
No. of Columns [*2] (1 to 4096)	This is available when [Reverse Definition of Lines/Columns] is selected. Set the number of columns in the CSV file. The record name column should not be included.
No. of Lines [*2] (1 to 4096)	This is available when [Reverse Definition of Lines/Columns] is selected. Set the number of lines in the CSV file.
No. of Total Words [*2] (1 to 4096)	This is automatically calculated from the data type of data.
Data type	Set the data type of data in the CSV file. Type: DEC, DEC-, HEX, OCT, BIN, CHAR, BCD, FLOAT Decimal Point: 0 to 32 Word Count: 1-Word, 2-Word Characters: 2 to 255
When RECxxxx.CSV is Used (xxxx : 0000~9999)	This option is valid when the CSV filename is between REC0000.CSV and REC9999.CSV (number designation). Set the CSV file number corresponding to the attribute setting. The CSV file is stored in the SD\ (access folder) \RECIPE folder.

For the Text Process row, the diagram:

LSB → MSB

15		0
MSB	LSB	
2nd byte	1st byte	

MSB → LSB

15		0
MSB	LSB	
1st byte	2nd byte	

For the "When RECxxxx.CSV is Used" row, the folder tree:

```
└─ MEMO
┌─■ RECIPE
│  └─ NORMAL
│  └─ TARGET
│     ├─ PRODUCT1.CSV
│     ├─ PRODUCT2.CSV
│     ├─ PRODUCT3.CSV
│     ├─ PRODUCT4.CSV
│     ├─ PRODUCT5.CSV
│     └─ PRODUCT6.CSV
│  └─ TEST
│     ├─ TEST1.CSV
│     ├─ TEST2.CSV
│     └─ TEST3.CSV
│  ├─ REC0000.CSV
│  ├─ REC0001.CSV
│  └─ REC0002.CSV
```

In "RECIPE" folder

* This is not valid when the CSV files are named freely.

*1   When using both titles and record names:

CSV file

-	Title1	Title2	Title3
ITEM1	6000	15	200
ITEM2	6100	15	201
ITEM3	6200	20	202
ITEM4	6300	20	203

Display on the screen

..\	Title1	Title2	Title3
ITEM1	6000	15	200
ITEM2	6100	15	201
ITEM3	6200	20	202
ITEM4	6300	20	203

*2   The maximum possible number of columns/lines is 4,096. However, if [No. of Total Words] reaches 4096 words, columns or lines cannot be added even when the number of columns or lines is not greater than 4,096.

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Creating Group Folders

When naming CSV files [*1], create a group folder [*1] for storing the CSV files.
Use the same attribute setting for all the CSV files in the same group folder.

  *1   Group folder names and CSV filenames must be within 8 one-byte numerals or uppercase alphabetic characters.
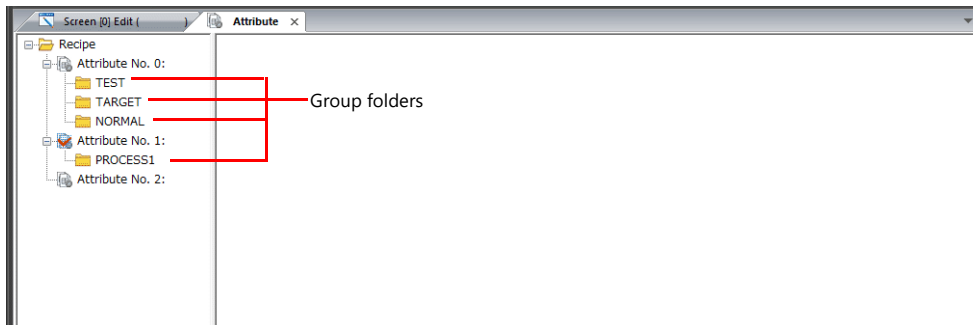
Procedure

1. Right-click on an attribute number. A drop-down menu is displayed.
2. Select [New Group]. The "G000000" folder is created.
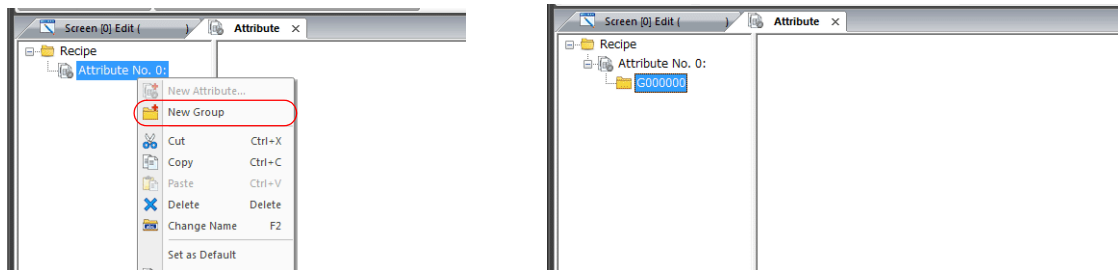
3. Right-click on the "G000000" folder. A drop-down menu is displayed.
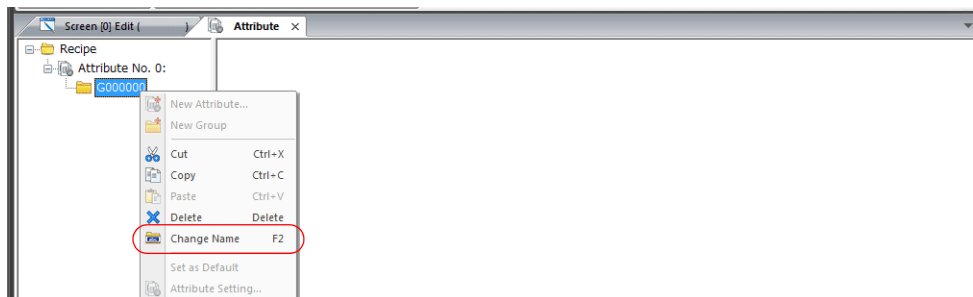
4. Select [Change Name]. A cursor will appear. Enter any name.
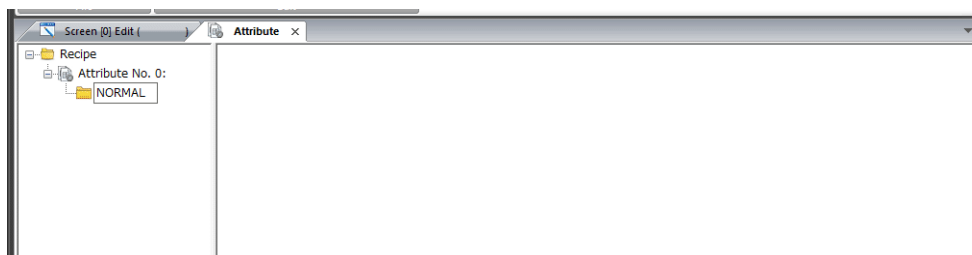
5. Repeat steps 1 to 4 to create folders as necessary.

Default Setting

One of the attribute icons has a red check mark on it. The marked attribute number is the "default setting."
The default setting is used in the following cases:

- There is no attribute setting corresponding to the file "RECxxxx.csv".

Attributes   Storage device

Red check mark
= Default setting

Since there is no corresponding attribute setting,
the default setting (No. 1) is applied.

- A group folder without an attribute setting is added to the storage device on Explorer.

Attributes   Storage device

Attribute No. 0 is applied.

Since the "TOTAL" group folder does
not exist in the attribute settings, the
default setting (No. 1) is applied.

15.4.3 CSV File

Filenames and Storage Destinations

Depending on the CSV filename, the storage destination as well as file designation method varies. Create files according to their purpose.

Filename	Storage destination
RECxxxx.CSV 0000 ~ 9999	Access folder\RECIPE\ Refer to the chart below.
xxxxxxxx.CSV Max 8 one-byte numerals or uppercase alphabetic characters	Access folder\RECIPE\ (group folder) \ Max 8 one-byte numerals or uppercase alphabetic characters Refer to the chart below.

```
Storage device ———□▱ DAT0000 ─ ─ ─ ─ ─ ─ ─ ─ Access folder
                   ├─▱ BITMAP
                   ├─▱ CARD
                   ├─▱ DSP
                   ├─▱ FONT
                   ├─▱ HDCOPY
                   ├─▱ JPEG
                   ├─▱ MEMO
                   ├─▰ RECIPE
                   │   ├─▱ NORMAL ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐
                   │   ├─▱ TARGET ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┐ │
                   │   │   ├─ PRODUCT1.CSV                      │ │
                   │   │   ├─ PRODUCT2.CSV                      │ │
                   │   │   ├─ PRODUCT3.CSV                      ─ ─ ─ ─ Group folder*
                   │   │   ├─ PRODUCT4.CSV                      │ │
                   │   │   ├─ PRODUCT5.CSV                      │ │
                   │   │   └─ PRODUCT6.CSV                      │ │
                   │   ├─▱ TEST ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ─ ┘ ┘
                   │   │   ├─ TEST1.CSV
                   │   │   ├─ TEST2.CSV
                   │   │   └─ TEST3.CSV
                   │   ├─ REC0000.CSV
                   │   ├─ REC0001.CSV
                   │   └─ REC0002.CSV
                   └─▱ SAMPLE
```
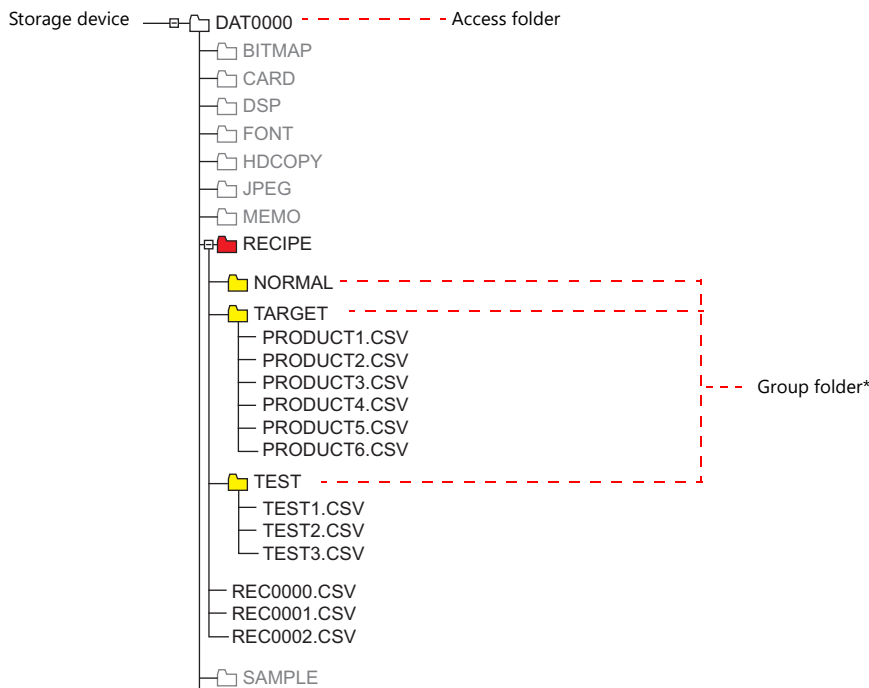
* Group folders must be defined in the [Attribute] tab window. A group folder defined in the [Attribute] tab window is automatically created when the storage device is connected to MONITOUCH.

Total Number of CSV Files

The number of group folders and CSV files that can be used with recipes is limited.
- The total number of group folders and CSV files in the "Recipe" folder: 1024 maximum
- The number of CSV files in a group folder: 1024 maximum

Folders or files exceeding 1024 are not recognized by the recipe function.
  * When macro commands are used to access CSV files, this limitation is not imposed.
However, note that access time is proportional to the number of files.

```
├─▱ HDCOPY
├─▱ JPEG
├─▱ MEMO
├─▰ RECIPE
│   ├─▰ NORMAL                    ▬▬ 1024 maximum
│   ├─▰ TARGET                    ▬▬ 1024 maximum
│   │   ├─ PRODUCT1.CSV           ▬▬ 1024 maximum
│   │   ├─ PRODUCT2.CSV
│   │   ├─ PRODUCT3.CSV
│   │   ├─ PRODUCT4.CSV
│   │   ├─ PRODUCT5.CSV
│   │   └─ PRODUCT6.CSV
│   ├─▰ TEST
│   │   ├─ TEST1.CSV
│   │   ├─ TEST2.CSV
│   │   └─ TEST3.CSV
│   ├─ REC0001.CSV
│   ├─ REC0002.CSV
│   └─ REC0003.CSV
```
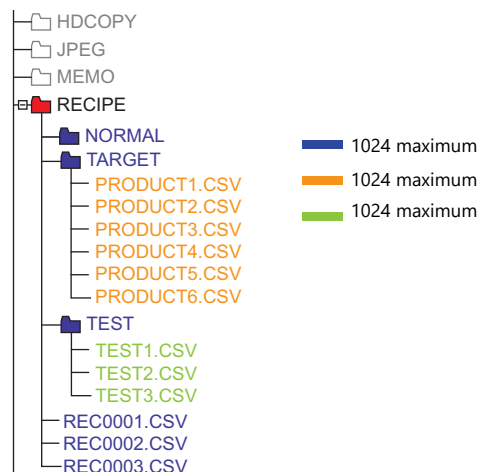
Data in CSV Files

Number of Transferable Words

A maximum of 4096 words can be read and written at one time by the recipe function or when using a macro command. If you attempt to transfer data that exceeds this capacity, only the first 4096 words will be transferred and no more.

Lines and Columns

Depending on the attribute setting, the available numbers of columns and lines vary.

	☐ Reverse Definition of Lines/Columns	☑ Reverse Definition of Lines/Columns [4]
No. of Lines	1 to 32767	1 to 4096 [3]
No. of Columns [1]	1 to 4096 [2]	1 to 4096

  *1 Excel can handle 256 columns maximum.
  *2 Maximum word count per column: 4096 words
  *3 Maximum word count per line: 4096 words
  *4 File size: 1 Mbyte or less

No. of Bytes for Record

32 bytes maximum per record
  * Make the setting in the [Attribute Setting] window.

Number of Bytes for Title

32 bytes maximum per title

Note

In CSV files, commas and double quotation marks are not recognized as data. Such data may not be read correctly.

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15.4.4 MONITOUCH Operation

Selection

Folders and files can be selected by tapping the operation area. It is also possible to select a folder, file, or record by designating its name or number from the [Command Device].

Folder Selection

If you double-tap a group folder name, the CSV filenames in the folder are displayed.
Every group folder name is followed by a "\".

- Display area
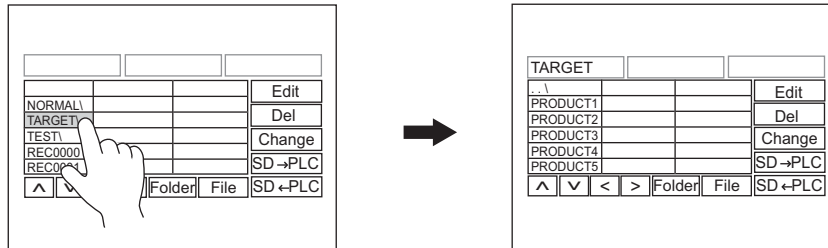
- Switch
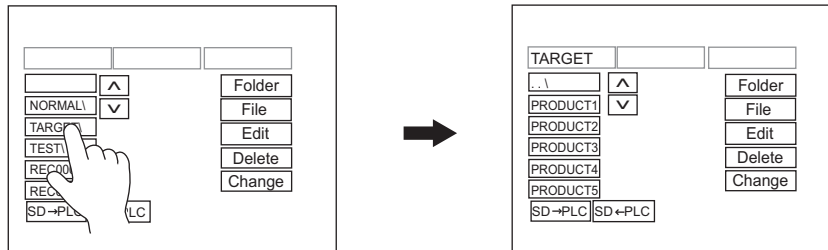
File Selection

- Display area
  Double-tap a filename to select it and display its contents.
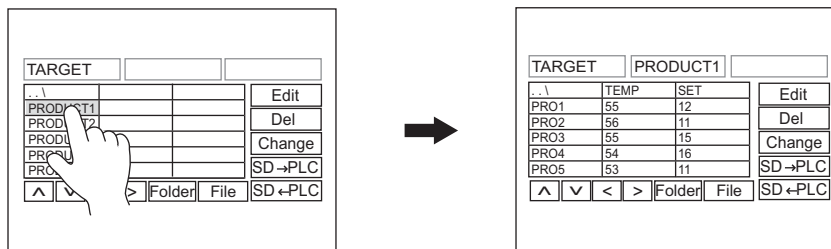
- Switch
  Tap a filename to select it and display records.
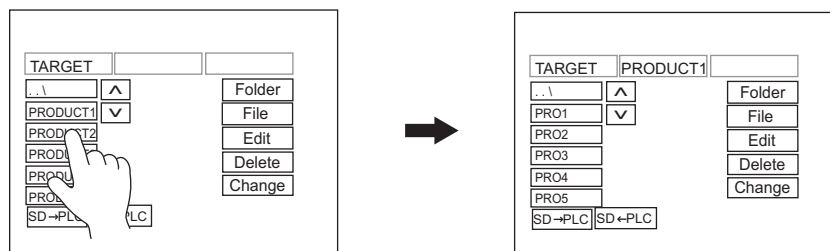
Record Selection

Tap a record to select it.

- Display area
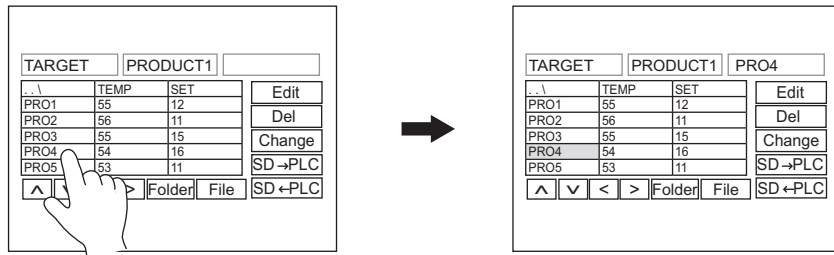
- Switch
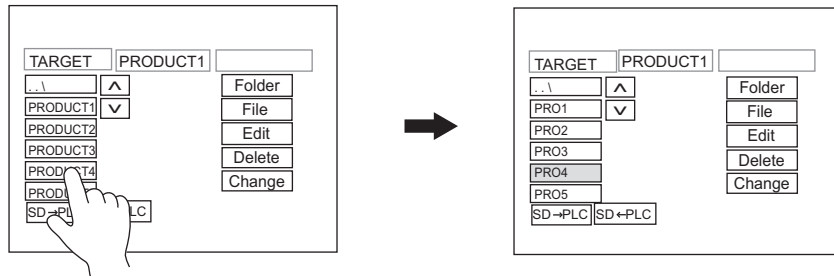
Return

- Display area
  Double-tap the top left cell (..\) in the display area to move up by one level in the directory.
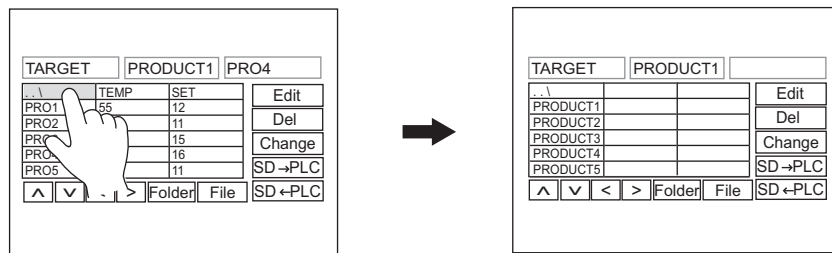
- Switch
  Tap the top switch (..\) to move up by one level in the directory.
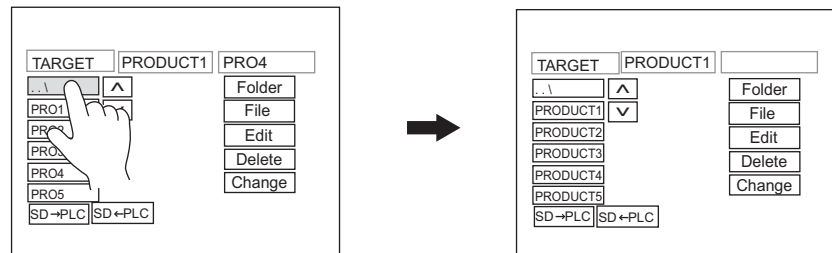
Transfer

Data can be transferred using a switch on the screen. It is also possible to designate a file or record using the [Command Device] and transfer data.

Record Transfer

Tap a transfer switch ([Card → PLC] or [PLC → Card]) with a record selected to transfer that record (1 line).

Data of record No. 4 in the CSV file is transferred to the [Transfer Device].
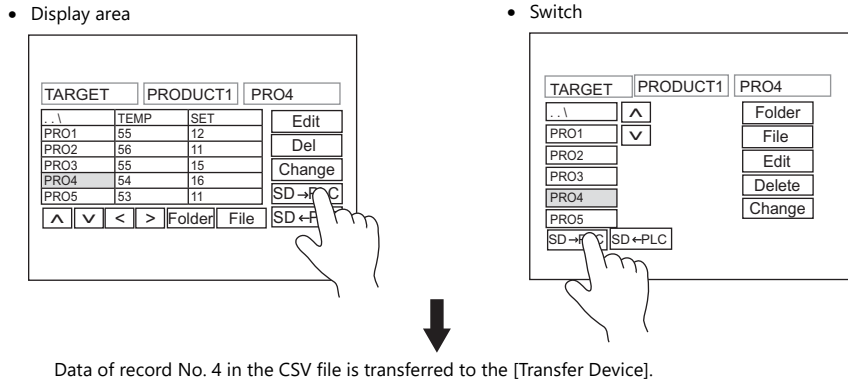
File Transfer

Tap a transfer switch ([Card → PLC] or [PLC → Card]) with a file selected (before selecting a record) to transfer the entire data of the selected file.

When a CSV file is selected and no record is selected, the entire data of the file is transferred to the [Transfer Device] (the maximum transferable size is 4096 words).
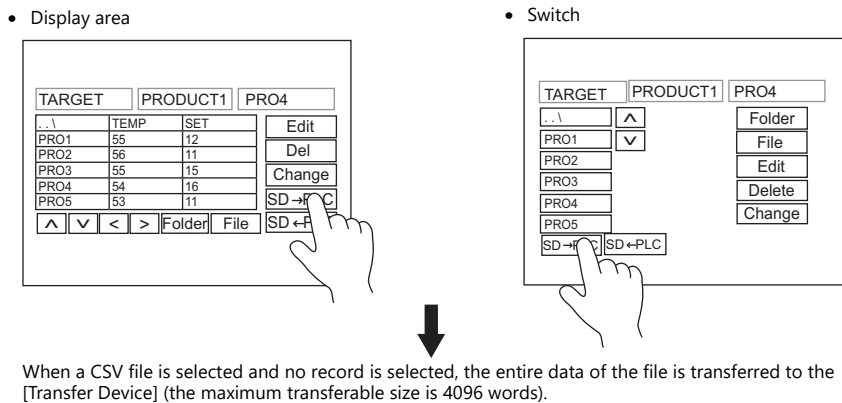
Edit

Data Edit

- Display area
  Tap a CSV data with the [Edit] switch in the ON state to display a keypad for editing. Key in a value and press the [ENT] key. The value is directly written into the storage device. However, if you tap a cell that is only partially displayed, no keypad is displayed.
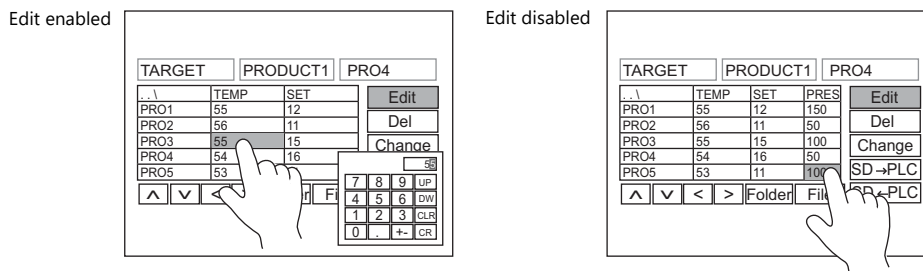
- Switch
  Data editing is not possible because CSV data is not displayed on switches.

Editing Names (Files, Records, Titles)

Tap a filename, record name or title name (if set) with the [Edit] switch in the ON state to display a keyboard for editing. These names can be edited directly in the same way as data edit. Note that only characters can be input.
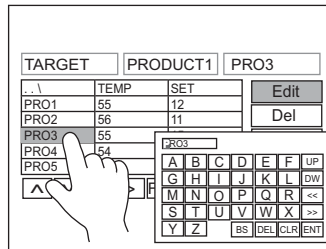
MEMO

MONITOUCH

16 Print

16.1   Overview

When the TS is operating in RUN mode, the displayed screen and the internal buffer information can be printed from a connected printer.

- Hard copy
  Print the displayed screen.
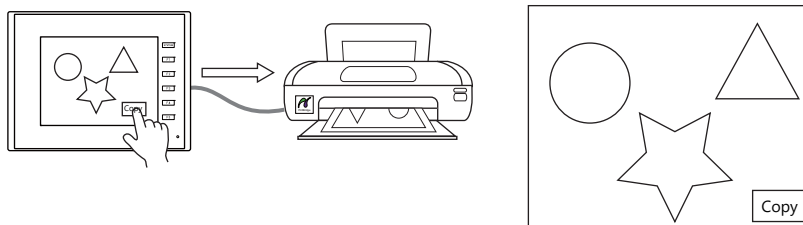
☞   For details, refer to "16.2 Hard Copy" page 16-17.

- Sample print
  Print collected log data.
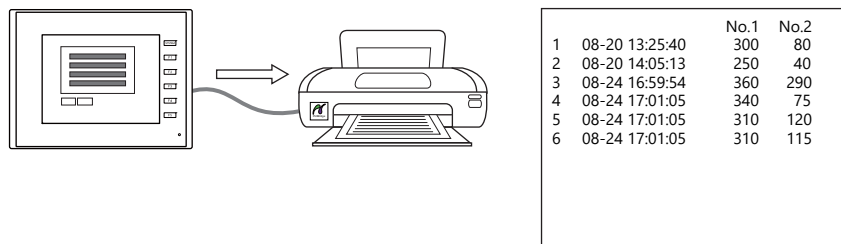
☞   For details, refer to "Sample Print" page 7-26.

- Data sheet print
  Print data registered as a data sheet.
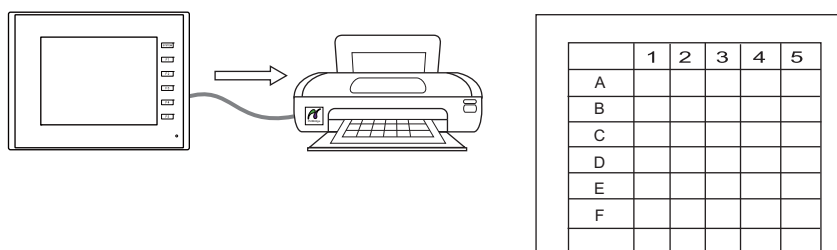
☞   For details, refer to "16.3 Printing Data Sheets" page 16-19.

16.1.1 Compatible Printers

The following printers can be connected to the TS.

Editor Setting	Supported Models	TS2060 Connection Port	TS1000S Connection Port
PictBridge	PictBridge-compatible printer	USB-B	USB-B
EPSON STYLUS PHOTO	EPSON color inkjet printer STYLUS PHOTO	MJ1 MJ2 USB-A *1	COM2 USB-A
EPSON STYLUS C86	EPSON color inkjet printer STYLUS C86		
EPSON STYLUS C65	EPSON color inkjet printer STYLUS C65		
PR201 Monochrome	PC-PR201 series models with which printing from MS-DOS is possible		
PR201 Color			
ESC-P Monochrome	MS-DOS-compatible printer models ESC/P24-J84, ESC/P-J84, and ESC/P Super		
ESC-P Color			
CBM292 / 293	Citizen Systems Line Thermal Printer		
MR - 400	Sato MR-400 series barcode printer		

*1 TS2060: USB-A port not supported

List of compatible printers

☞   For a list of compatible printer models, visit our website (www.monitouch.com).

Printable Items

The table below shows the items printable by each printer.

Printable Items	PictBridge	STYLUS PHOTO STYLUS C86 STYLUS C65	PR201 ESC-P	CBM292/293	MR-400
Screen hard copy	○ *1	○ *1	○ *3	✕	✕
Sample Print	○	○	○	○	✕
Data sheet print	○	○ *2	○	○	✕
Data sheet print (expanded)	○	○	✕	✕	✕
Printing using the "OUT_PR" macro command	○	○ *4	○	○	✕
Printing using the "MR_REG"/"MR_OUT" macro command	✕	✕	✕	✕	○

*1 A color or monochrome hard copy can be designated with the system device memory ($s1007).

$s1007	Hard copy
0	Color (32-k colors)
1	Grayscale

*2 Landscape printing on A4/15-inch paper is not supported.
Data is printed in portrait orientation regardless of the paper setting.

Paper feed direction
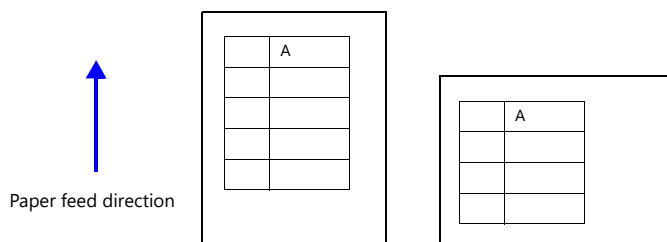
*3 When PR201 Color or ESC-P Color is selected, printing is performed using 16 colors.

*4 Macro command: OUT_PR
Only characters can be printed. Control codes cannot be printed.

16.1.2 EPSON STYLUS PHOTO, STYLUS C86, and STYLUS C65

MONITOUCH can be connected to EPSON printers that support Microsoft Windows (STYLUS PHOTO, STYLUS C86, and STYLUS C65).

☞   For information on connectable models, visit our website at www.monitouch.com.

Connection Method

USB-A connection

- Connect the USB-A port of the TS unit to the USB port of the printer with a USB cable (commercially available).
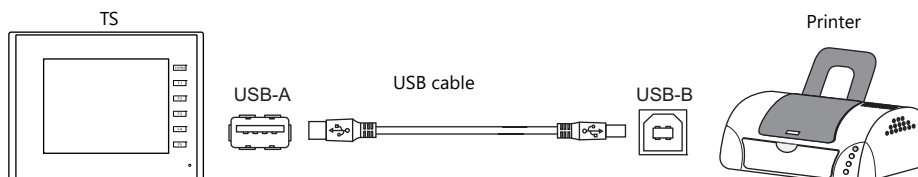
- Connect the USB-A port of the TS unit to the parallel port of the printer with a USB-parallel conversion cable (commercially available).
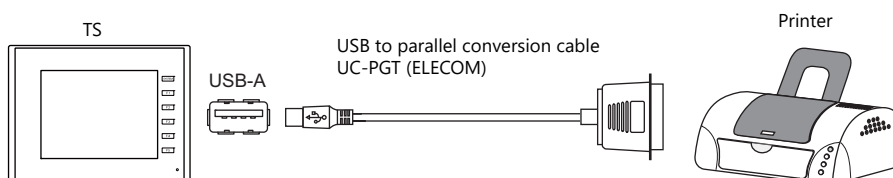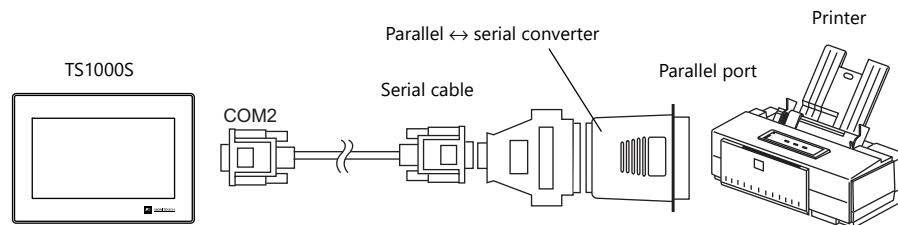

Serial connection

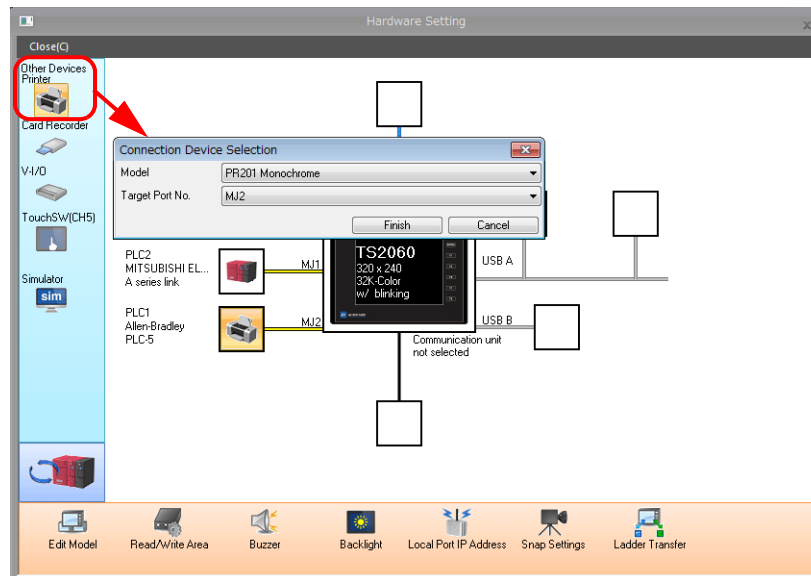- Connect the MJ port of the TS2060 unit to the parallel port of the printer via a converter.
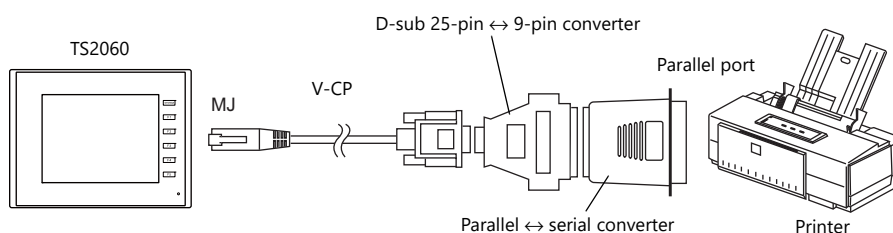
- Connect the COM2 port of the TS1000S to the parallel port of the printer via a converter.
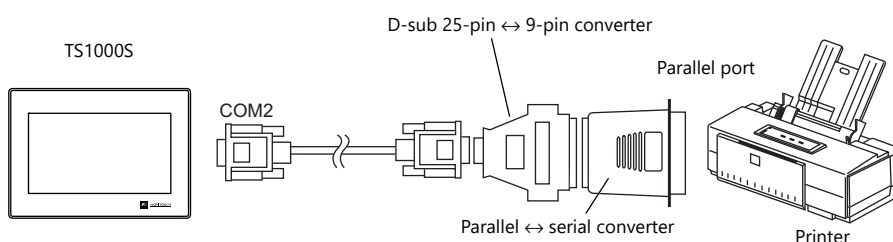
Hardware Settings

Configure settings at [System Setting] → [Hardware Setting] → [Printer].

Printer Model
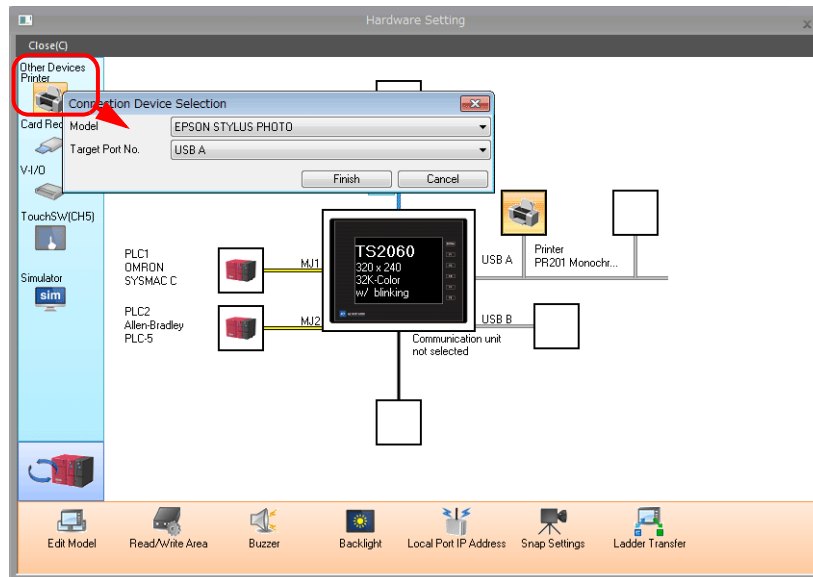
Item	Description
Model	Select the printer to connect. 　EPSON STYLUS PHOTO, EPSON STYLUS C86, EPSON STYLUS C65
Target Port No.	Select the port where the printer cable is to be connected. USB-A: 　Connect a printer using a commercially available USB cable. MJ1/MJ2/COM2: 　Select this option when connecting to a printer equipped with a serial interface.

Printer Properties

Item		Description
Always Output Status Bit (Yes/None)		When the TS receives a print command, "0 → 1" is output at the start of data transmission and "1 → 0" is output at the end of transmission. However, if the print data is minimal, the signal may not be output. Set to "Yes" when bit output is required regardless of the data size. The output area is shown below. • Bit 10 of write area "n + 1" • Bit 0 of internal device memory $s16 Write area "n + 1" $s16
Hard copy	Orientation (Horizontal, Vertical)	Select the orientation of the screenshot image printed on paper. When [Vertical] is selected, the image for printing is rotated 90 degrees on the paper. • Hard copy example
	Reversed Image (Reversed, Normal)	Reversed: White and black are reversed for printing. Normal: The screenshot image is printed out as displayed on MONITOUCH.
Data Sheet	Data Sheet Setting	Configure settings for data sheet printing. For details, refer to page 16-19.
Serial Port (only when serial port is selected)	Baud Rate	Set the baud rate. 4800, 9600, 19200, 38400, 57600, 76800, 115K bps
	Parity	Set the parity. None, Odd, Even
	Data Length	Set the number of bits for data. 7-Bit, 8-Bit
	Stop Bit	Set the number of stop bits. 1-Bit, 2-Bit

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16.1.3 PictBridge Printers

A PictBridge-compatible printer can be connected.

     ☞   For information on compatible models, visit our website (www.monitouch.com).

Connection

USB-B port connection

Connect the USB-B port of the TS unit to the USB-A port of the printer with a commercially available USB cable.
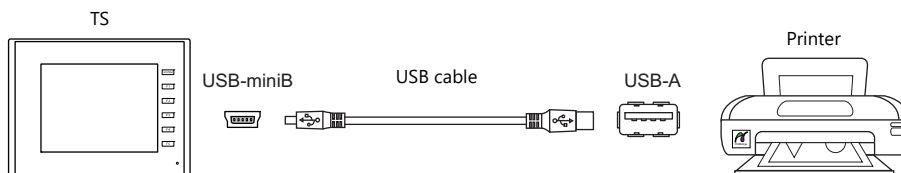
  * When transferring screen programs via the USB-B port, change the cable connection.

Hardware Settings

Configure the [System Setting] → [Hardware Setting] → [Printer] settings.
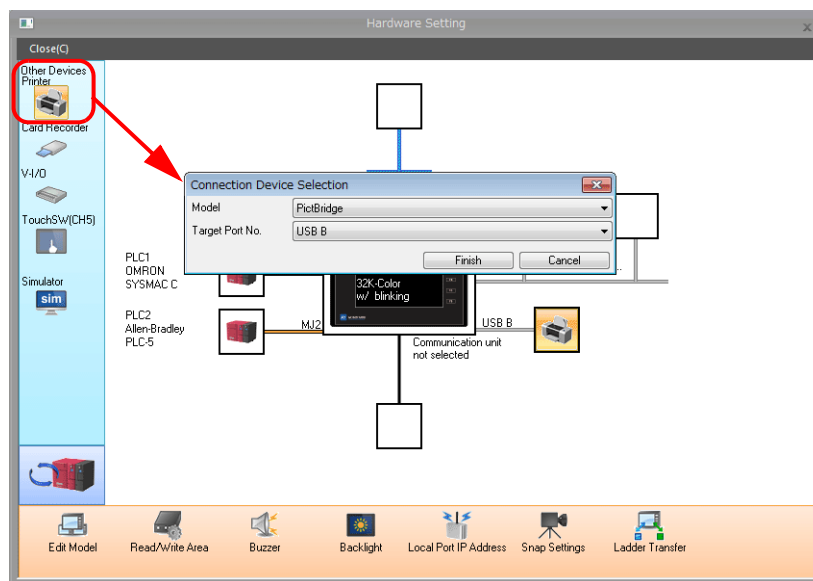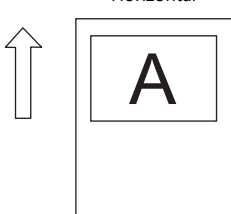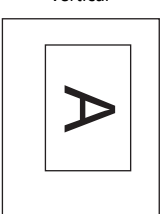
Printer model

Item	Description
Model	PictBridge
Target Port No.	USB-B (automatically set when "PictBridge" is selected for [Model])

Printer properties

Item		Description

Always Output Status Bit (Yes/None)		When the TS receives a print command, "0 → 1" is output at the start of data transmission and "1 → 0" is output at the end of transmission. However, if the print data is minimal, the signal may not be output.
		Set to "Yes" when bit output is required regardless of the data size.
		
		The output area is shown below.
		• Bit 10 of write area "n + 1"
		• Bit 0 of internal device memory $s16
		
		Write area "n + 1"
		
		MSB LSB
		15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
		                              0 0 0 0 0
		                    0: End (standby)
		                    1: Transferring print data
		
		$s16
		MSB LSB
		15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00
		0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
		                    0: End (standby)
		                    1: Transferring data for printing

Hard copy	Orientation (Horizontal/Vertical)	Select the orientation of the screen image printed on paper. When [Vertical] is selected, the image for printing is rotated 90 degrees on the paper. • Hard copy example Horizontal Vertical
	Reversed Image (Reversed/Normal)	Reversed: White and black are reversed for printing. Normal: The exact state of the screen on the unit is printed.
Data Sheet	Data Sheet Setting	Configure settings for data sheet printing. For details, refer to page 16-19.
Use PictBridge only on USB-B port (Yes/None)		Select "Yes" when using the USB-B port to connect to a PictBridge printer during operation in RUN mode. When transferring screen programs via the USB-B port, switch to Local mode.

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Print Size

The print size varies depending on the item to be printed and the paper setting.

Screen hard copy

- The paper size is fixed to "A4".
- The print start position and print size cannot be changed. The actual margins, however, may differ from the one shown below depending on the printer used.
  - When [Vertical] (portrait) is selected (unit: mm):

    The landscape output is available when the printer supports A4 paper and 2-up printing. If not supported, printing is performed in the landscape orientation.
  - When [Horizontal] (landscape) is selected (unit: mm):

    The landscape output is available when the printer supports A4 paper and 1-up printing. If not supported, printing is performed in the orientation set on the printer.

Sample Print

- Printing is fixed to "A4 vertical (portrait)". If a line cannot be held within the paper width, the remaining section will be printed while wrapping around and going down to the next line.
- The print start position and print size cannot be changed. The actual margins, however, may differ from the one shown below depending on the printer used.
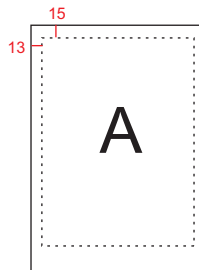
Data sheet print

- Printing orientation is fixed to "portrait".
- Specify the paper size with the settings below. However, if a selected print size is different from the paper size set for the printer, printing cannot be performed correctly. (Data outside the printing area is not printed.)
  - [Home] → [Registration Item] → [Data Sheet] → [Edit] → [Data Sheet Setting] → [Paper Size]
  - [System Setting] → [Hardware Setting] → [Printer] → [Properties] → [Data Sheet Setting] → [Paper Size]
- The print start position and print size cannot be changed. The actual margins, however, may differ from those shown below depending on the printer used.
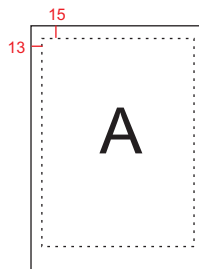
Data sheet print (expanded)

- The print size is A4 only. Use a printer that handles A4 paper. If A4 paper is fed in landscape orientation or a selected paper size is different from the paper size set for the printer, printing cannot be performed correctly. (Data outside the printing area is not printed.)
- The print start position and print size cannot be changed. Note that margins will vary slightly between different printer models.
- For parts placed on an expanded data sheet screen, the [Show/Hide] setting takes effect.

  When a part should always be printed, select [Show] for the [Show/Hide] setting.

Status Output

The status of the connection between the TS unit and a PictBridge printer is output to the internal device memory $s1066.

Value	Description	Cause and Remedy
0	The PictBridge printer is not connected or it is in the normal state.	-
1	Printing in process using the PictBridge printer.	-
-1	Printer error (hardware related)	The cable is not connected. Check the USB cable connection.
		Check if the printer is out of order.
-2	Printer error (paper related)	The printer ran out of paper. Add paper.
		Paper is not correct. Set correct paper.
-3	Printer error (ink related) [*]	The ink is not set. Install an ink cartridge.
		The ink level is low. Install a new ink cartridge.

* The error may be output as "–1" (printer error related to hardware) depending on the printer used.

Notes

- Color printing is performed.
- Error handling varies depending on the printer model. For details, refer to the instruction manual for the printer.

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16.1.4 PR201 and ESC-P Printers

The TS can connect to MS-DOS-compatible printers.
- MS-DOS-compatible printer models in the PR201 series
- MS-DOS-compatible printer models ESC/P24-J84, ESC/P-J84, and ESC/P Super

☞   For information on connectable models, visit our website at www.monitouch.com.

Connection Method

USB-A port connection

- Connect the USB-A port of the TS unit to the parallel port of the printer with a USB-parallel conversion cable (commercially available).
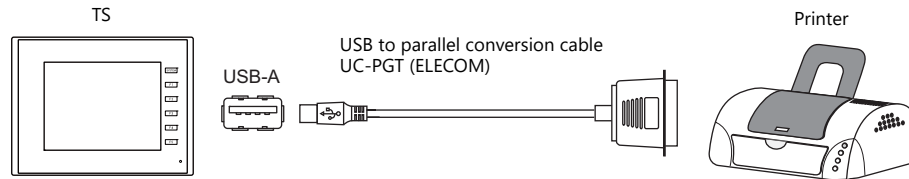
Serial connection

- Connect the MJ port of the TS2060 with the parallel port of the printer.
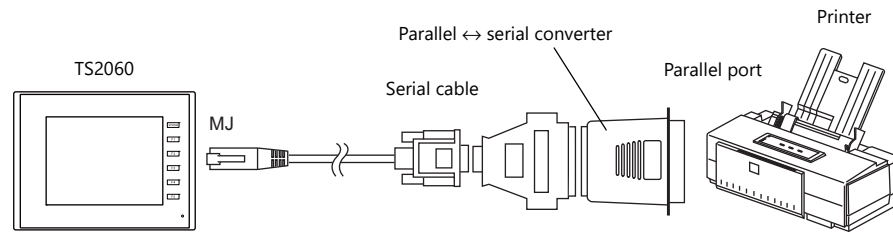
- Connect the COM2 port of the TS1000S with the parallel port of the printer.

Hardware Settings

Configure the [System Setting] → [Hardware Setting] → [Printer] settings.
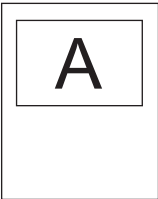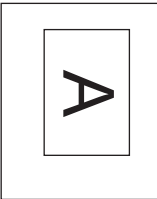
Printer model

Item	Description
Model	Select the control code of the target printer from the following options: • PR201 Monochrome • PR201 Color • ESC-P Monochrome • ESC-P Color

Target Port No.	Select the port where the printer cable is connected.
	
	USB-A:
	  Select this option when connecting to a parallel interface printer with a USB-parallel conversion cable (commercially available).
	
	MJ1/MJ2/COM2:
	  Select this option when connecting to a printer equipped with a serial interface.

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Printer properties

Item	Description
Always Output Status Bit (Yes/None)	The TS outputs [0 → 1] when starting to transfer data upon receiving a print command, and outputs [1 → 0] upon finishing transfer. However, these signals may not be output if the print data is small. Set to "Yes" when bit output is required regardless of the data size. The output area is shown below. • Bit 10 of write area "n + 1" • Bit 0 of internal device memory $s16 Write area "n + 1" MSB .... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0: End (standby) 1: Transferring print data $s16 MSB .... LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0: End (standby) 1: Transferring print data
Hard Copy — Orientation (Horizontal, Vertical)	Select the orientation of the screen image printed on paper. When [Vertical] is selected, the image for printing is rotated 90 degrees on the paper. • Hard copy example Horizontal Vertical
Hard Copy — Reversed Image (Reversed, Normal)	Reversed: White and black are reversed for printing. Normal: The exact state of the screen on the unit is printed.
Data Sheet — Data Sheet Setting	Configure settings for data sheet printing. For details, refer to page 16-19.
Serial Port (only when serial port is selected) — Baud Rate	Specify the baud rate. 4800 / 9600 / 19200 / 38400 / 57600 / 76800 / 115K BPS
Serial Port — Parity	Set the parity. None, Odd, Even
Serial Port — Data Length	Set the number of bits for data. 7-Bit, 8-Bit
Serial Port — Stop Bit	Set the number of stop bits. 1-Bit, 2-Bit

16.1.5 CBM292/293 Printer

The TS can connect to CBM line thermal printers (Citizen).

☞   For information on connectable models, visit our website at www.monitouch.com.

Connection Method

USB-A port connection

- Connect the USB-A port of the TS unit to the parallel port of the printer with a USB-parallel conversion cable (commercially available).

Serial connection

- Connect the MJ port of the TS2060 unit with the serial port of the printer.

- Connect the COM2 port of the TS1000S with the serial port of the printer.

Hardware Settings

Configure the [System Setting] → [Hardware Setting] → [Printer] settings.

Printer model
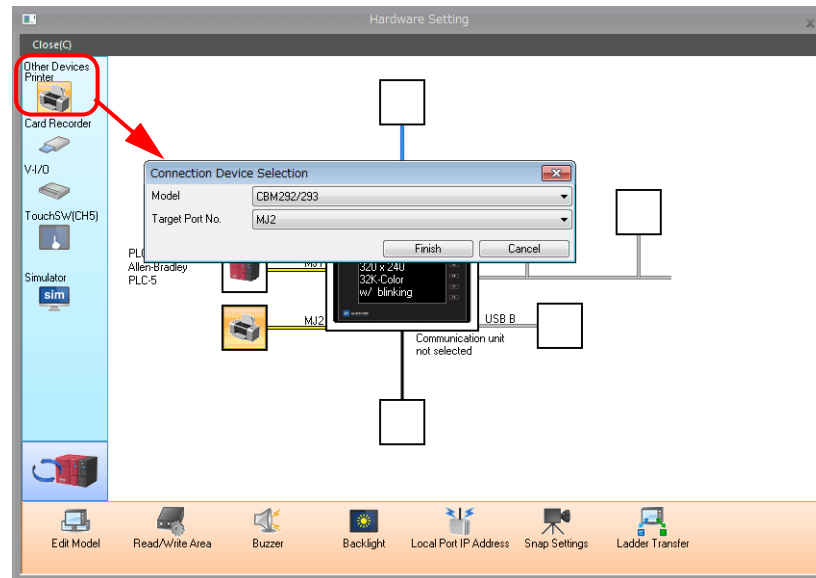
Item	Description
Model	Select CBM292/293.

Target Port No.	Select the port where the printer cable is connected.
	USB-A:
	  Select this option when connecting to a parallel interface printer with a USB-parallel conversion cable (commercially available).
	MJ1/MJ2/COM2:
	  Select this option when connecting to a printer equipped with a serial interface.

Printer properties

Item	Description

Always Output Status Bit (Yes/None)	The TS outputs [0 → 1] when starting to transfer data upon receiving a print command, and outputs [1 → 0] upon finishing transfer. However, these signals may not be output if the print data is small.
	Set to "Yes" when bit output is required regardless of the data size.
	
	The output area is shown below.
	• Bit 10 of write area "n + 1"
	• Bit 0 of internal device memory $s16
	
	Write area "n + 1"
	
	MSB LSB
	`15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00`
	`                        0  0  0  0  0        `
	
	0: End (standby)
	1: Transferring print data
	
	$s16
	MSB LSB
	`15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00`
	`0  0  0  0  0  0  0  0  0  0  0  0  0  0  0  0 `
	
	0: End (standby)
	1: Transferring print data

	Item	Description
Data Sheet	Data Sheet Setting	Configure settings for data sheet printing. For details, refer to page 16-19.
Serial Port (only when serial port is selected)	Baud Rate	Specify the baud rate. 4800 / 9600 / 19200 / 38400 / 57600 / 76800 / 115K BPS
	Parity	Set the parity. None, Odd, Even
	Data Length	Set the number of bits for data. 7-Bit, 8-Bit
	Stop Bit	Set the number of stop bits. 1-Bit, 2-Bit

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16.1.6 Sato's MR-400 Barcode Printer

The TS can connect to Sato's barcode printer for printing barcodes.

⚠️ Read the instruction manual and command reference book for Sato's MR-400 series barcode printer before using this function.

☞ • For details on configuration and printing, refer to "16.4 Connecting to a Sato MR-400 Barcode Printer" page 16-25.
• For information on connectable models, visit our website at www.monitouch.com.

16.2   Hard Copy

16.2.1 Overview

The displayed screen can be printed using the switch function or a command from the PLC.

Press a switch which is set with "Hard Copy"
for [Function].

Example: Read area "D0000"

PLC

Bit 10 of read area "n + 1"
= Change "0" to "1" to print a hard copy of the screen
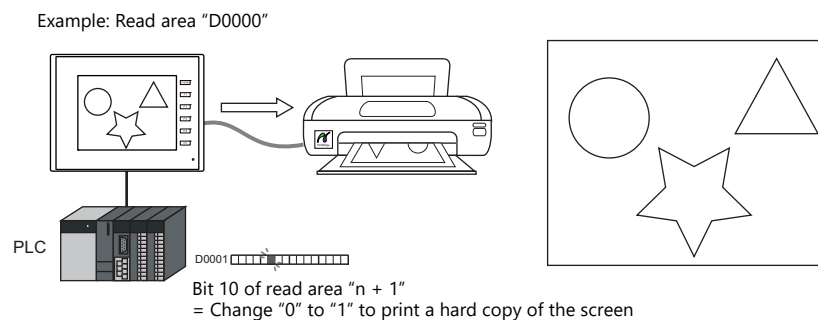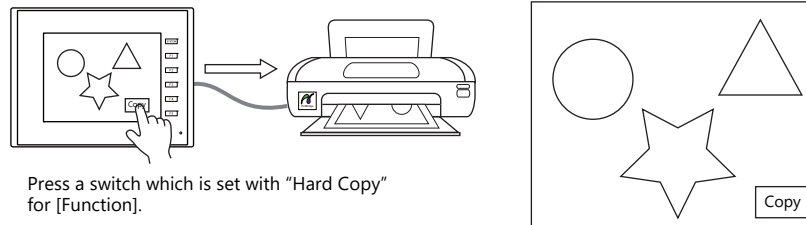
16.2.2 Printing

Two methods are available for printing the currently displayed screen.

Command from a Switch

Output a hardcopy by tapping a switch placed on the screen. In this case, the switch image is also output.
A function switch can be used instead.

Screen program setting

1)   Place a switch set with "Hard Copy" for [Function] on the screen targeted for printing.
2)   Transfer the screen data to the TS unit.

Printing procedure

1)   Display the screen to be printed.
2)   Press the hard copy switch.
3)   Printing starts.
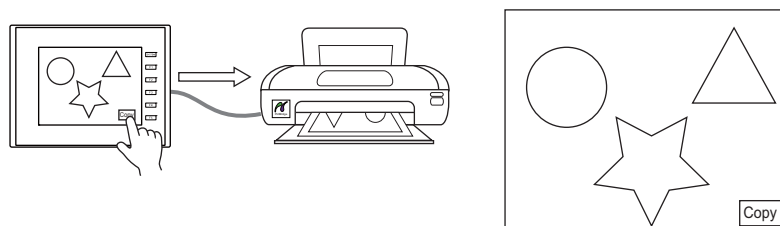
Command from Read Area

Bit 10 of [Read Area] "n + 1" is the screen hard copy bit.
When this bit changes from "0" to "1", a hard copy is printed.

Printing procedure

1) Display the screen to be printed.
2) Set bit 10 of [Read Area] "n + 1" (0 → 1)
3) Printing starts.

PLC

D0001

Bit 10 of read area "n + 1"
= Change "0" to "1" to print a hard copy of the screen
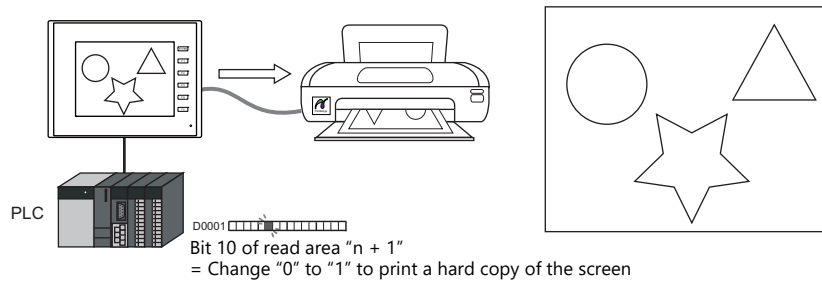
16.3 Printing Data Sheets

16.3.1 Overview

This section explains printing the data currently displayed on numerical data displays or character displays that are registered on a data sheet.

This print function also enables real-time printing of device memory data that is not shown on the TS.

TS

PLC

Printer

Setting the bit for "output data sheets" to ON...

The TS can print out data sheets showing the current PLC data.
Setting the bit for "data sheets" prints the respective data sheets.

The printed data sheets show the PLC data of when printing was initiated.
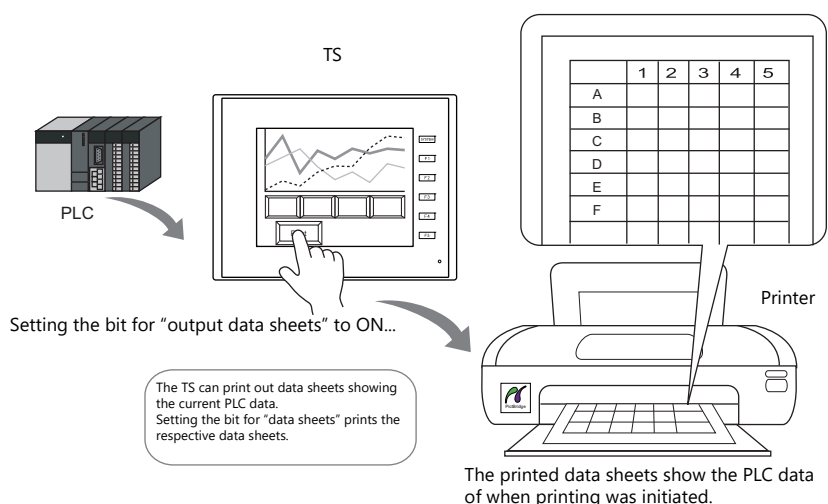
Expanded functions

The data sheet expanded functions are available with the PictBridge printer.

The expanded functions allow additional parts, such as lamps and graphs, to be used and changing of the sizes of those parts. Moreover, the expanded functions allow for part placement regardless of the grid, thereby diversifying layouts on data sheet screens. These data sheets can be printed in color.

Data sheet screen No. 3

Current Production Statistics

Statistic pie graph

D100 = 3
D101 = 1

Total   815

Numerical data display

A	350	42.9%
B	209	25.5%
C	156	19.1%
D	100	12.2%

Print

Set bit 9 (data sheet output) of [Read Area] "n + 1" to ON.

PictBridge Printers

One sheet of data sheet screen No. 3 is printed out.

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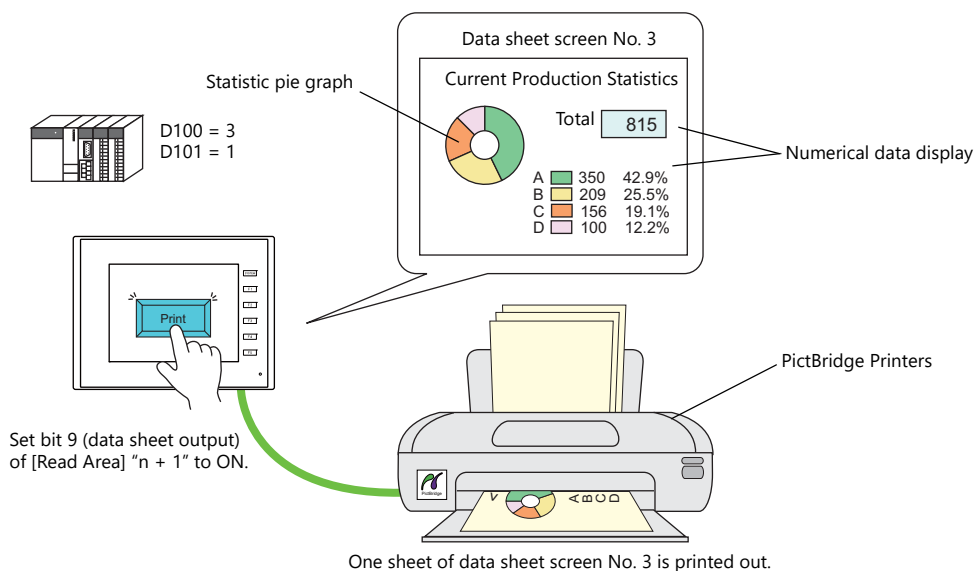
Data sheet screen

The print screen is formatted in "Data Sheet" in the TS screen program file.
Items usable on data sheets vary depending on whether the expanded functions are used.

- Without the expanded functions
- With the expanded functions
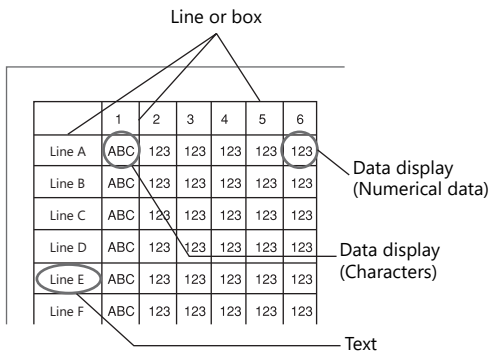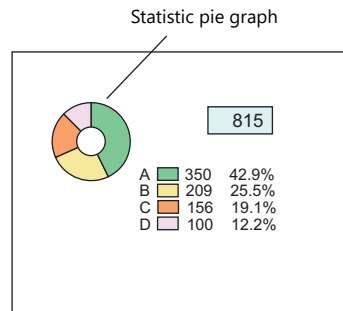
Item	Without Expanded Functions	With Expanded Functions (With PictBridge only)
Graphics	Straight line Rectangle Text	Line/continuous line Box/circle Text/multi text Pixel Paint Scaling Pattern
Parts	Numerical data display Character display	Lamp Numerical data display Character display Message display Bar graph Pie graph Panel meter Statistic bar graph Statistic pie graph Time display/calendar

16.3.2 Detailed Settings

Data Sheet Setting

Configure settings from either [System Setting] → [Hardware Setting] → [Printer] → [Properties], or [Home] → [Registration Item] → [Data Sheet] → [Edit] → [Data Sheet Setting].

Use extension data sheet: unselected

Item	Description
Print Data Sheet No. Setting Device	Use this device memory when printing data sheets using the read area (refer to page 16-23). Two words are used.

n	Print start data sheet number (→ TS)
n+1	Number of pages to be printed (→ TS)

Item	Description
Paper Size (A4 Portrait, A4 Landscape, 15-Inch Landscape, User Designation)	Select a paper size. According to the size selected, the numbers of characters and lines are set. Printed images are always in portrait orientation.
Characters (16 to 152)	Specify the number of characters per line on a data sheet page.
No. of Lines (2 to 152)	Specify the number of lines per data sheet page.
Use Character Graphic Print	Select this checkbox to clearly print ruled lines. The set number of lines changes depending on whether this checkbox is selected. The numbers of characters and lines are automatically set as shown below.

Paper Size	No. of Characters	No. of Lines	
		Character Graphics Not used	Character Graphics Used
A4 Portrait	80	66	108
A4 Landscape	114	40	64
15-Inch Landscape	136	64	64

* This setting is valid only for Japanese printers. (PictBridge are not supported)

* All characters and lines on the data sheet screen are handled as text. Consequently, the printed data sheet looks slightly different from the one on the editor screen.

Example: Data sheet edited on the editor

No. 0 Data value
No. 1 Data value
No. 2 Data value
No. 3 Data value

Printed

- Selected

No. 0 Data value
No. 1 Data value
No. 2 Data value
No. 3 Data value

- Unselected

No. 0 Data value
No. 1 Data value
No. 2 Data value
No. 3 Data value

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[Use Extension Data Sheet] Selected (PictBridge only)

Item	Description
Print Data Sheet No. Setting Device	Use this device memory when printing data sheets by read area commands (refer to page 16-23). Two words are used.

n	Print start data sheet number ($\rightarrow$ TS)
n+1	Number of pages to be printed ($\rightarrow$ TS)

Item	Description
Paper Size (A4 Portrait, A4 Landscape)	Select the orientation of the data sheet screen. (Paper size: A4 fixed)

Paper Size (Graphic area: height $\times$ width)	Orientation
A4 Portrait (912 $\times$ 640 pixels)	Vertical
A4 Landscape (640 $\times$ 912 pixels)	Horizontal

Example: Print on A4 paper fed in portrait orientation

16.3.3 Printing

There are two methods for printing configured data sheets from the TS unit.

Command from Read Area

Bit 9 of [Read Area] "n + 1" is the data sheet output bit.
When this bit changes from "0" to "1", a data sheet is printed.

Printing procedure

1)   Set the data sheet number that is the top page to [Print Data Sheet No. Setting Device] "n".

2)   Specify the number of output pages for [Print Data Sheet No. Setting Device] "n + 1".

   *   When [Print Data Sheet No. Setting Device] "n + 1" is "0", the printer will not print any data sheets.

3)   Set bit 9 of [Read Area] "n + 1" (0 → 1)

4)   Data sheet printing starts.

Usage Example
Read area = D0000
[Designation Device for Print Data Sheet No.] = D0010

4)
One page of data sheet No. 3 is printed.

D0001

PLC

3)
Bit 9 of [Read Area] "n + 1"
Set bit 9 (for data sheet output) of [Read
Area] "n + 1" (0 → 1).

1) 2)

D0009
D0010   3
D0011   1

D010:   Top page setting device memory = "3"
D011:   Number of data sheets to output = "1" specified

Data Sheet No. 3

	1	2	3	4	5	6
Line A	101	95	98	110	102	96
Line B	330	324	332	336	329	331
Line C	201	194	190	189	199	203
Line D	553	542	546	551	540	547
Line E	20	30	24	16	35	29

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Command with Macro

Use the "STA_LIST" macro command to print data sheets.

Device memory used

	Internal Device Memory	PLC1 to PLC8 Device Memory	Memory Card	Constant
F1	◎			

○: Setting enabled (indirect designation disabled) ◎: Setting enabled (indirect designation enabled)

Range

	Value	Remarks
F0	STA_LIST	
F1	Print start data sheet number	
F1 + 1	Number of pages to be printed: 1 to 1,024 *	

* **No printing is executed when "0" is set as the number of pages to be printed. When the range specified for printing includes an unregistered number, the page corresponding to the number will not be printed.**

Printing procedure

1) Set the data sheet number which is to be the top page to the device memory "F1 + 0".
2) Set the number of output pages to the device memory "F1+1".
3) Execute the "STA_LIST" macro command.
4) Data sheet printing starts.

Print example:
To print data sheet No. 3 with F1 = $u100:

4) One page from data sheet No. 3 is printed.
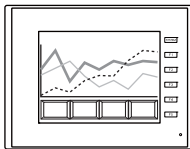
1) $u100 = 3 (W) Print start data sheet number
2) $u101 = 1 (W) Number of pages to be printed
3) SYS (STA_LIST) $u100 Macro execution
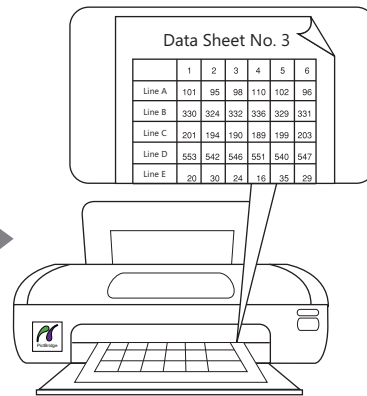
Notes

When no data sheet screen has been registered, data sheets cannot be printed even if they are specified by number.

Print example:
Read area = D0000
[Print Data Sheet No. Setting Device] = D0010
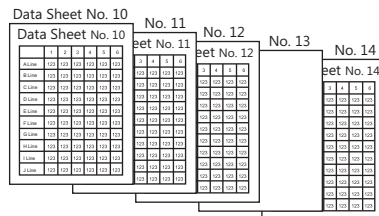
If data sheet pages are registered as shown on the left

D0010 (top page number of data sheet for printing) = 10
D0011 (number of pages of data sheet to output) = 5

Change bit 9 (data sheet output) of D0005 from "0" to "1".
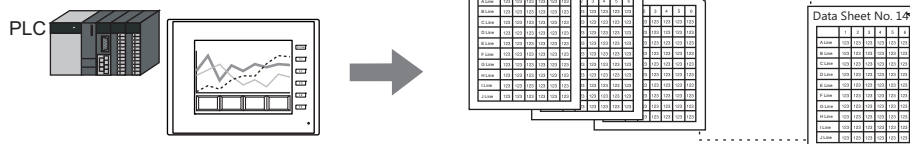
Data sheet No. 10 to 12 and 14 are printed.
The page that is not stored, No. 13, is ignored, and four pages are output.

16.4   Connecting to a Sato MR-400 Barcode Printer

The TS can connect to Sato's barcode printer for printing barcodes.

⚠️ Read the instruction manual and command reference book for Sato's MR-400 series barcode printer before using this function.
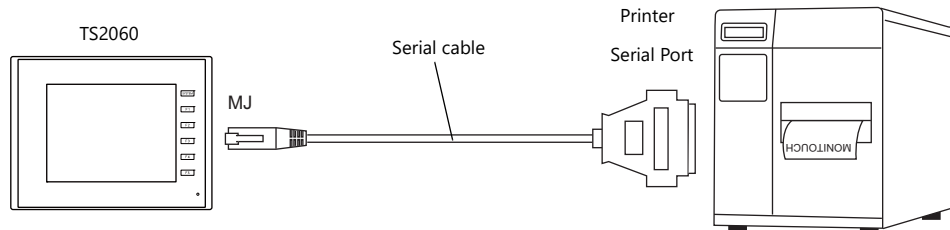
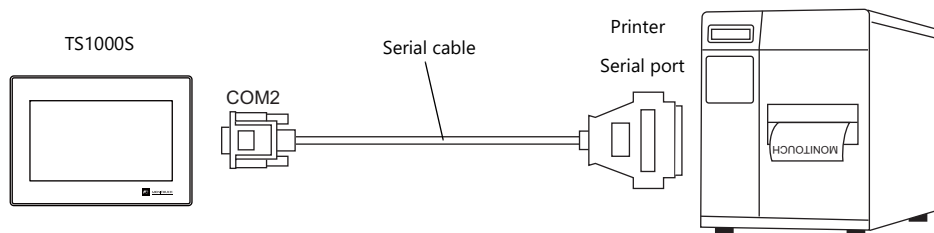☞ For information on connectable models, visit our website at www.monitouch.com.

16.4.1 Connection Method

Serial connection

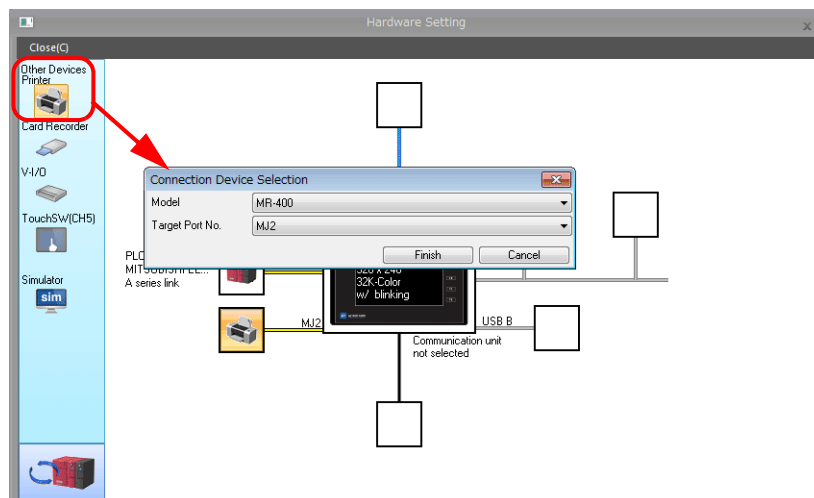- Connect the MJ port of the TS2060 unit with the serial port of the printer.

- Connect the COM2 port of the TS1000S with the serial port of the printer.

Hardware Settings

Configure the [System Setting] → [Hardware Setting] → [Printer] settings.

Printer model

Item	Description
Model	Select MR-400.
Target Port No.	Select the port where the printer cable is connected. MJ1/MJ2/COM2

Printer properties

Item		Description
Always Output Status Bit (Yes/None)		The TS outputs [0 → 1] when starting to transfer data upon receiving a print command, and outputs [1 → 0] upon finishing transfer. However, these signals may not be output if the print data is small. Set to "Yes" when bit output is required regardless of the data size. The output area is shown below. • Bit 10 of write area "n + 1" • Bit 0 of internal device memory $s16 Write area "n + 1" MSB LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0: End (standby) 1: Transferring print data $s16 MSB LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0: End (standby) 1: Transferring print data
MR400	MR400 Print Designation Device	This setting can be configured when MR400 is selected for the printer model. Set the device memory used to issue printing commands to the MR400. For details, refer to "MR400 Print Designation Device" page 16-36.
	Format Table	Register the printing format. For details, refer to "16.4.3 Format Tables" page 16-28.
Serial Port	Baud Rate	Specify the baud rate. 4800 / 9600 / 19200 / 38400 / 57600 / 76800 / 115K BPS
	Parity	Set the parity. None, Odd, Even
	Data Length	Set the number of bits for data. 7-Bit, 8-Bit
	Stop Bit	Set the number of stop bits. 1-Bit, 2-Bit

16.4.2 Notes on Memory Cards

Memory Cards

To use this function, a memory card is required for the MR400.
For the memory card type and mounting procedure, refer to the instruction manual for the MR-400 series.

Card Slot Number Setting and Memory Card Formatting

To enable the use of memory cards, set the memory card slot number and format the memory card on the MR-400.

> * **"Memory card formatting" means the same as media initialization for USB flash drives etc.**

1) Turn off the power to the MR-400 and insert a memory card into the card slot on the rear of the MR-400.
2) Hold down the LINE key on the front of MR-400, and turn the power ON.
   "USER MODE" is displayed on the front panel.
3) Press the LINE key and FEED key at the same time.
   "ADVANCED MODE" is displayed.
4) Press the LINE key and FEED key at the same time again.
   "CARD MODE" is displayed.
5) Press the FEED key until "CARD DRIVE NO / 1 2" is displayed.
   Set the memory card slot number.
   (Press the LINE key to select, and press the FEED key to accept.)
   This drive number is the memory card slot number.
6) Press the FEED key to accept the options. Select "YES" for "CARD FORMAT /   YES   NO" and format the memory card.
   If no error is given, formatting has completed successfully.
7) To quit "CARD MODE," turn the printer off.

- Formatting is required if the screen program is transferred after editing the MR-400 format table (registration setting) described in the following section.
  In addition to the above formatting procedure, it is possible to format the memory card by outputting the control command of MR-400 from the TS. For details, refer to   Example 1: When the following commands are set in No. 22: (page 16-35).
- When printing two-byte characters, select "JIS" for "Kanji Code" on MR-400.

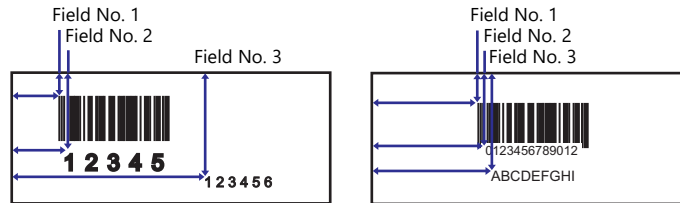**16**

16.4.3 Format Tables

Format Table Types

There are two types of format tables.
When the MR-400 commands are registered in this table, desired formats or data can be printed.

MR-400 format table (registration setting)

Set the print format.

> * **The "format" used in the format table includes settings for digits, position, typeface, barcode, etc. for the MR-400.**

Write these settings on the memory card using the MR_REG macro command.
Once they are written on the memory card, it is not necessary to repeat this step until the registration setting is changed.

MR-400 format table (call setting)

Use the format (registration setting), and change the print data. Set the storage target, type, etc. of the changed data.
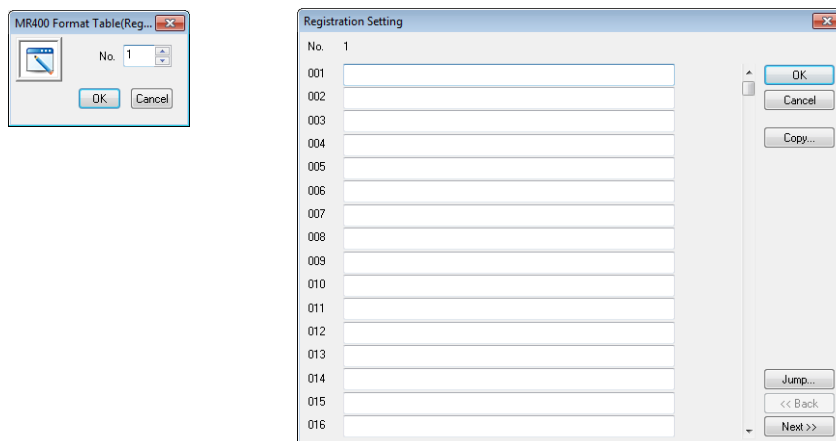

Print the data using the MR_OUT macro command.

Format Table (Registration Setting)

Configure the [System Setting] → [Hardware Setting] → [Printer] → [Format Table (Registration Setting)] settings.
Format table settings (registration settings) range from No. 1 to No. 128.

Item	Description
OK	The format table setting is ended.
Cancel	Format table editing is canceled.
Copy	The currently open format table is copied into the specified table.
Jump	The specified format table is opened.
Back	The previous format table number is opened.
Next	The following format table is opened.

Setting example

To print in the following format:

Field No. 1
Field No. 2
Field No. 3
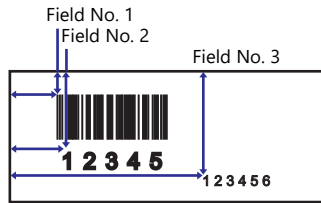
1 2 3 4 5
1 2 3 4 5 6

- Description of escape sequence

<A>
<Data send start>

<CC> 2
<Card slot> Slot number

<YS>, 1 0   Match this number to the
<Format register>, Format register number   registration setting number.

</N>, 1, 1 0
<Field register>, field number, print digits

<V> 1 0 <H> 5 0   Data registered for
<Vertical print position> dots <Horizontal print position> dots   field No. 1

<B> 2 0 2 0 8 0 1 2 3 4 5 6 7 8 9 0
<Barcode> Bar code type, bar width enlargement, bar top/bottom size (dots), data

</N>, 2, 5

<V>1 0 0 <H> 5 0 <L> 0 2 0 2 <P> 2   Data registered for
                                                         field No. 2

<X22>, 1 2 3 4 5
<X22 characters>, data

</N>, 3, 6

<V> 1 5 0 <H> 3 0 0 <L> 0 1 0 1 <P> 2   Data registered for
                                                         field No. 3

<X2 2>, 1 2 3 4 5 6

<Z>
<Data send end>

- Description of the format table

Match these numbers.

No. 10

001	\1bA\1bCC2
002	\1bYS,10
003	\1b/N,1,10
004	\1bV10\1bH50
005	\1bB2020801234567890
006	\1b/N,2,5
007	\1bV100\1bH50\1bL0202\1bP2
008	\1bX22,1,123456
009	\1b/N,3,6
010	\1bV150\1bH300\1bL0101\1bP2
011	\1bX22,1,123456
012	\1bZ

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Notes on inputting

<X22>, 12345   Escape sequence

1BX22, 12345   Escape sequence
(HEX display)

\1BX22, 12345   Format table
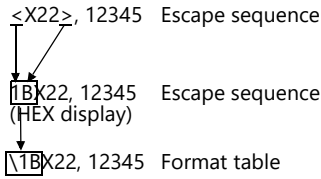
The escape character (ESC) at the top of the escape sequence is expressed as "<>" on MR-400 and as "1B(H)" in hexadecimal notation.
In the format table, "\" denotes hexadecimal data.
Consequently, "1B(H)" is shown as "\1B".

To use "\" as a character, enter "\\".

MR400 Format Table (Call Setting)

Configure format table settings (call setting) at [System Setting] → [Hardware Setting] → [Printer Properties] → [Format Table (Call Setting)]. Numbers 1 to 128 can be set in the format table.
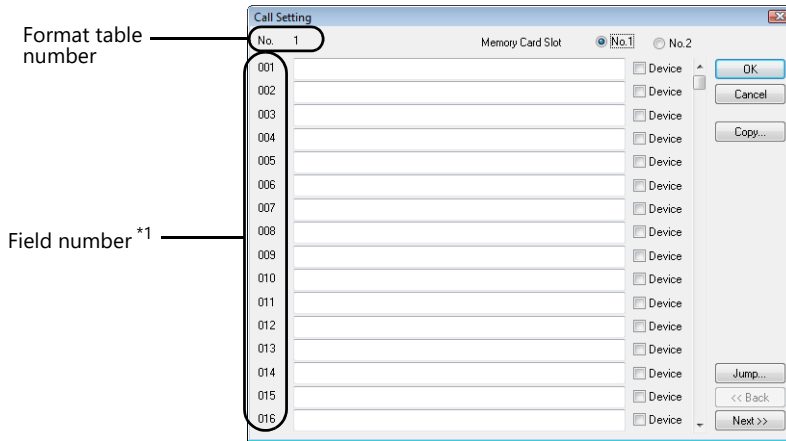
Item	Description
Memory Card Slot (No. 1 / No. 2)	Select the card slot drive number set on the MR-400.
Device	Select the checkbox when field data is stored in device memory.
OK	The format table setting is ended.
Cancel	Format table editing is canceled.
Copy	The currently open format table is copied into the specified table.
Jump	The specified format table is opened.
Back	The previous format table number is opened.
Next	The following format table is opened.

*1   Field numbers 1 to 99 are used.
    Settings for numbers 100 to 512 are invalid.
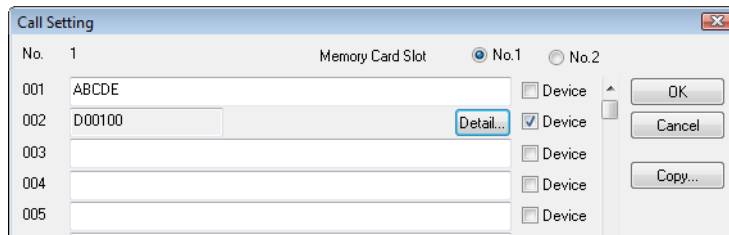
Setting example (1)

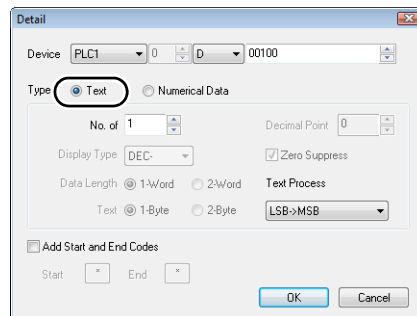Printing "ABCDE" as a fixed string in field No. 1
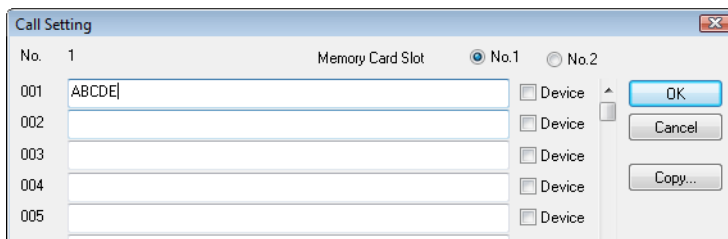
Setting example (2)

Printing data stored in a device memory in field No. 2

Select the [Device] checkbox of field No. 2.
Press the [Detail] button to display the [Detail] window.

- Select [Text] for [Type].

Item	Description
Device	Specify the top device memory address where data for printing is stored.
No. of Bytes	The specified number of bytes is output in order from the device memory address specified for [Device]. * To print "ABCDEF" in one-byte characters, specify as shown below in the Shift JIS code. <table><tr><td>D100</td><td>4241 [H]</td></tr><tr><td>D101</td><td>4443 [H]</td></tr><tr><td>D102</td><td>4645 [H]</td></tr></table>
Text Process	LSB → MSB/MSB → LSB Set the order of the first and second bytes within one word.
Add Start and End Codes	Configure this setting when using "CODE 39" type barcodes. (Refer to page 16-33.)

- Select [Numerical Data] for [Type].

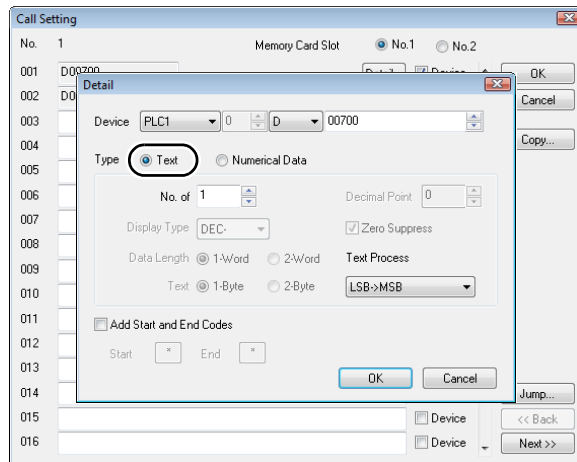| Item	Description
Device	Print data in the specified device memory address in numerical form. * When [Numerical Data] is selected, binary data is converted into characters (JIS code). Example: When "0100 (BIN)" is set for D100, the characters 0100 (= "100") are printed.
Digits	Specify the number of digits for the display type.
Decimal Point	Specify the number of decimal places.
Display Type	Select from DEC-, HEX, OCT, DEC or BIN. When [DEC-] is selected, data is shown in decimal notation with a ± sign.
Zero Suppress	Select whether or not to use the zero suppress function. When the [Zero Suppress] checkbox is selected, any suppressed zeros are filled with spaces.
Data Length	Set the data length for the device memory.
Text	Select one-byte or two-byte characters.
Add Start and End Codes	Configure this setting when using "CODE 39" type barcodes. (Refer to .)

Barcode Type "CODE 39"

CODE 39 has "*" at the beginning and the end of each barcode.
When the format table is created, set "*" in the following two positions

- [MR400 Format Table (Registration Setting)] settings
  Set the number of digits including "*" for format registration.
  For the following case for example, set "12" (10 characters + 2).
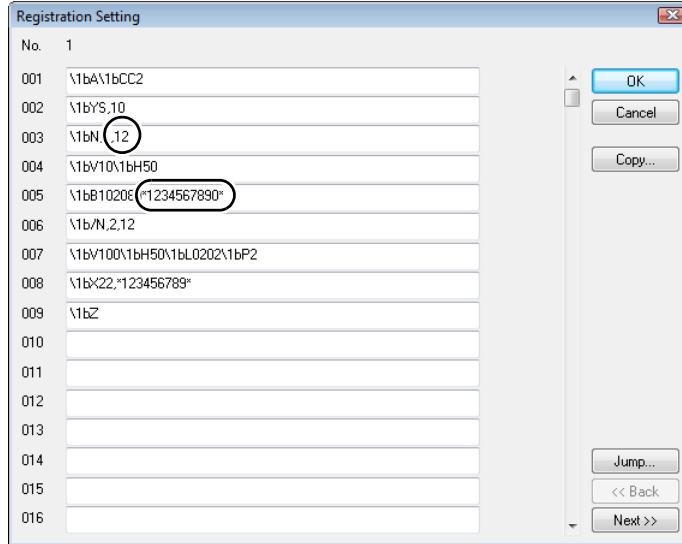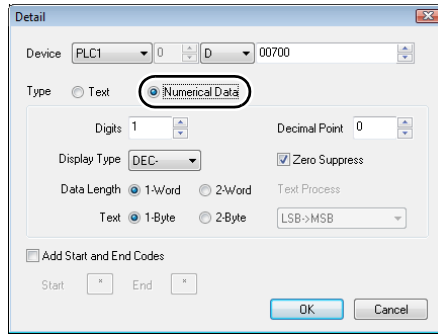

- [MR400 Format Table (Call Setting)] settings
  - Select [Text] for [Type].

Item	Description
No. of Bytes	Specify the number of bytes including "*".
Add Start and End Codes	Selected: "*" is not included in the data of [Device]. Unselected: "*" is included in the data of [Device].

- Select [Numerical Data] for [Type].

Item	Description
Add Start and End Codes	Selected: "*" is not included in the data of [Device]. Unselected: "*" is included in the data of [Device].

16.4.4 Printing

There are two methods for printing from the TS unit with a Sato barcode printer connected.

Macros

The "MR_REG" macro command is available to write the setting data from format tables (registration setting or call setting) to the MR-400. The "MR_OUT" macro command is available to print out the data.

MR_REG

Device memory used

	Internal Device Memory	PLC1 to PLC8 Device Memory	Memory Card	Constant
F1	◎	◎	○	○

○: Setting enabled (indirect designation disabled) ◎: Setting enabled (indirect designation enabled)

Range

	Value
F0	Format table registration setting numbers 1 to 128

- Example 1: When the following commands are set in No. 22:
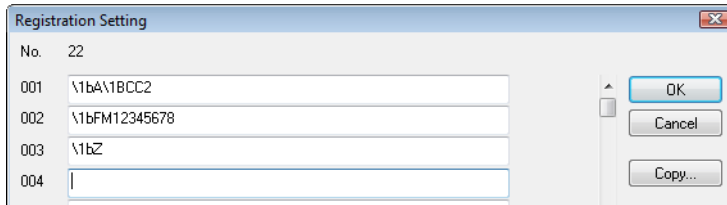
When the "MR_REG 22" macro command is executed, the memory card is formatted.

- Example 2: When the following commands are set in No. 1:
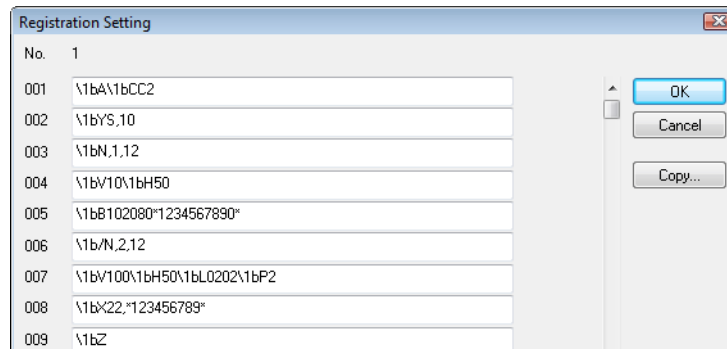
Execute the "MR_REG 1" macro command as the ON macro of a switch.
First: The format is registered on the memory card of the MR-400.
Second: The registered data is printed and the format can be checked.

MR_OUT

Device memory used

	Internal Device Memory	PLC1 to PLC8 Device Memory	Memory Card	Constant
F1	◎	◎	○	○

○: Setting enabled (indirect designation disabled) ◎: Setting enabled (indirect designation enabled)
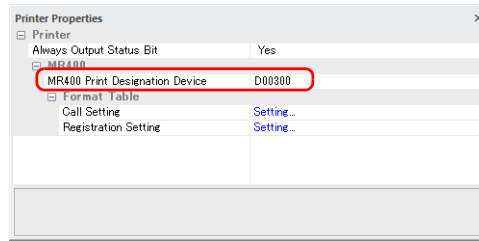
Range

	Value
F0	Format table call setting numbers 1 to 128

- Example 1: When the "MR_OUT 50" macro command is executed:
    Data of the MR-400 format table (call setting No. 50) is printed.

MR400 Print Designation Device

Printing can be executed using an external command.

| Item	Description
n	Control device memory MSB LSB 15 14 13 12 11 10 09 08 07 06 05 04 03 02 01 00 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0: Standby 1: Printing * This is automatically reset when printing has been completed.
n+1	Format table No. designation device Set the number of the format table (call setting) to be printed.

17   Barcode

17.1   Overview

The TS reads barcode data, converts the necessary data into ASCII code, and stores the result in the specified PLC device memory address. This allows various types of information to be transferred immediately using a barcode reader.
Also, the TS can show the read barcode data on the screen.

The TS reads barcode data and transfers it to the PLC.
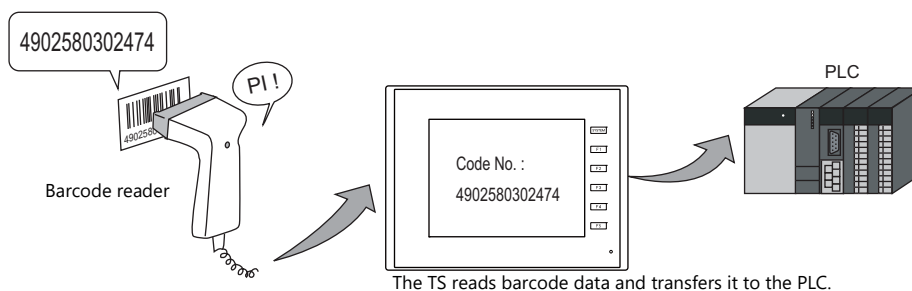
- The TS does not perform "handshake" processing with the barcode reader. (The barcode reader is not synchronized with the TS.)

- A barcode reader is connectable to either a serial port (MJ1, MJ2, CN1, or COM2) or the USB-A port of the TS.

- A 2D barcode reader can be connected for data read/write operations.

- A barcode reader connection is recognized as a type of 8-way communication.
  This means that the setting procedure is the same as that for 8-way communication.

☞   For setting examples, refer to page 17-2.

☞   For details on compatible barcode readers, refer to the following.
- Out website at: www.monitouch.com/
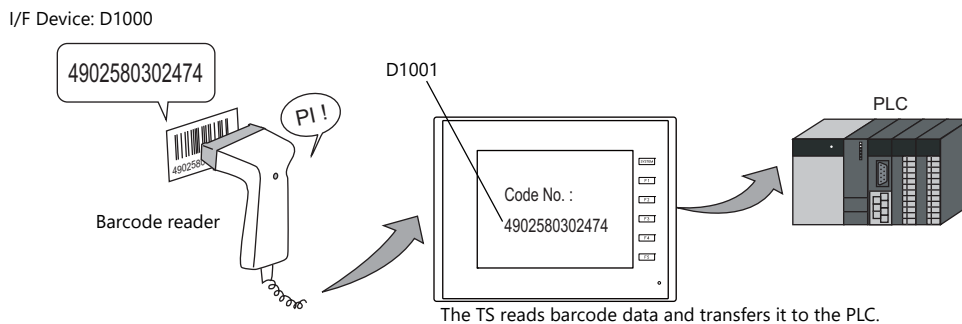- TS2060 Connection Manual
- TS1000 Smart Connection Manual

⚠️ Note on serial connection
The cable for connecting the barcode reader to the TS differs depending on the type of barcode reader. Users should prepare an appropriate conversion cable if necessary.

☞   For details on wiring, refer to "17.4 Wiring" page 17-7.

17.2 Setting Examples

The following describes the procedure for reading "CODE 39" barcode data using a barcode reader and transferring the data as ACSII codes to PLC device memory D1001.

I/F Device: D1000

Barcode reader

D1001

PLC

Code No. :

4902580302474

The TS reads barcode data and transfers it to the PLC.

1. Click [System Setting] → [Hardware Setting] to display the [Hardware Setting] window.
2. Double-click an empty position between [PLC2] and [PLC8] and select "Barcode" for [Connected Device] and set [Target Port No.].
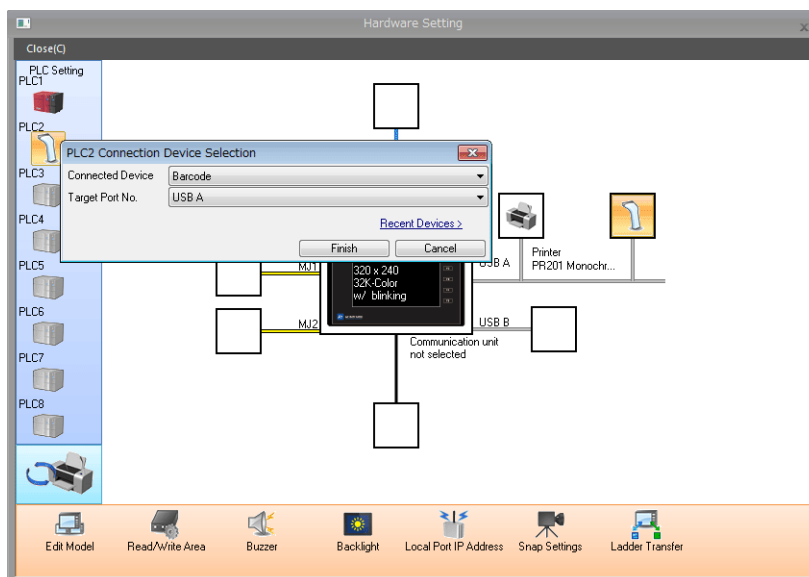
3. Set the parameters of the barcode reader in the [Barcode Properties] window.
    Set [I/F Device] to D1000.
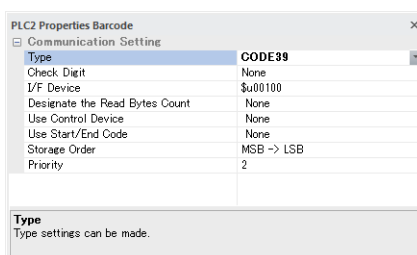
D1000: Flag/amount of data read
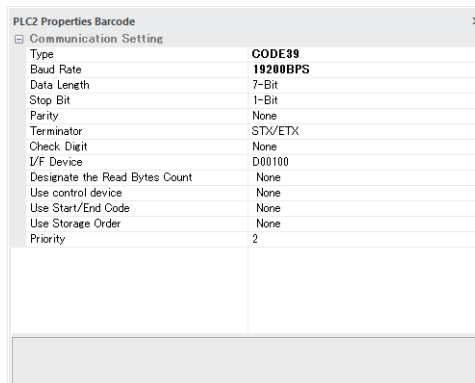D1001: Barcode data

☞   For details, refer to "Detailed Settings" page 17-3.

4. Place a character display to display the read barcode data and set the PLC device memory to D1001.

This completes the necessary settings.

17.3 Detailed Settings

Location of settings: [System Setting] → [Hardware Setting] → "Barcode"

Item	Description
Type	Specify the type of barcode reader. JAN (UPC, EAN)/ITF (Interleaved 2 of 5)/CODABAR (NW-7)/CODE39/CODE128/ANY (2D barcode)
Baud Rate (serial connection)	Set the transmission speed.4800/9600/19200 BPS
Data Length (serial connection)	Set the number of bits for data. 7-Bit, 8-Bit
Stop Bit (serial connection)	Set the number of stop bits. 1-Bit, 2-Bit
Parity (serial connection)	Set the parity. None, Odd, Even
Terminator (serial connection)	Set the terminator.STX/ETX/CR/LF/CR
Check Digit	Set the check digit. None, Do Not Delete, Delete
I/F Device	This device memory stores the barcode data and the number of read bytes. Specify the top device memory address. For details, refer to page 17-4.
Designate the Read Bytes Count	Specify the maximum number of bytes to be read. Always specify an even number of bytes. For details, refer to page 17-5.
Use Control Device	Control reading operations of the barcode reader. When the 0th bit is set to "1" (permitted), store data using the I/F device memory. | 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		 Not used (always set to "0")　　Read permission bit 　　　　0: Not permitted 　　　　1: Permitted
Use Start/End Code (Type: CODE 39)	Set whether or not to add a start and end code of "*" to the barcode data. Yes: Add an "*" code. None: Do not add an "*" code.
Use Storage Order	Set the order in which barcode data is stored in the I/F device memory. For details, refer to page 17-6.
Priority	Set the order of precedence among PLC2 to PLC8.

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I/F Device

I/F device memory allocation is shown below.

Type: JAN/ITF/CODABAR/CODE39/CODE128

Device Memory	Description
n	Flag / amount of data read | 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0 | | 0 | | 0 | | 0 | 0 | | ... | 1: Reading complete 1: Communication error 0 to 256 bytes: Amount of data read * All unused bits are reset to "0".
n + 1 - n + m	Data read (ASCII) * "0" (null code) is attached to the end of the data

Type: ANY

Device Memory	Description
n	Flag | 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0 | | 0 | | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1: Reading complete 1: Communication error Not used (always set to "0") * All unused bits are reset to "0".
n + 1	Amount of data read: 0 to 2,048 bytes
n + 2 - n + m	Data read (ASCII) * "0" (null code) is attached to the end of the data

Flag details

| Flag	Description
Communication error (bit 14)	When an error occurs in communication between the barcode reader and the TS, bit 14 changes to "1". Check that the barcode reader settings match the connected barcode reader and whether wiring has been performed correctly.
Reading complete (bit 12)	When data from the barcode reader is received and written to the I/F device memory, bit 12 (reading complete) changes to "1". Check that the bit is set to "1" and prepare for reading subsequent data. To read the next barcode data, reset the bit to "0" when the data has been read.
Amount of data read	The number of bytes read by the barcode reader is stored.

Read Bytes Setting

The number bytes to be read depends on the setting for [Type] and [Read Bytes Setting].

Type	Read Bytes Setting	Number of Bytes Used
JAN ITF CORDERBAR CODE39 CODE128	None	Variable for codes to be read, maximum of 254 bytes
	Selected	Fixed to the set number of words, 2 to 254 bytes
ANY	None	Variable for codes to be read, maximum of 2046 bytes
	Selected	Fixed to the set number of words, 2 to 2046 bytes

Operation example

- Type: CODE39
- I/F Device: D1000
- Read Bytes Setting: Selected
- No. of Bytes: 10 bytes
- Text Processing: LSB → MSB

- When data of "4902580302474" that exceeds 10 bytes is read:

D1001

4902580302
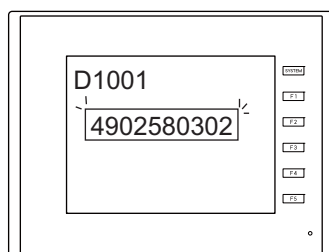
I/F Device	Value
D1000	Flag Amount of data read
D1001	3934HEX (94)
D1002	3230HEX (20)
D1003	3835HEX (85)
D1004	3330HEX (30)
D1005	3230HEX (20)
D1006	Not used

10 bytes of data is stored and the remainder is deleted.

- When data of "12345" that is less than 10 bytes is read:

D1001

12345
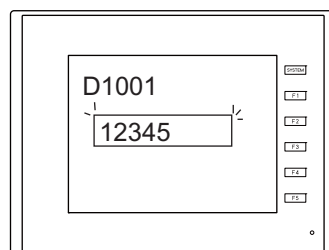
I/F Device	Value
D1000	Flag Amount of data read
D1001	3231HEX (21)
D1002	3433HEX (43)
D1003	0035HEX (5)
D1004	0000HEX
D1005	0000HEX
D1006	Not used

"0" is stored as the HEX value in device memory addresses when there is no corresponding data.

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Storage Order

Data is read in the following manner according to the [Storage Order] setting.

Storage Order	Description
LSB → MSB	Data is read in the order of LSB → MSB 15　　　　　　　　　　　　　　　　1 | MSB | LSB | 2nd byte　　1st byte
MSB → LSB	Data is read in the order of MSB → LSB 15　　　　　　　　　　　　　　　　1 | LSB | MSB | 1st byte　　2nd byte

Operation example

- Type: CODE39
- I/F Device: D1000
- Barcode data: 4902580302474 (13 digits)
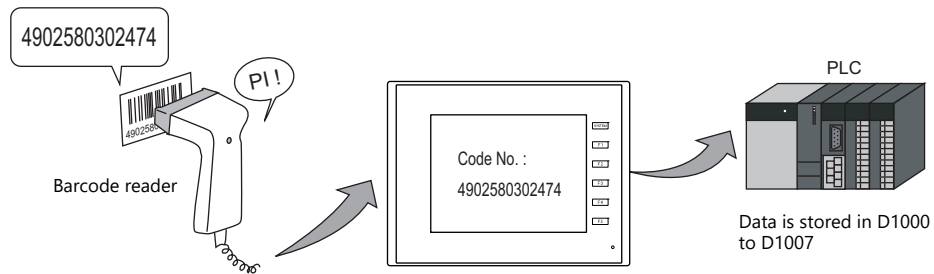
- Storage Order: LSB → MSB

I/F Device	Value (Description)
D1000	100DHEX (reading complete, 13 bytes)
D1001	3934HEX (94)
D1002	3230HEX (20)
D1003	3835HEX (85)
D1004	3330HEX (30)
D1005	3230HEX (20)
D1006	3734HEX (74)
D1007	0034HEX (04)

- Storage Order: MSB → LSB

| I/F Device	Value (Description)
D1000	100DHEX (reading complete, 13 bytes)
D1001	3439HEX (49)
D1002	3032HEX (02)
D1003	3538HEX (58)
D1004	3033HEX (03)
D1005	3032HEX (02)
D1006	3437HEX (47)
D1007	3400HEX (40)

17.4 Wiring

17.4.1 USB Connection

Barcode readers connect to the USB-A port of the TS unit.
Connect the barcode reader using the USB cable provided with the barcode reader.
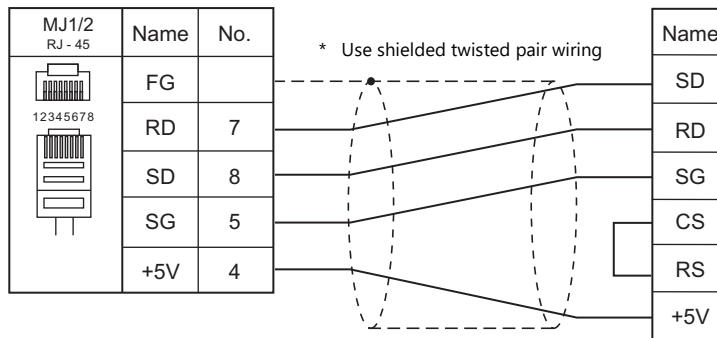
17.4.2 Serial Connection

Connector: CN1 (TS2060i + DUR-00)
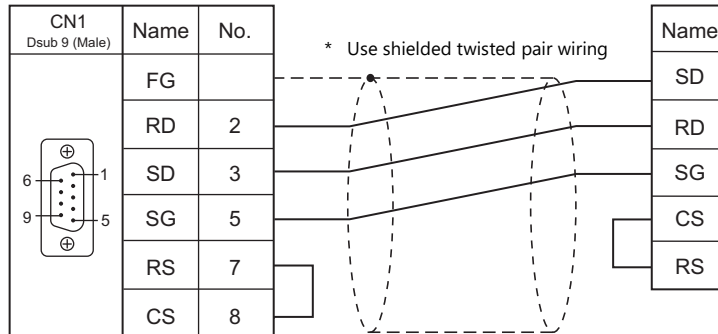
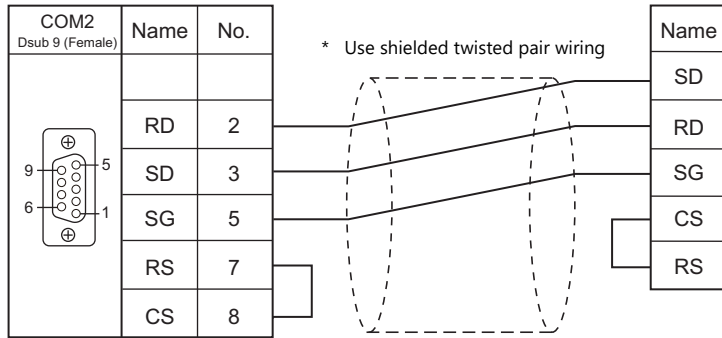### Modular jack: MJ1, MJ2 (TS2060)

⚠️
- For barcode readers with CS/RS control, it may be necessary to install a jumper between CS and RS to maintain proper operation.
- For details on the +5 V external power supply of MJ1/MJ2, refer to the TS2060 Hardware Specifications Manual.

* When using Hakko Electronics' cable (model: V6-BCD)
  - Length: 3 m
  - With modular plug

Brown:	+ 5 V
Red:	0 V
Orange:	RD
Yellow:	SD

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Connector: COM2 (TS1000 Smart)

COM2 Dsub 9 (Female)	Name	No.		Name
				SD
	RD	2		RD
	SD	3		SG
	SG	5		CS
	RS	7		RS
	CS	8		

* Use shielded twisted pair wiring

17.5 Notes

- When connecting multiple USB devices to the TS, refer to the TS2060 Hardware Specifications or the TS1000 Smart Hardware Specifications for precautions when using a USB hub.