13. **Objects**

This chapter explains how to use different objects.

13.1. Bit Lamp

13.1.1. Overview

Bit Lamp object displays the state of a designated bit address. If the bit state is OFF, the State 0 shape will be displayed. If the bit state is ON, the State 1 shape will be displayed.
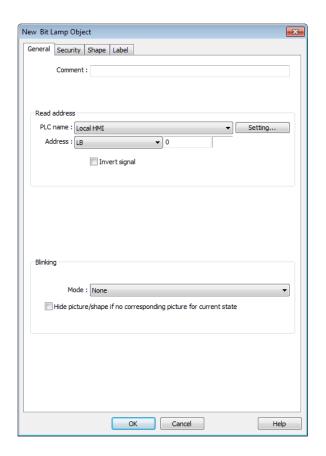

13.1.2. Configuration

Click the Bit Lamp icon on the toolbar to open a Bit Lamp object property dialog box. Set up the properties, press OK button, and a new Bit Lamp object will be created.
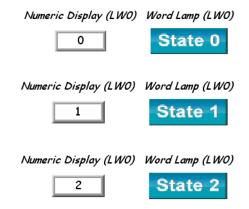
General Tab

Setting	Description
Comment	User can describe the information of the object.
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the bit device that controls the [Bit Lamp] object. Users can also set address in [General] tab while adding a new object. **Invert signal** Reverses the display of ON / OFF states. For example, if [Invert signal] check box is selected, when the designated bit is OFF, the object displays ON state.
Blinking	The appearance of the object may alternate between states when the bit is ON or OFF. **Mode:** **None** No blinking. **Alternating image on state 0** The appearance of the object alternates between State 0 and 1 when the bit is OFF. **Alternating image on state 1** The appearance of the object alternates between State 0 and 1 when the bit is ON. **Blinking on state 0** The State 0 appearance of the object will blink when the bit is OFF. **Blinking on state 1** The State 1 appearance of the object will blink when the bit is ON. **Hide picture/shape if no corresponding picture for current state** If selected, when there are not enough pictures to represent all the states, hides the picture. Otherwise, displays the last state.

13.2.   Word Lamp

13.2.1.   Overview

Word Lamp object displays the state according to the value of a designated word register. Up to 256 states are available. When the value of the register is 0, State 0 appearance of the object is displayed, and with the register value being 1 the object displays State 1, and so on.
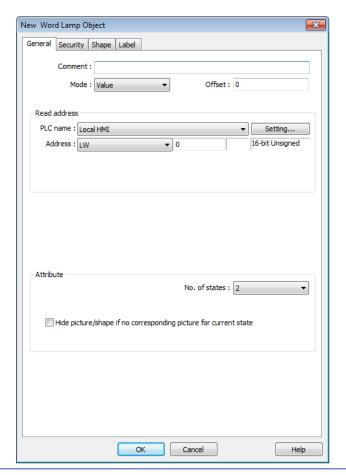
13.2.2.   Configuration

Click the Word Lamp icon on the toolbar to open a Word Lamp object property dialog box. Set up the properties, press OK button, and a new Word Lamp object will be created.

General Tab
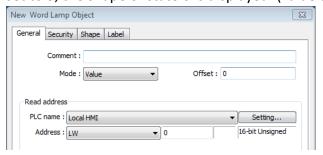
Setting	Description
Comment	User can describe the information of the object.
Mode / Offset	Word Lamp object offers the following three modes: **Value** The state is displayed according to the value in the designated word address and plus the [Offset]. As shown below, if the value within LW-200 is 3, since the offset is set to 3, the shape of state 6 is displayed. (value 3 + offset 3) **LSB** Convert the value from decimal to binary. The least significant active bit in a binary data word selects the state displayed.
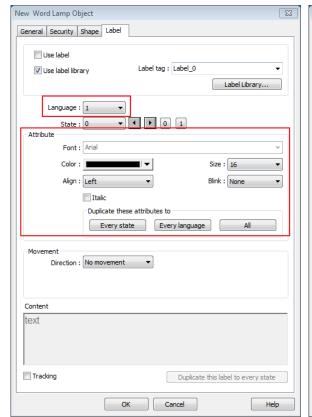
Decimal	Binary	Displayed state
0	0000	State 0 displayed. All the bits are 0.
1	0001	State 1 displayed. The least significant active bit is bit 0.
2	0010	State 2 displayed. The least significant active bit is bit 1.
3	0011	State 1 displayed. The least significant active bit is bit 0.
4	0100	State 3 displayed. The least significant active bit is bit 2.
5	0101	State 1 displayed. The least significant active bit is bit 0.
6	0110	State 2 displayed. The least significant active bit is bit 1.
7	0111	State 1 displayed. The least significant active bit is bit 0.
8	1000	State 4 displayed. The least significant active bit is bit 3.

Change state by time

The state displayed changes on a time basis. The frequency can be set.

Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the [Word Lamp] object. Users can also set address in [General] tab while adding a new object.
Attribute	**No. of states**
	The number of states is utilized by the object. The state is numbered from 0, so the number of states minus 1 will be the state number. If the value within the word register is ≥ [No. of states] defined in Attribute, the highest state will be displayed.
	If the number of states is set to 8, the valid states will be 0, 1, 2, …, 7. In this case if the word value is 8 or higher, the system will display the state 7 shape.
	Hide picture/shape if no corresponding picture for current state
	If selected, when there are not enough pictures to represent all the states, hides the picture. Otherwise, displays the last state.

Note
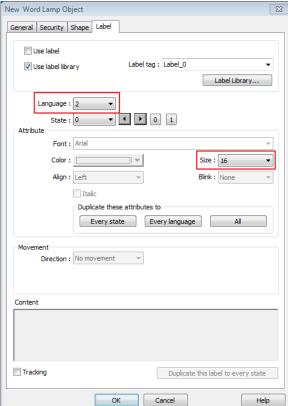
■ In [Label] tab, Language 1 determines the relevant settings of the font. For Language 2~8, only the font size can be changed and other settings follow Language 1.

13.3.   Set Bit

13.3.1.   Overview
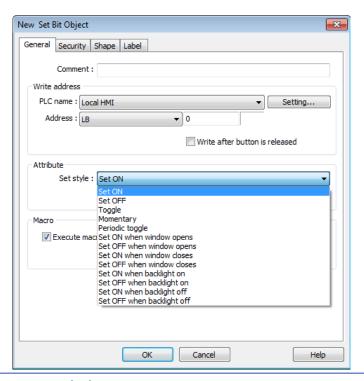
The Set Bit object provides two operation modes: manual or automatic. Manual mode can trigger a designated bit address to change the state between ON and OFF when the object is touched. In automatic mode, the bit is automatically activated when a pre-defined condition occurs; touching the button will not be effective.

13.3.2.   Configuration

Click the Set Bit icon on the toolbar to open a Set Bit object property dialog box. Set up the properties, press OK button, and a new Set Bit object will be created.

General Tab

Setting	Description
Write address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the bit device that controls the Set Bit object. Users can also set address in [General] tab while adding a new object.

Write after button is released

If this function is selected, the action is delayed till button is released; otherwise, the action is executed once the button is pressed. This function does not work with momentary buttons.

Mode / Offset	Set style	Description
	Set ON	Set ON the designated bit of the device.
	Set OFF	Set OFF the designated bit of the device.
	Toggle	Alternates the bit state each time pressed.
	Momentary	Holds the bit ON only while button is pressed.
	Periodical toggle	Set a designated bit ON and OFF at a set time interval. Time interval can be selected; the range is from 0.1 to 25.5 seconds.
	Set ON when window opens	Set ON the bit within the window when the window opens.
	Set OFF when window opens	Set OFF the bit within the window when the window opens.
	Set ON when window closes	Set ON the bit within the window when the window closes.
	Set OFF when window closes	Set OFF the bit within the window when the window closes.
	Set ON when backlight on (N/A for cMT)	Set the bit ON when the backlight is turned ON.
	Set OFF when backlight on (N/A for cMT)	Set the bit OFF when the backlight is turned ON.
	Set ON when backlight off (N/A for cMT)	Set the bit ON when the backlight is turned OFF.
	Set OFF when backlight off (N/A for cMT)	Set the bit OFF when the backlight is turned OFF.

Macro	Set Bit object can trigger the start of a Macro routine when the Macro has been created in advance. ☞ For more information, see "18 Macro References".
Trigger mode	If [Set style] is set to [Toggle], there is a further selection to make of whether the macro operates after Off to ON, ON to OFF transition, or at both of the changes of state.

13.4.   Set Word

13.4.1.   Overview
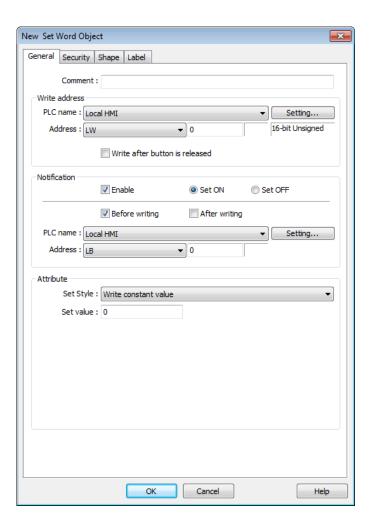
The Set Word object provides two operation modes: manual or automatic. Manual mode can change the value in a designated word address when the object is touched. In automatic mode, the word register is automatically activated when a pre-defined condition occurs; touching the button will not be effective.

13.4.2.   Configuration

Click the Set Word icon on the toolbar to open a Set Word object property dialog box. Set up the properties, press OK button, and a new Set Word object will be created.

General Tab

Setting	Description
Write address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the Set Word object. Users can also set address in [General] tab while adding a new object. **Write after button is released** If this function is selected, the action is delayed till button is released; otherwise, the action is executed once the button is pressed.
Notification	If this check box is selected, it will notify a designated bit address (setting ON or OFF). **Before writing / After writing** Set the state of the designated bit address before or after the manual operation.
Attribute	**Set Style** Select the button action from the drop down list, see Example 2. **Dynamic limits** Set the [Bottom limit] and [Upper limit] by a designated register, see Example 1.

Example 1

Set the [Bottom limit] and [Upper limit] by a designated register. When Dynamic Address is LW-n, where n is an arbitrary number, the rule of setting Upper / Bottom limit is:

Content	16-bit	32-bit
Dynamic address	LW-n	LW-n
Bottom limit	LW-n	LW-n
Upper limit	LW-n+1	LW-n+2

When Dynamic Address is LW-100, the rule of setting Upper / Bottom limit is:

Content	16-bit	32-bit
Dynamic address	LW-100	LW-100
Bottom limit	LW-100	LW-100
Upper limit	LW-101	LW-102

Example 2

The available button actions are:

● Write constant value

Preset a register with the value entered. Each time when the button is pressed, it writes the [Set value] to the designated register. Data format is as set by the [Write address]; it can be 16-bit BCD, 32-bit BCD, ...32-bit float. As shown below, when the button is pressed, preset the register with 12.
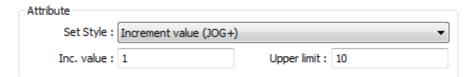
●   Increment value (JOG+)

Increase value in register by a set amount in [Inc. value], each time when the button is pressed, up to the [Upper limit]. As shown below, each button press increases the value in the register by 1 until the value is 10.
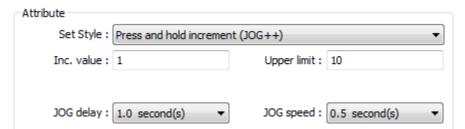

●   Decrement Value (JOG-)

Decrease value in register by a set amount in [Dec. value], each time when the button is pressed, down to the [Bottom limit]. As shown below, each button press decreases the value in the register by 1 until the value is 0.
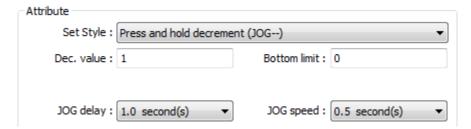

●   Press and hold increment (JOG++)

When the button is held longer than a set time in [JOG delay], it will increase the value in a register by a set amount :[Inc. value] at a set rate :[JOG speed], to the [Upper limit].

As shown below, when the button is pressed, it increases the value in the designated register by 1. When the button is held longer than 1 second, it increases the value in register by 1 every 0.5 second, till the value is 10.

●   Press and hold increment (JOG--)

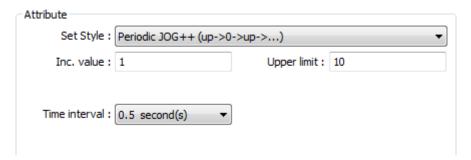When the button is held longer than a set time in [JOG delay], it will decrease the value in a register by a set amount: [Dec. value] at a set rate: [JOG speed], to the [Bottom limit].

As shown below, when the button is pressed, it decreases the value in the designated register by 1. When the button is held longer than 1 second, it decreases the value in register by 1 every 0.5 second, till the value is 0.
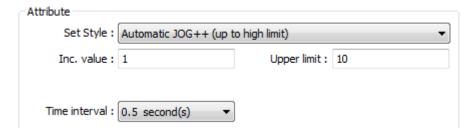
● Periodic JOG++

This automatic function increases the value in the register by a set amount: [Inc. value], at a set rate: [Time interval], to the [Upper limit]. As shown below, the system will automatically increase the value in the register by 1 every 0.5 second, till the value is 10. Then the value returns to 0 and add 1 every 0.5 second again.

● Automatic JOG++

This automatic function increases the value in the register by a set amount: [Inc. value], at a set rate: [Time interval], to the [Upper limit].then holds this value. As shown below, the system will automatically increase the value in the register by 1 every 0.5 second, till the value is 10, and then stop.
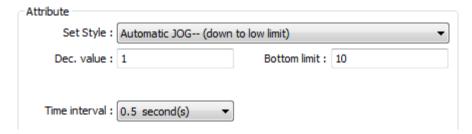

● Automatic JOG--

This automatic function decreases the value in the register by a set amount: [Dec. value], at a set rate: [Time interval], to the [Bottom limit].then holds this value. As shown below, the system will automatically increase the value in the register by 1 every 0.5 second, till the value is 10, and then stop.
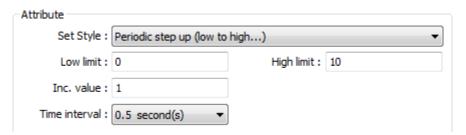
● **Periodic bounce**

Increases the word address value to the [Upper limit] by a [Inc. value] at a set rate in [Time interval], then decreases to the [Bottom limit] by the same value at the same rate. As shown below, the system will increase the value in the designated register by 1 every 0.5 second, till the value is 10, and then decrease the value by 1 every 0.5 second till the value is 0 whenever the screen is active.

● **Periodic step up**

Step up to the [High limit] by [Inc. value] at a set rate in [Time interval], then reset immediately to the [Low limit]. The action repeats whenever the screen is active. As shown below, the system will increase the value in the designated register by 1 every 0.5 second, till the value is 10, and then reset to 0 and increase again, and the action repeats.
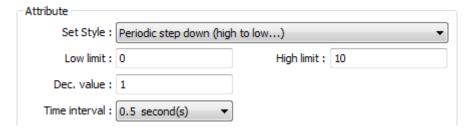

● **Periodic step down**

Step down to the [Low limit] by [Dec. value] at a set rate in [Time interval], then reset immediately to the [High limit]. The action repeats whenever the screen is active. As shown below, the system will decrease the value in the designated register by 1 every 0.5 second, till the value is 0, and then reset to 10 and decrease again, and the action repeats.

Attribute

Set Style :	Periodic step down (high to low...) ▼
Low limit : 0	High limit : 10
Dec. value : 1	
Time interval : 0.5 second(s) ▼	

- Set when window opens / Set when window closes

Automatic function occurs whenever the screen is active. The value entered in [Set value] is set into the word address when the action occurs. If [Set value] is set to 5, when the window opens / closes, the system enters 5 into the designated register.

- Set when backlight on / Set when backlight off

Automatic function occurs whenever the backlight is active. The value entered in [Set value] is set into the word address when the action occurs. If [Set value] is set to 5, when the backlight turns ON / OFF, the system sets 5 into the designated register.

- Cyclic JOG+

Each time when the button is pressed, increases the word address value to the [Upper limit] by [Inc. value] then reset to the [Bottom limit]. As shown below, each time when pressing the button, the system will increase the value in the designated register by 1, till the value is 10, and then reset to 0 and increase again by pressing the button.

Attribute

Set Style :	Cyclic JOG+ ▼
Bottom limit : 0	Upper limit : 10
Inc. value : 1	

- Cyclic JOG-

Each time when the button is pressed, decrease the word address value to the [Bottom limit] by [Dec. value] then reset to the [Upper limit]. As shown below, each time when pressing the button, the system will decrease the value in the designated register by 1, till the value is 0, and then reset to 10 and decrease again by pressing the button.

Attribute

Set Style :	Cyclic JOG- ▼
Bottom limit : 0	Upper limit : 10
Dec. value : 1	

- Cyclic JOG++

When the button is held longer than a set time in [JOG delay], it increases the value in a register by a set amount in [Inc. value] at a set rate in [JOG speed], to the [Upper limit], then reset to the [Bottom limit]. As shown below, when the button is held longer than 0.5 second, increase the value in the designated register by 1 every 0.1 second, till the value is 10, and then

reset to 0 and increase again by holding the button.

● Cyclic JOG- -

When the button is held longer than a set time in [JOG delay], decrease the value in a register by a set amount in [Dec. value] at a set rate in [JOG speed], to the [Bottom limit], then reset to the [Upper limit]. As shown below, when the button is held longer than 0.5 second, decrease the value in the designated register by 1 every 0.1 second, till the value is 0, and then reset to 10 and decrease again by holding the button.
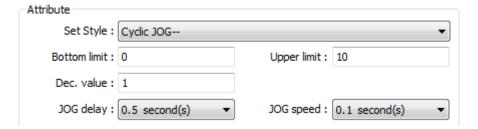
13.5.   Function Key

13.5.1.   Overview

The Function Key object can be used for several tasks, such as switching between windows, keypad design, Macro execution, screen hardcopy, and setting USB security key.
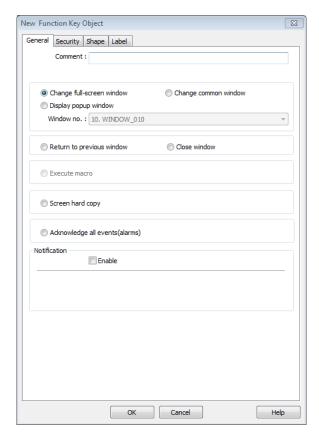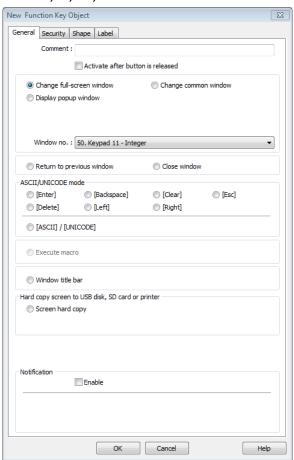
13.5.2.   Configuration

Click the Function Key icon on the toolbar to open a Function Key object property dialog box. Set up the properties, press OK button, and a new Function Key object will be created.
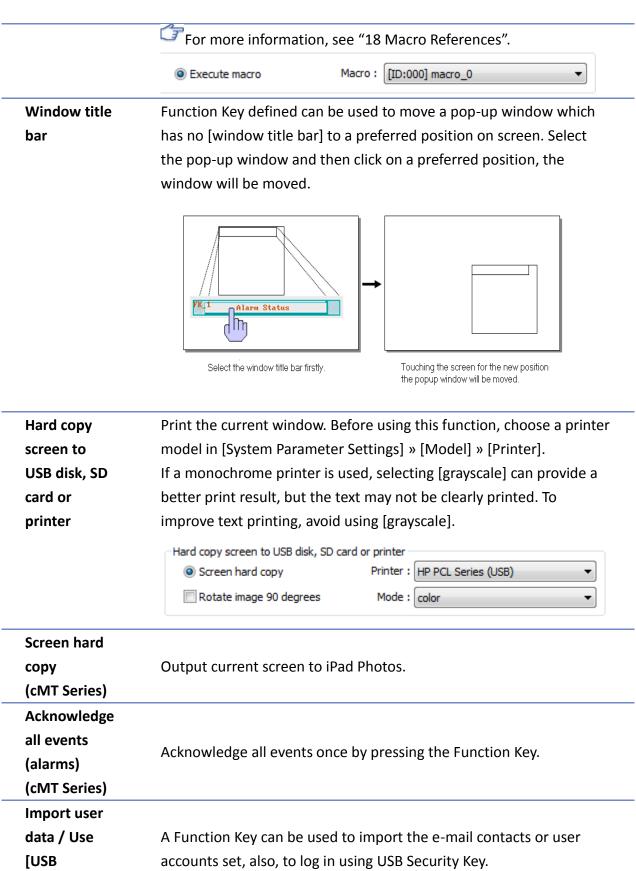
General Tab

cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Activate after button is released	If this function is selected, the action is delayed till button is released; otherwise, the action is executed once the button is pressed.
Change window	**Change full-screen window:** Change to another base window. **Change common window:** Change common window. **Display popup window:** A pop-up window displays in the base window. If [Close this popup window when parent window is closed] check box is selected, the pop up window will be closed when change the base window to another window. Otherwise, a function key in the pop up window is needed to close it. ◉ Display popup window ☑ Close this popup window when parent window is closed Style : With title bar ▾ Window no. : 11. Window_011 ▾ **Return to previous window:** If this is selected, the Function Key will change from the current screen to the previous one displayed. For example, when window no. 10 is changed to window no. 20, press the function key to return to window no. 10. This function is only available for base window. **Close window:** Close any active pop-up windows, message windows included.
ASCII/ UNICODE mode	Configures the button as a keypad key, and the character it enters, via [Numeric Input] or [ASCII Input] objects. **Enter:** Same as the keyboard's "Enter" function. **Backspace:** Same as the keyboard's "Backspace" function. **Clear**: Clear the value in the word register. **Esc:** Same as the [Close window] function; it is used to close the keyboard window. **Delete:** Same as the keyboard's "Delete" function, deletes the number or character on the right side of the text cursor. **Left:** Same as the keyboard's "←" key moves the text cursor to the left side of the previous number or character. **Right:** Same as the keyboard's "→" key moves the text cursor to the left side of the next number or character. **ASCII/UNICODE:** Specify the character to be entered by this key.
Execute Macro	Select this check box to execute one of the Macros from the drop down list that has already been configured by users.

👉 For more information, see "18 Macro References".

Window title bar	Function Key defined can be used to move a pop-up window which has no [window title bar] to a preferred position on screen. Select the pop-up window and then click on a preferred position, the window will be moved.

Select the window title bar firstly.　　　Touching the screen for the new position the popup window will be moved.

Hard copy screen to USB disk, SD card or printer	Print the current window. Before using this function, choose a printer model in [System Parameter Settings] » [Model] » [Printer]. If a monochrome printer is used, selecting [grayscale] can provide a better print result, but the text may not be clearly printed. To improve text printing, avoid using [grayscale].

Screen hard copy (cMT Series)	Output current screen to iPad Photos.
Acknowledge all events (alarms) (cMT Series)	Acknowledge all events once by pressing the Function Key.
Import user data / Use [USB Security Key]	A Function Key can be used to import the e-mail contacts or user accounts set, also, to log in using USB Security Key.

Data Position

Select the external device to store data from [SD card] or [USB disk].

Account import mode

If [Overwrite] is selected, the existing accounts will be overwritten with new accounts in the external device after importing. If [Append] is selected, HMI will append more accounts while the old accounts still exist.

Delete file after importing user accounts

If select this check box, the system will delete the account data saved in the external device after importing, this can prevent the account data from leaking out.

Notification	If this selection is enabled, it will notify a designated bit address to set ON or OFF, each time the button is pressed.

*Note

■ [Overwrite] is the only option when importing the e-mail contacts. This means that all existing contacts will be removed first, and then the new contacts are added.

☞ For more information, see "6 Window Operations", "12 Keypad Design and Usage", "36 Administrator Tools".

13.6.   Toggle Switch
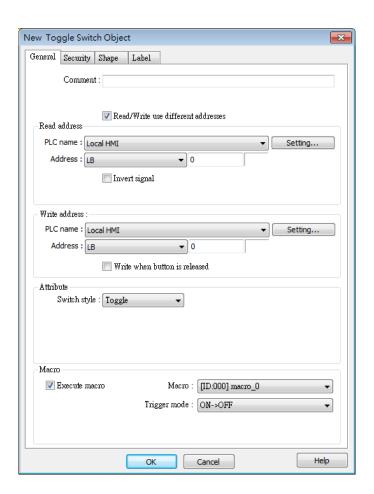
13.6.1.   Overview

Toggle Switch object is a combination of Bit Lamp object and Set Bit object. The appearance of the object is controlled by the ON / OFF state of the read bit address. As well, pressing the button sets the value in the bit address according to the settings.

13.6.2.   Configuration

Click the Toggle Switch icon on the toolbar to open a Toggle Switch object property dialog. Set up the properties, press OK button, and a new Toggle Switch object will be created.

General Tab

Setting	Description
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the bit device that controls the [Toggle Switch] object. Users can also set address in [General] tab while adding a new object. **Invert signal** Reverses the display of ON / OFF states. For example, if [Invert signal] check box is selected, when the designated bit is OFF, the object displays ON state.
Write address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the bit device that controls the [Toggle Switch] object. Users can also set address in [General] tab while adding a new object. The address can be the same or different from [Read address]. **Write after button is released** If this function is selected, the action is delayed till button is released, otherwise, the action is executed once the button is pressed. This function does not work with momentary buttons.
Attribute	<table><tr><td>**Set style**</td><td>**Description**</td></tr><tr><td>Set ON</td><td>Set ON the designated bit of the device.</td></tr><tr><td>Set OFF</td><td>Set OFF the designated bit of the device.</td></tr><tr><td>Toggle</td><td>Alternates the bit state each time pressed.</td></tr><tr><td>Momentary</td><td>Holds the bit ON only while button is pressed.</td></tr></table>
Macro	Toggle Switch object can trigger the start of a Macro routine when the Macro has been created in advance. ☞ For more information, see "18 Macro References".

13.7.   Multi-State Switch

13.7.1.   Overview

Multi-state Switch object is a combination of Word Lamp object and Set Word object. The appearance of the object is controlled by the value of the read word address. As well, pressing the button sets the value in the word address according to the settings.
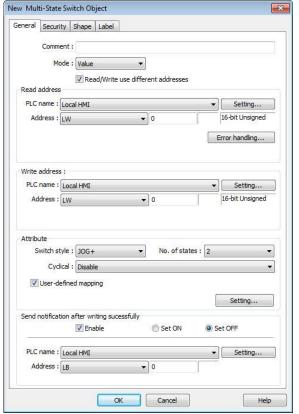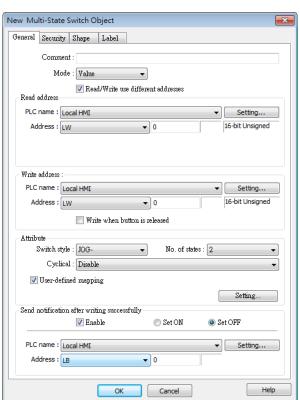
13.7.2.   Configuration

Click the Multi-State Switch icon on the toolbar to open a Multi-State Switch object property dialog box. Set up the properties, press OK button, and a new Multi-State Switch object will be created.

General Tab

cMT Series   eMT, iE, XE, mTV Series
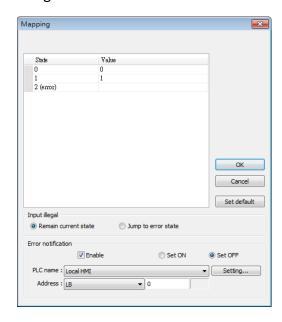
Setting	Description
Model / Offset	Different modes can be selected: [Value], [LSB]. 👉 For more information, see "13.2 Word Lamp".
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the Multi-state Switch object. Users can also set address in [General] tab while adding a new object.
Write address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the Multi-state Switch object. Users can also set address in [General] tab while adding a new object. **Write after button is released** If this function is selected, the action is delayed till button is released; otherwise, the action is executed once the button is pressed.
Attribute	**Switch style** Select the object's operation mode, see Example 1. **User-defined mapping** The value placed in the write register of each selection, the action taken when an illegal value is entered, and error notification to a designated bit address can be set. **Remain current state** If an illegal value is entered, Multi-state Switch will remain at the current state.

	Jump to error state	
	If an illegal value is entered, Multi-state Switch will jump to the error state.	
	Error notification	
	If an illegal value is entered, automatically set the value placed in the designated register.	
Send notification after writing successfully	After the system successfully writes data to PLC, the designated bit address will be set On/Off.	
Error handling (cMT-SVR Series)	The action taken when an illegal value is entered or notify a designated bit address. This is similar to [User-defined mapping]; the difference is the value corresponding to each state need not to be preset.	

Example 1

● JOG+

Increase the value of a designated register by 1 each time when pressing the button, till the value equals to [No. of states]. A cyclic action can be enabled. As shown below, each time when pressing the button, the state number will add 1 start from state 0, till state 4 ([no. of state]-1), and returns to 0 and step up again.

Attribute

Switch style : JOG+   No. of states : 5

Cyclical : Enable

☐ User-defined mapping

● JOG-

Decrease the value of the designated register by 1 each time when pressing the button, till the value equals to 0. A cyclic action can be enabled. As shown below, each time when pressing the button, the state number will minus 1 start from state 4 ([no. of state]-1), till state 0, and returns to state 4 and step down again.

Attribute

Switch style : JOG-   No. of states : 5

Cyclical : Enable

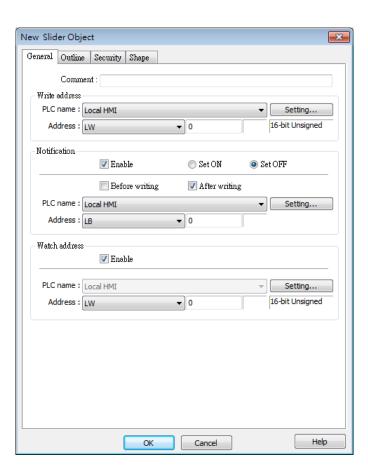☐ User-defined mapping

13.8. Slider

13.8.1. Overview

Slider object is used to change the value in a designated word register address by moving the slide on the screen.

13.8.2. Configuration

Click the Slider icon on the toolbar to open a Slider object property dialog box. Set up the properties, press OK button, and a new Slider object will be created.
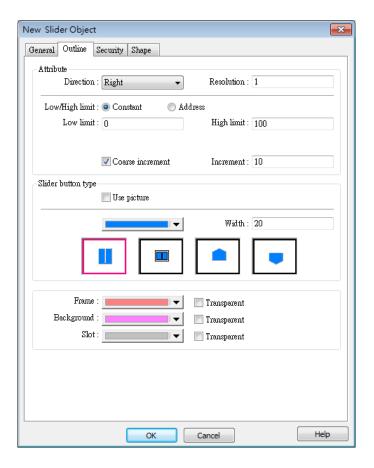
General Tab

Setting	Description
Write address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the
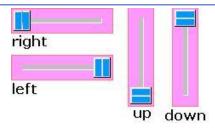
	Slider object. Users can also set address in [General] tab while adding a new object.
Notification	If enabled, the state of a designated bit address will be set to ON or OFF. Click **[Setting]** to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the bit device that controls the notification settings. Users can also set address in [General] tab while adding a new object. **[Before writing] / [After writing]** Change the state of a designated bit register before, or after the slider is slid.
Watch address	When moving the roller, the new value written to the word register address can be displayed in real time.

Outline Tab

Setting	Description
Attribute	**Direction** Select the direction of the slider. (Right, Up, Left, Down)

Resolution

Sets the value change in the word register for each step of the Slider. For example, if set to 10, the register value changes by 10 points for each increment or decrement on the Slider.

Constant

Sets the range of the Slider. For example, If set [Low limit] to 5, and [High limit] to 100, the Slider will enter values between 5 and 100.

Address

Set the [Low/High limit] by a designated register, see Example 1.

Coarse increment

Apart from moving the roller to change the value as in [Resolution], if this option is selected, the word value will increase / decrease by the [Increment] value each time the object is touched.

Slider button type	**Use picture** (cMT Series only)
	If this checkbox is selected, a picture can be selected from the Picture Library to be the slider button.
	Four default styles are offered here, and the width of the Slider may be set.
	Color
	Colors of the frame, background, and slot may be chosen.
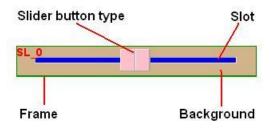
Example 1

Set the low or high limit by a designated register. When write address is LW-n, where n is an arbitrary number, the rule of setting limits is:

Content	16-bit	32-bit
Address	LW-n	LW-n
Low limit	LW-n	LW-n
High limit	LW-n+1	LW-n+2

When address is LW-100, the rule of setting limits is:

Content	16-bit	32-bit
Address	LW-100	LW-100
Low limit	LW-100	LW-100
High limit	LW-101	LW-102

13.9. Numeric Input and Numeric Display

13.9.1. Overview
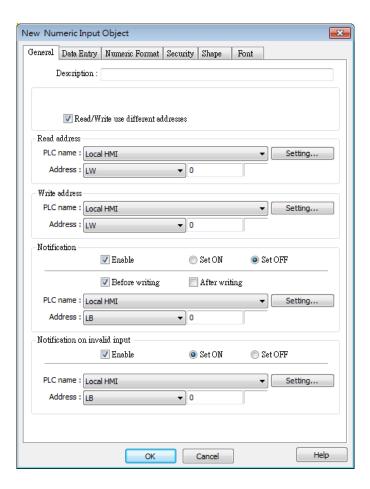
Numeric Input object and Numeric Display object can be used to display the value of a designated word register. Numeric Input object can, in addition, be used to input a value into a register via a keyboard.

13.9.2. Configuration

Click the Numeric Input or Numeric Display icon on the toolbar to open a Numeric Input or Numeric Display object property dialog box. Set up the properties, press OK button, and a new Numeric Input or Numeric Display object will be created.

General Tab
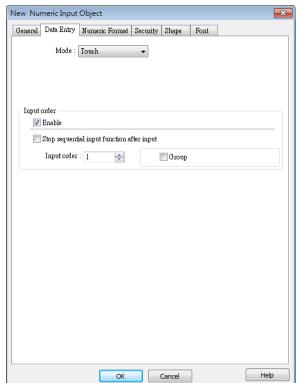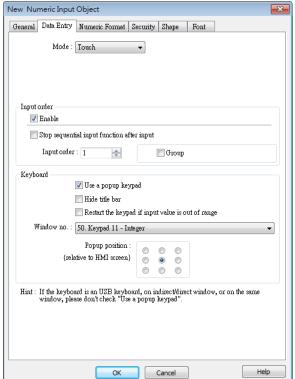
Setting	Description
Read / Write use different address	Set [Read address] and [Write address] differently.
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that displays the value. Users can also select a tag defined in Address Tag Library..
Write address	Select the [PLC name], [Device type], [Address] of the word device that system writes to.
Notification	If this check box is selected, it will notify a designated bit address (setting ON or OFF). **Before writing / After writing** Set the state of the designated bit address before or after the manual operation.
Notification on invalid input	If an illegal value is entered, automatically set the state of a designated register.

Data Entry Tab

cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Mode	**Touch** Used when data entry is initiated by touching the screen object. **Bit control** Used when data entry is enabled by turning ON a designated bit, and entry ends when the bit goes OFF.
Allow input bit address	Specify a bit address that enables or ends data entry. The order of data entry is specified in [Input order] and an external USB keyboard is needed for data entry. For cMT-SVR, use iPad's keyboard.
Input order	Perform continuous input by setting [Input order] and [Group]. The criterion of searching the next input object: ● The range of [Input order]: 1 ~ 511, range of [Group]: 1 ~ 15. ● If [Group] is not selected, its input order is 0. ● The system only searches for the objects within the same Group. ● The lower number of order is entered before the higher number of order. ● For multiple objects within the same group and with the same input order, the object placed in the lower layer is entered first.
Keyboard (For eMT, iE, XE, mTV Series)	**Use a popup keypad** If selected: A pre-designed pop-up keypad can be chosen by selecting a check box, and selecting the relative position on the HMI screen. When data entry is enabled, the pop-up keypad displays in the selected position, and closed when data entry ends. If not selected: When data entry is enabled, the pop-up keypad is not displayed. Users may: ● Create a custom design on the same screen window. ● Use a USB keyboard. **Hide title bar** Use a keypad without the title bar. **Restart the keypad if input value is out of range** When entering data, if the value entered is not within the valid range, the system will automatically restart the keypad.

🖉 Note

■ To enter data for cMT-SVR, the iPad's keyboard is used.

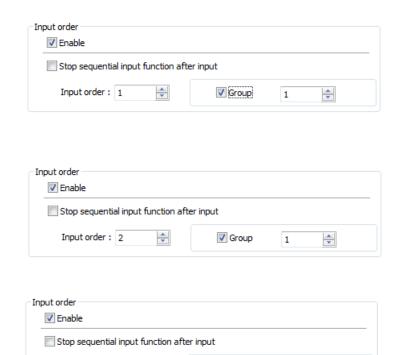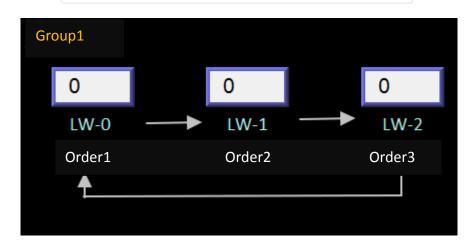👉 To create a keyboard in current window, see "12 Keypad Design and Usage".

Example 1

This example demonstrates how to use [Input Order] and [Group] to perform continuous input in several [Numeric Input] objects. After entering data in one object, entry will be passed to the next input order object which is in the same group.

1.   Create three Numeric Input objects, and set [Input order] to 1, 2, and 3 respectively. Include the three objects in [Group 1] as shown in the following figure.
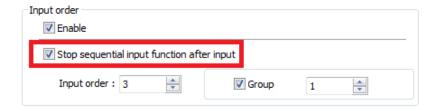
LW-0

LW-1

LW-2
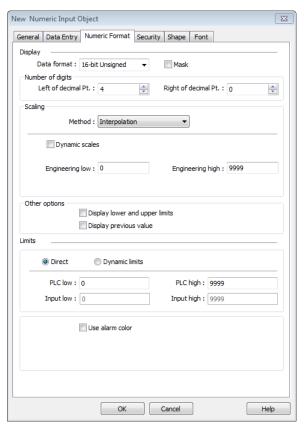
2.   When finish entering data in the last object, to end data entry of all objects, please select [Stop sequential input function after input] check box.
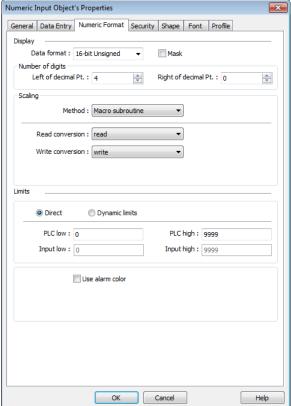
Numeric Format Tab

cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Display	**Data Format**
	Set the data format of a designated word register. The selections include: BCD, HEX, Binary, Unsigned, Signed, Float. 16-bit uses 1 word where 32-bit uses two words.
	Mask
	If selected, any values entered will be hidden by displaying them as ****.
Number of digits	**Left of decimal Pt.**
	The number of digits before the decimal point.
	Right of decimal Pt.
	The number of digits after the decimal point.

Scaling	**Interpolation**
	If this check box is selected, [Engineering low] and [Engineering high] boxes appear. Values entered in these boxes correspond to the display range required. The setting also requires [Input low] and [Input high] in the limits section. See Example 2. Dynamic scales: Set the [Engineering low] and [Engineering high] by a designated register. See Example 4. **Macro subroutine** (Not available for cMT Series) The value read from or written to the register can be computed by macro subroutines selected in [Read conversion] and [Write conversion]. The macro subroutines should be diefined in Macro Function Library. To use this feature, see "13.9.2.1 The rule of using Macro subroutine".
Other options (For cMT Series)	**Display lower and upper limits** If selected, when entering a value, the range is displayed near the object. **Display previous value** If selected, when entering a value, the value before update is displayed near the object.
Limits	This section allows users to apply display limits to the values held in the input register. The color when the register value is outside limits can be set. **Direct** Sets the limits by entering values in [Input low] and [Input high]. If the value entered is outside the limits, the value in the register cannot be changed. **Dynamic limits** Set the limits by a designated register, see Example 5.
Use alarm color	**Low limit** When the value in the register is outside the [Low limit], display digits by the color set. **High limit** When the value in the register is outside the [High limit], display digits by the color set. **Blink** When the value in the register is outside either limit, the digits flash.

13.9.2.1. The rule of using Macro Subroutine

● There must be a return value and exactly one parameter.

Examples:

sub char test (short a)   // (Correct)

sub test (char a)   // (Incorrect, no return value.)

sub char test (char a, char b)   // (Incorrect, two parameters.)

● Use the Macro data type that corresponds to the object's data format.

The mapping is as follows:

Macro Data Type	Numeric Object Data Format
short	16-bit Signed
Int	32-bit Signed
unsigned short	16-bit BCD, 16-bit HEX, 16-bit Binary, 16-bit Unsigned
unsigned int	32-bit BCD, 32-bit HEX, 32-bit Binary, 32-bit Unsigned
float	32-bit Float

For example, if the data format of the numeric object is 16-bit Unsigned, only the corresponding Macro data type: unsigned short, is available.

Examples:

sub char test(unsigned short a)   // (Correct)

sub char test(char a)   // (Incorrect)

● Supports only the local HMI address.

Examples:

GetData(var, "Local HMI", LB, 0, 1) // (Correct)

GetData(var, "MODBUS RTU", 0x, 0, 1) // (Incorrect)

● The following system defined functions are unable to be invoked:

ASYNC_TRIG_MACRO, SYNC_TRIG_MACRO, DELAY, FindDataSamplingDate, FindDataSamplingIndex, FindEventLogDate, FindEventLogIndex, INPORT, INPORT2, OUTPORT, PURGE, TRACE

● The following statements are not supported:
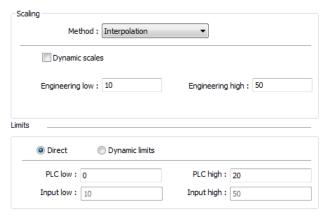
For-Next, While-Wend

Example 2

If [Interpolation] is selected, the scaling equation is as the following:

If A indicates the original data and B indicates the displayed data:

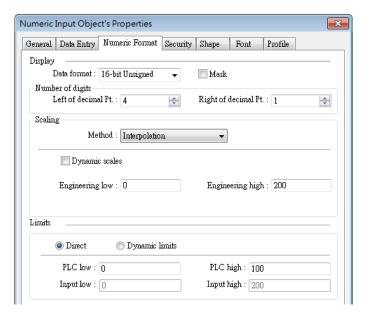**B = [Engineering low] + (A - [PLC low]) × ratio**

where, ratio = ([Engineering high] - [Engineering low]) / ([PLC high] - [PLC low])
As shown below, the original data is 15, after conversion, 40 will be displayed.

Example 3

If the numeric format selected is not Float and decimal point is used, the decimal place of the converted result will not be adjusted automatically, please adjust [Engineering high] to correctly place the decimal point of the result gained in [Interpolation] mode. Please see the illustration below.

1. Create two Numeric Input objects, set [Right of decimal Pt.] to 1 and select [Interpolation] method for one of the objects as shown in the following figure.
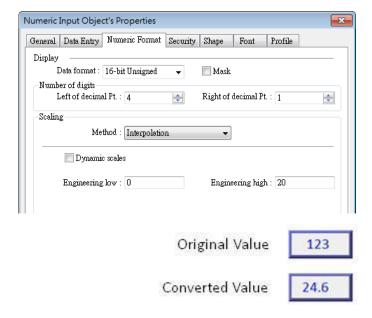
2. Enter value "123", the object set to [Interpolation] displays "246.0" instead of "24.6".

3. To move the decimal point one place to the left, adjust [Engineering high] as shown in the following figure.

Example 4

If [Interpolation] is selected, set the [Engineering low] and [Engineering high] by a designated register. When Dynamic Address is LW-n, where n is an arbitrary number, the rule of setting [Engineering low] and [Engineering high] is:

Content	16-bit	32-bit
Dynamic address	LW-n	LW-n
Engineering low	LW-n	LW-n
Engineering high	LW-n+1	LW-n+2

When address is LW-100, the rule of setting limits is:

Content	16-bit	32-bit
Dynamic address	LW-100	LW-100
Engineering low	LW-100	LW-100
Engineering high	LW-101	LW-102

Example 5

Set the limits by a designated register. When [Address] is LW-n, where n is an arbitrary number, the rule of setting limits is:

Content	16-bit	32-bit
Address	LW-n	LW-n
Low limit	LW-n	LW-n
High limit	LW-n+1	LW-n+2

When address is LW-100, the rule of setting limits is:

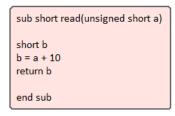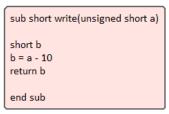| Content	16-bit	32-bit
Address	LW-100	LW-100
Low limit	LW-100	LW-100
High limit	LW-101	LW-102

Example 6

The following demonstrates how to use [Macro subroutine] for scaling when configuring Numeric Input object.

The following two macros are used, one for [Read conversion] and one for [Write conversion].
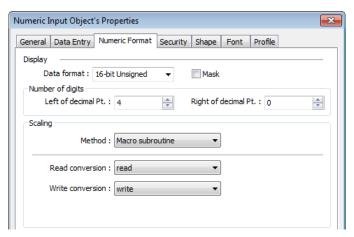
Read Conversion

```
sub short read(unsigned short a)

short b
b = a + 10
return b

end sub
```

Write Conversion

```
sub short write(unsigned short a)

short b
b = a - 10
return b

end sub
```

1. Create two Numeric Input objects: NE_0 and NE_1 and use the same control address. Select [Macro subroutine] for NE_1.

NE_0
(Without Macro conversion)
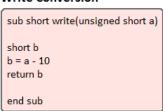
NE_0
####

NE_1
(With Macro conversion)

NE_1
####

Numeric Input Object's Properties

General | Data Entry | Numeric Format | Security | Shape | Font | Profile

Display

Data format : 16-bit Unsigned   ☐ Mask

Number of digits

Left of decimal Pt. : 4   Right of decimal Pt. : 0

Scaling

Method : Macro subroutine

Read conversion : read

Write conversion : write
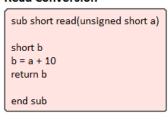
2. Enter 0 in NE_0 then NE_1 will execute [Read conversion]. The value gained will be 10.

NE_0
(Without Macro conversion)

0

NE_1
(With Macro conversion)

10

Read Conversion

```
sub short read(unsigned short a)

short b
b = a + 10
return b

end sub
```

Write Conversion

```
sub short write(unsigned short a)

short b
b = a - 10
return b

end sub
```
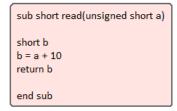
3. Enter 80 in NE_1, [Write conversion] is executed and the value gained will be 70. NE_0 displays 70.

NE_0
(Without Macro conversion)

NE_1
(With Macro conversion)

```
70
```

```
80
```

Read Conversion

```
sub short read(unsigned short a)

short b
b = a + 10
return b

end sub
```

Write Conversion

```
sub short write(unsigned short a)

short b
b = a - 10
return b

end sub
```
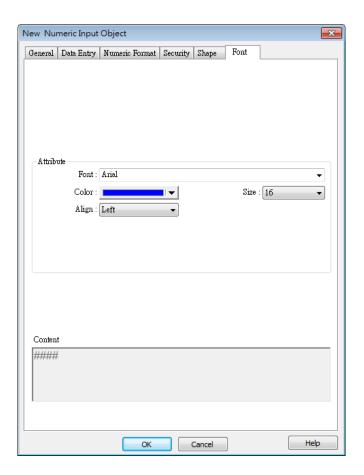
Note
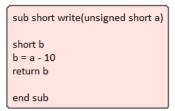
■ If executing [Read conversion] and [Write conversion] by the same numeric object, the value entered in this object is computed by the Macro subroutine of [Write conversion] first, and then the result is computed by the Macro subroutine of [Read conversion]. In Example 5, if the subroutine of [Write conversion] is set to b=a-20, then entering 80 in NE_1 will get 60 after [Write conversion] and then the object displays 70 after [Read conversion].

Font Tab

New Numeric Input Object

General | Data Entry | Numeric Format | Security | Shape | Font

Attribute

Font : Arial

Color :   Size : 16

Align : Left

Content

```
####
```

OK   Cancel   Help

Setting	Description
Color	When the value is within the limits, display digits using color set in this tab.
Align	**Left:** Align the number to the left. **Center:** Align the number to the center. **Right:** Align the number to the right. **Leading zero:** The number is preceded with leading zeros when the number of digits is less than that set. Left　　　　66 Center　　　66 Right　　　　66 Leading zero　0066
Size	Set the font size.

13.10.   ASCII Input and ASCII Display

13.10.1.   Overview
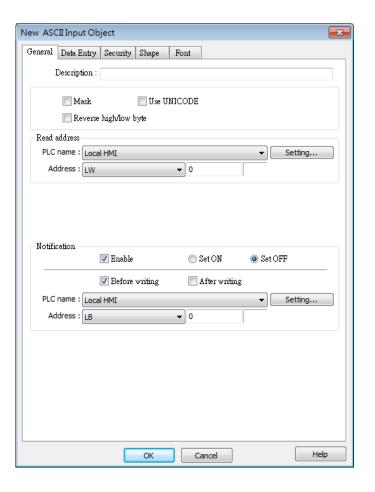
ASCII Input object and ASCII Display object can be used to display ASCII or UNICODE characters held in designated word registers. [ASCII Input] object can, in addition, be used to input a value into a register via a keyboard.

13.10.2.   Configuration

Click the ASCII Input or ASCII Display icon on the toolbar to open an ASCII Input or ASCII Display object property dialog box. Set up the properties, press OK button, and a new ASCII Input or ASCII Display object will be created. The difference between ASCII Input and ASCII Display is that ASCII Input includes notification settings.

General Tab
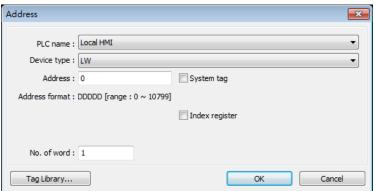
Setting	Description
Mask	If selected, any values entered will be hidden by displaying them as ****.
Use UNICODE	Select this check box to display data in UNICODE format. If not selected, the characters are displayed in ASCII format. This feature can be used with the [Function Key] object that uses [ASCII/UNICODE].
Reverse high/low byte	Normally an ASCII code is displayed in "high byte", "low byte" order. Reverse selection makes the system display ASCII characters in "low byte", "high byte" order.

ABCD   BADC

The left object is in normal form, and another is high/low byte reversed.

Setting	Description
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that displays characters. Users can select a defined address tag from Address Tag Library, or set address in [General] tab while adding a new object.
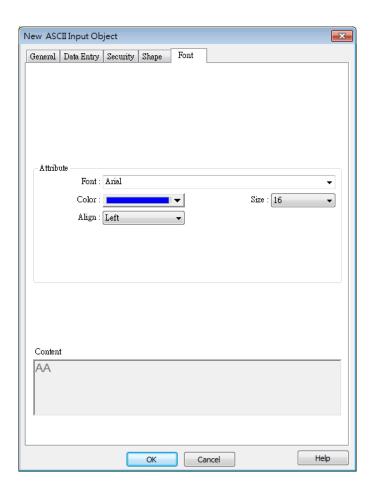
No. of words

Select the maximum number of words to be displayed.

📎**Note**

■ An UNICODE character uses 1 word, and an ASCII character uses 1 byte. Therefore 1 word can be used as 1 UNICODE character or 2 ASCII characters. (1 word equals to 2 bytes)

Font Tab

Setting	Description
Attribute	The font, size, color, and alignment can be set.
	Align
	Left: Align the text to the left.
	Center: Align the text to the center.
	Right: Align the text to the right.

13.11. Indirect Window

13.11.1. Overview

Indirect Window object opens the pop-up window assigned by a designated word register. There are two ways to use Indirect Window object: The first is to use the profile of Indirect Window object, and let the pop-up window be resized and displayed in the defined profile; the second is to automatically resize the window according to the size of the pop-up window to be displayed. To close the pop-up window, assign 0 to the designated word register. The difference between Direct Window and Indirect Window is that Direct Window is controlled by a bit register, while Indirect Window is controlled by a word register.
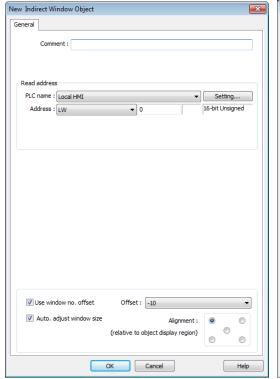
13.11.2. Configuration
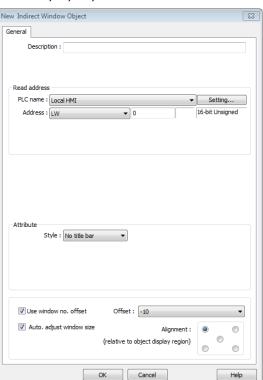
Click the Indirect Window icon on the toolbar to open the object property dialog box. Set up the properties, press OK button, and a new Indirect Window object will be created.

General Tab

cMT Series   eMT, iE, XE, mTV Series

| Setting	Description
Read address	Click [Setting] to select the [PLC name], [Address], [Device type], [System tag], [Index register] of the word device that controls the pop-up window. Users can also set address in [General] tab while adding a new object.
Attribute	**Style** Set the display style of the pop-up window. There are two styles: ● No title bar The pop-up window has no title bar and cannot be dragged. ● With title bar The pop-up window has a title bar that can be dragged to move the window.
Use window no. offset	Sets the offset of the window number for selecting the pop-up window. The window number of the pop-up window is calculated by the value in the word register added to the offset. For example, assume the value in the register is 20 and offset is 5, the pop-up window number will be 25.
Auto. adjust window size	Automatically resize the Indirect Window and align the pop-up window to the preset region. **Alignment** Sets a reference point of the pop-up window from one of the five positions on the screen. For example, if the lower-right region is selected, the lower-right corner of the pop-up window is aligned to the lower-right region of the Indirect Window. See Example 1.

Example 1
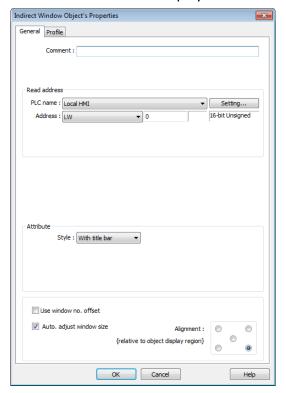
Here is an example of using Indirect Window. The setting is shown in the following figure, set the address to LW-0 which assigns the window number. Create window no. 11 and 12 first.
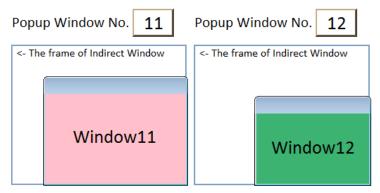
1. Create an Indirect Window object, set address to LW-0, and select [Auto. adjust window size].

2. Select the region where the window is to be displayed.

3. Enter value 11 in LW-0, the pop-up window displayed is window no. 11.
4. Enter value 12 in LW-0, the pop-up window displayed is window no. 12.
5. Enter value 0 in LW-0, the pop-up window is closed.

To close the pop-up window, apart from entering 0 in the designated word register, another way is to place a Function Key object in the pop-up window, and set the key to [Close window].

Note

■ At most 24 windows can be displayed simultaneously at run time.
■ The system does not allow opening the same window with two Direct (or Indirect) windows in one base window.
■ If the pop up window has monopoly property enabled, then when the window pops up, all background windows may not be operated until the monopolizing window has been closed.

13.12. Direct Window

13.12.1. Overview

Direct Window object defines the position and size of a pop-up window location on a window. When the content of the bit register is changed, the window will pop up at the predefined location. The display area for the pop-up window is limited by the size of predefined location. Restoring the value of the bit register closes the pop-up window. The difference between the Direct Window and the Indirect Window is that Direct Window object has a predefined window number, and is controlled by a bit register, while Indirect window is controlled by a word register, and the value of the word register determines the window displayed.
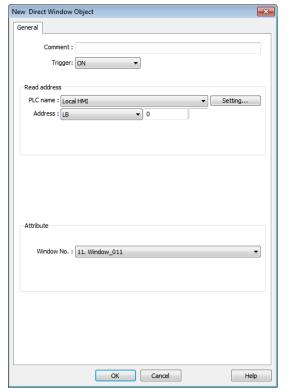
13.12.2. Configuration
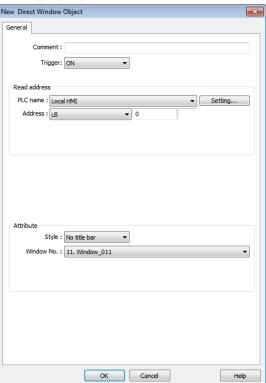
Click the Direct Window icon on the toolbar to open a Direct Window object property dialog box. Set up the properties, press OK button, and a new Direct Window object will be created.

General Tab

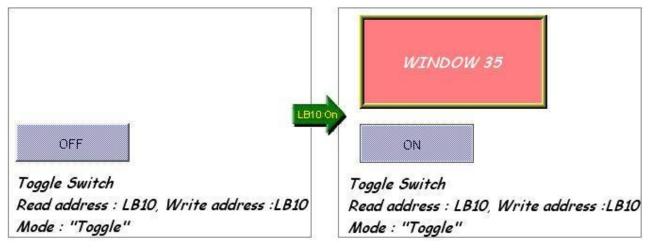cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Read address	Click [Setting] to select the [PLC name], [Device type], [Address], [System tag], [Index register] of the bit device that control the window popup. Users can select a defined address tag from Address Tag Library, or set the address in [General] tab while adding a new object.
Attribute	**Style** Define the pop-up window style. Two styles are available, [No title bar] and [With title bar]. **Window no.** Set the pop-up window number.

Example 1
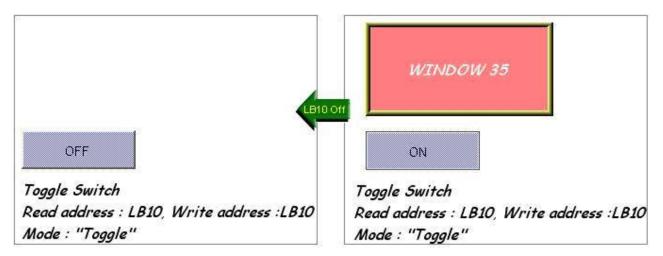
Here is an example to explain how to use the Direct Window object. The following figure shows the settings of the Direct Window object. In the example, use LB-10 to call up window no. 35.

If the state of LB-10 turns to ON, window no. 35 will pop up; if the state of LB-10 turns to OFF, window no. 35 will be closed, as shown in the following figure.

Toggle Switch
Read address : LB10, Write address :LB10
Mode : "Toggle"

Toggle Switch
Read address : LB10, Write address :LB10
Mode : "Toggle"

📝**Note**

■ A screen can simultaneously display up to 24 pop-up windows including System Message Window, Direct Window and Indirect Window.

■ The system does not allow opening the same window with two Direct (or Indirect) Windows in one base window.

■ If the pop up window has monopoly property enabled, then when the window pops up, all background windows may not be operated until the monopolizing window has been closed.

13.13. Moving Shape

13.13.1. Overview
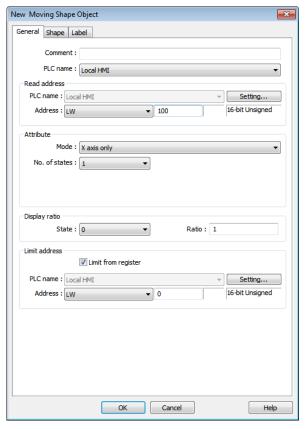
Moving Shape object defines the states and moving distance of an object. The state and the location of the object depend on consecutive registers.

13.13.2. Configuration

Click the Moving Shape icon on the toolbar to create a Moving Shape object. Set up the properties, press OK button, and a new Moving Shape object will be created.

General Tab

Setting	Description
Read address	Click [Setting] to configure the [PLC name], [Device type], [Address], [System tag], or [Index register] of the word devices that control the display of object's state and moving distance. Users can

	also set the address in [General] tab while adding a new object.
Attribute	Select the object's movement mode and range. See "13.13.2.1 Illustration of Modes" in the following part.
Display ratio	The size of shape in different states can be set individually as shown in the following figure.

Limit address	The object's moving range can be set by adjusting the data in the designated register, see Example 1.

Example 1

Supposed that the object's moving range is limited by register LW-n, the addresses in the following table are used to limit the moving range.
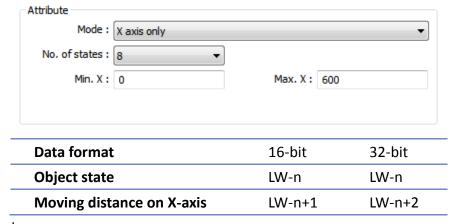
Data format	16-bit	32-bit
[Min. X] address	LW-n	LW-n
[Max. X] address	LW-n+1	LW-n+2
[Min. Y] address	LW-n+2	LW-n+4
[Mas. Y] address	LW-n+3	LW-n+6

13.13.2.1.   Illustration of Modes

Available modes are: (Assume Read Address is LW-n)

● X axis only

The object is only allowed to move along the X-axis. The moving distance ranges from [Min. X] to [Max. X].

Data format	16-bit	32-bit
Object state	LW-n	LW-n
Moving distance on X-axis	LW-n+1	LW-n+2

● Y axis only

The object is only allowed to move along the Y-axis. The moving distance ranges from [Min. Y] to [Max. Y].

Data format	16-bit	32-bit
Object state	LW-n	LW-n
Moving distance on Y-axis	LW-n+1	LW-n+2

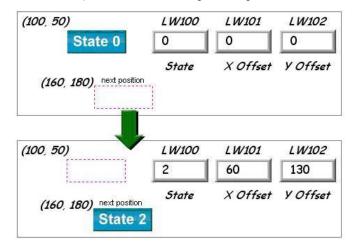● X & Y axis

The object is allowed to move along the X-axis and Y-axis. The moving range in X and Y directions is defined by [Min. X], [Max. X] and [Min. Y], [Max. Y] respectively.

Data format	16-bit	32-bit
Object state	LW-n	LW-n
Moving distance on X-axis	LW-n+1	LW-n+2
Moving distance on Y-axis	LW-n+2	LW-n+4

For example, if the object's read address is LW-100 and the data format is [16-bit Unsigned], LW-100 is used to control the object's state, LW-101 is used to control the object's moving distance on the X-axis, and LW-102 is used to control the object's moving distance on the Y-axis. The following figure shows that the object's read address is LW-100 and initial position is (100, 50). To move the object to the position (160,180) and change its state to State 2, assign 2 to LW-100, 160-100 = 60 to LW-101, 180-50 = 130 to [LW102].

● X axis w/ scaling

The object moves in X-axis only with scaling. Suppose that the value of the designated register is DATA, the system uses the following equation to calculate the moving distance on the X-axis.

$$\text{Displacement} = (\text{Data-[Input low]}) \times \frac{\text{[Scaling high]-[Scaling low]}}{\text{[Input high]-[Input low]}}$$

Data format	16-bit	32-bit
Object state	LW-n	LW-n
Moving distance on X-axis	LW-n+1	LW-n+2

● Y axis w/ scaling

The object is for Y axis movement with scale, and the equation to calculate the moving distance on the Y-axis is the same as the one in [X axis w/ scaling].

Data format	16-bit	32-bit
Object state	LW-n	LW-n
Moving distance on Y-axis	LW-n+1	LW-n+2

● X axis w/ reverse scaling

This works in the way as [X axis w/ scaling], but the moving direction is in reverse.

● Y axis w/ reverse scaling

This works in the way as [Y axis w/ scaling], but the moving direction is in reverse.

13.14. Animation

13.14.1. Overview

Animation object is defined by a pre-defined point set and states. Animation object will then move to a given point in a given state defined by designated registers. The object state and position depend on current value of two consecutive registers. The first register controls the state of the object and the second register controls the position along the predefined path.
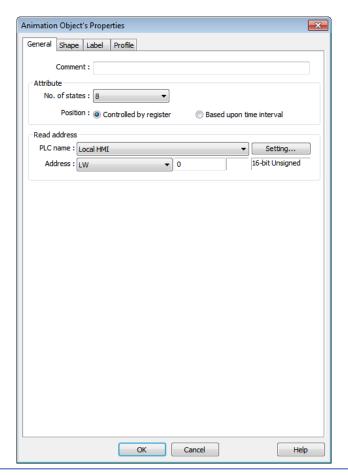
13.14.2. Configuration

Click the Animation icon on the toolbar. First, create the pre-defined path. Move the mouse to each moving position, and click the left button to define positions one by one. When it is done, right click on the screen, set up the properties, press OK button, and a new Animation object will be created.

To change the object's attributes, double click on the object to open Animation Object's Properties dialog box.

General Tab

Setting	Description
Attribute	**No. of states** Configure the number of states for this object. **Controlled by register** Use the designated registers to control the object's state and position. See Example 1. **Based upon time interval** The object's state and position will change from time to time. [Time interval attributes] is used to set the time interval for states and positions. **Position speed:** The speed of movement. The unit is 0.1 second. Supposed that [Speed] is set to 10, the object's position will change each second.

Image state change: Determines how state changes, either [Position dependent] or [Time-based]. If [Position dependent] is selected, the object state will change when position changes. If [Time-based] is selected, the object position will change based on [Position speed] and the object state will change based on [Image update time].

Backward cycle: Assumed the object has four positions: position 0, position 1, position 2, and position 3, and [Backward cycle] is not selected. When the object moves to the last position (position 3), the next position will be back to the initial position 0, and repeat. The moving path is shown as follows:

position 0 → position 1 → position 2 → position 3 → position 0 → position 1 → position 2…

If [Backward cycle] is selected, when the object moves to the last position (position 3), it will move backwards to position 2, position 1 and then the initial position 0, and start over again. The moving path is shown as follows.
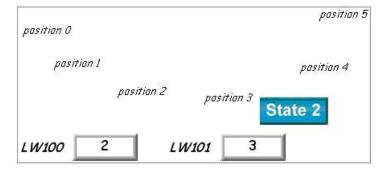
position 0 → position 1 → position 2 → position 3 → position 2 → position 1 → position 0…

Example 1

The object's state and position are determined by the registers, and the addresses must be configured correctly, as in the following table:
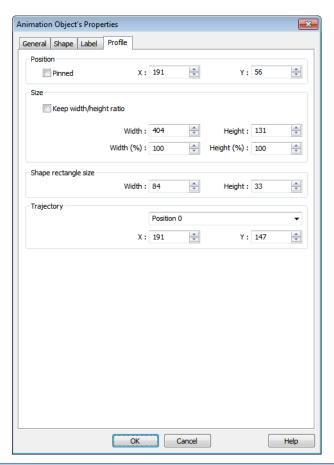
Data format	16-bit	32-bit
Object state	LW-n	LW-n
Object position	LW-n+1	LW-n+2

For example, if the designated register is LW-100 and the data format is [16-bit Unsigned], then LW-100 represents object's state, LW-101 represents position. In the picture below, LW-100 = 2, LW-101 = 3, so the object's state is 2 and position is 3.

Profile Tab

Setting	Description
Shape rectangle size	Set the size of the shape.
Trajectory	Set the position of each point on the moving path.

✎Note

■ Since multiple pictures might be used by an [Animation] object, [Set to original dimension] will not return all pictures to the original size.

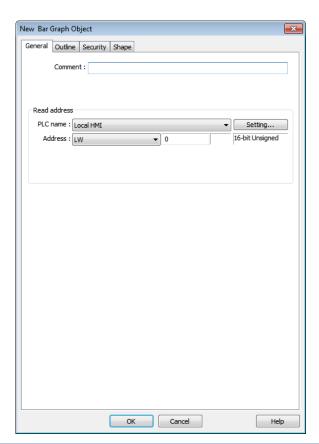## 13.15. Bar Graph

13.15.1. Overview

Bar Graph object displays data as a bar graph for visualization.

13.15.2. Configuration

Click Bar Graph icon on the toolbar to open Bar Graph dialog box. Select properties, click OK button, a new Bar Graph object is created.

General Tab

Setting	Description
Read address	Click [Setting] to Select the [PLC name], [Device type], [Address], [System tag], and [Index register] of the word devices that controls how the bar graph displays.

Outline Tab

Setting	Description
Attribute	**Type** Choose either [Normal] or [Offset]. If [Offset] is selected, an original value [Origin] must be entered for reference. **Direction** Determine the bar graph direction. Available options are [Up], [Down], [Right], and [Left]. **Zero / Span** The percentage of filling can be calculated by the formula, see Example 1. **Bar width ratio (%)** It is the ratio of bar to object width. The figure below shows two ratios, 100% and 50%.
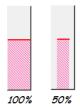
Bar color/style	Set the bar's frame and background color, bar style, and bar color. See the picture below.
Target indicator	When the register value meets the condition, the color of filled area will change to the target color, see Example 2.
Alarm indicators	If the register value is larger than [High limit], the color of filled area will change to [High color]. If the register value is smaller than [Low limit], the color will change to [Low color].
Dynamic taget/alarm /zero(span)	When [Enable] is selected, the [Low limit] and [High limit] of [Alarm indicator] and the [Target Value] of [Target indicator] will use designated registers, which is shown in their respective fields see Example 3.

Example 1

The percentage of filling can be calculated by the following formula:
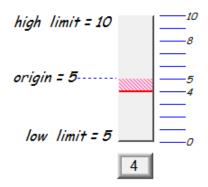
$$\text{Percentage of filling} = \frac{\text{Register value} - [\text{Zero}]}{[\text{Span}] - [\text{Zero}]} \times 100\%$$
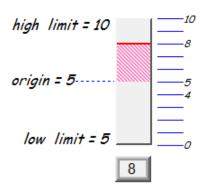
Assume [Offset] is selected. If (Register value – [Zero]) is greater than 0, the bar will fill up from [Origin]. If (Register value – Zero) is less than 0, the bar will be drawn below [Origin].

For example, [Origin] is 5, [Span] is 10, and [Zero] is 0.
For different value in read address, it will display as below:

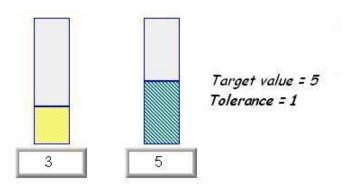If the value at read address is 4:   If the value at read address is 8:

Example 2

When the register value meets the following condition, the color of filled area will change to the target color.

[Target Value] - [Tolerance] ≤ Register value ≤ [Target Value] + [Tolerance]

Assume [Target Value] is 5 and [Tolerance] is 1. As shown below, if the register value is equal to or larger than 4 (=5-1) and equal to or less than 6 (=5+1), the filled area's color of the bar will change to the target color.

Target value = 5
Tolerance = 1

Example 3

If [Dynamic target/alarm] is enabled, [Low limit] and [High limit] of [Alarm indicator] are defined by designated registers as shown in the following table. Furthermore, if [Dynamic zero/span] is used, [Zero], [Span] and [Origin] will be defined by designated registers. Assume the address is LW-n, the limits are:

Data format	16-bit	32-bit
Alarm Low Limit	LW-n	LW-n
Alarm High Limit	LW-n+1	LW-n+2
Target	LW-n+2	LW-n+4
Zero	LW-n+3	LW-n+6
Span	LW-n+4	LW-n+8
Origin	LW-n+5	LW-n+10

13.16. Meter Display

13.16.1. Overview

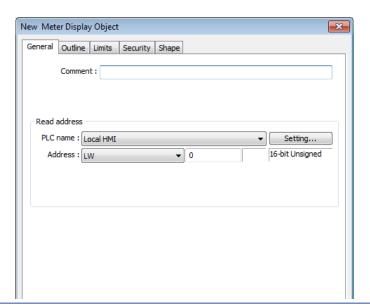Meter Display object displays the value of word register with a meter.

13.16.2. Configuration

Click the Meter Display icon on the toolbar to open the Meter Display dialog box. Set the object's attributes and then click OK to create a new Meter Display object.
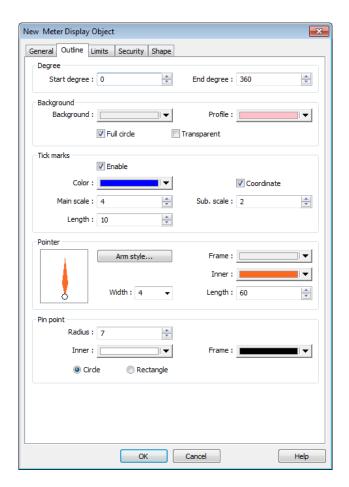
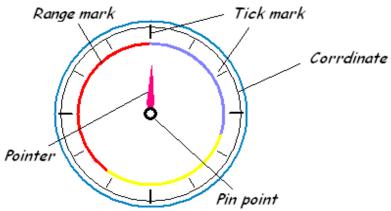#### 13.16.2.1.   eMT, iE, XE, mTV Series

General Tab

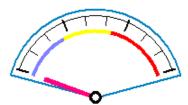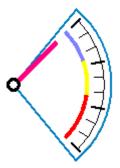| Setting	Description
Read address	Click [Setting] to select the [PLC name], [Device type], [Address], [System tag], and [Index register] of the word devices that controls the Meter Display object.

Outline Tab

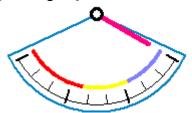| Setting	Description
Degree	Sets the object's start degree and end degree measured clockwise from the 12 o'clock position. The angle range is 0 to 360 degrees. The following shows meters of different settings.

- [Start degree] =290°
  [End degree] = 70°

- [Start degree] = 120°
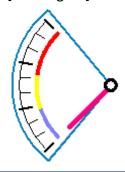 [End degree] = 240°

- [Start degree] = 40°
  [End degree] = 140°

- [Start degree] = 225°
  [End degree] = 315°

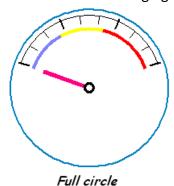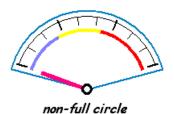|	
Background	Sets the object's background color and profile color.

Full circle

When selected, the object will display the whole circle. Otherwise, the object will only display a partial circle in the defined degree range, as shown in the following figure.
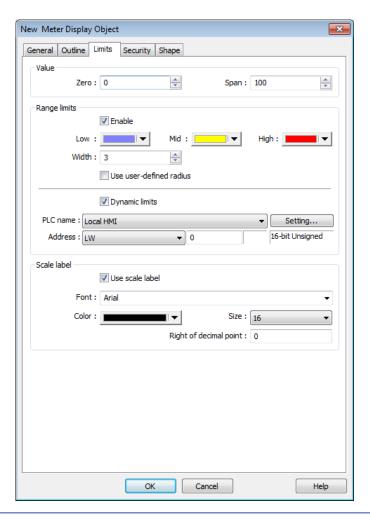
Full circle   *non-full circle*

Transparent

When selected, the object will not display the background and profile color.

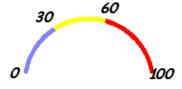|	
Tick marks	Configures the number of tick mark and color.
Pointer	Configures pointer's style, length, width, and color.
Pin point	Configures the style, radius, and color of the pin point.

Limits Tab

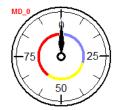| Setting	Description
Value	Sets the object's display range. Meter Display object will use the value of [Zero] and [Span] and the value of register to calculate the pointer's position. See Example 1.
Range limits	Configures the values of [Low limit], [High limit], their corresponding display colors, and the width. **Use user-defined radius** Configures the radius to display range limits. For example, set to 80: Set to 30:

Dynamic Limits

The low limit and high limit are set by registers. See Example 2.

| Scale label | Select the attribute of scale label on Meter Display. |

Example 1: Pointer position calculation

Set object's display range. Meter Display object will use the value of [Zero] and [Span] and the value of register to calculate the pointer's position. For example, supposed that [Zero] is 0, [Span] is 100, when the value of register is 30, [Start degree] is 0, and [End degree] is 360, then the degree indicated by the pointer is:

{ (30 – [Zero]) / ([Span] – [Zero]) } * ([End degree] - [Start degree]) =

{(30 – 0) / (100 - 0)} * (360 – 0) = 108

Pointer will be pointing at 108 degrees.

Example 2: Dynamic Limits

The low limit and high limit are set by the register.

Suppose the address is LW-n, the following table shows the read address of low limit and high limit:

Content	16-bit	32-bit
Low limit	LW-n	LW-n
High limit	LW-n+1	LW-n+2
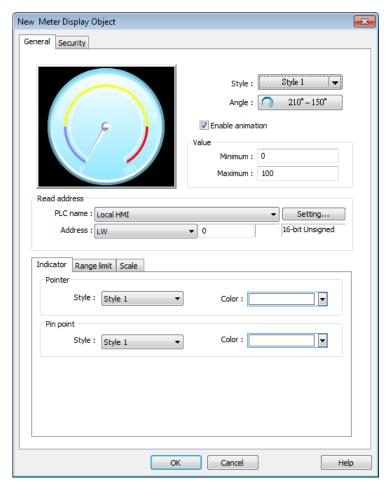
For instance, when address is LW-100, the rule of setting limits is:
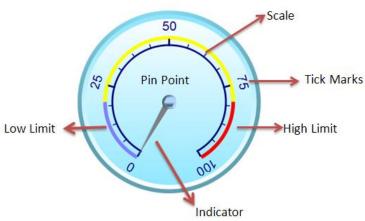
Content	16-bit	32-bit
Low limit	LW-100	LW-100
High limit	LW-101	LW-102

13.16.2.2.   cMT Series

General Tab

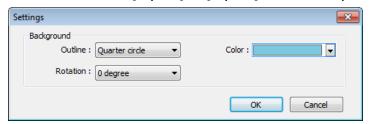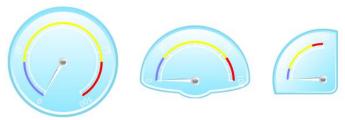| Setting	Description
Style	Three options are available: [Custom], [Style 1], and [Style 2]. Click on the text to configure the properties. If [Custom] is selected, set the properties such as [Pointer], [Pin point], [Background picture], etc.

Setting	Click the button of [Style 1] or [Style 2] to set the style of meter.
	Outline
	The following is the outline of Style 1 when [Full circle], [Half circle], or [Quarter circle] is selected.
	The following is the outline of Style 2 when [Full circle], [Half circle], or [Quarter circle] is selected.
	Rotation
	Rotates the background picture clockwise according to the angles set.
	Color
	Sets the color of the background picture of meter.
Angle	Sets the range to label the scale, 0° to 360° clockwise or counterclockwise from the twelve o'clock position.
	Full circle
	If selected, the full circle is drawn according to the selected direction and the start angle. The limits are determined by the value set in [Minimum] and [Maximum] field under [Value].
Enable animation	If selected, the pointer slides to the designated position when the read value changes; if not selected, the pointer directly points to the designated position when the read value changes.
Value	Sets the lower and upper limits of the meter.
Read address	Displays the value in meter according to the value in the designated word register.
Indicator	Sets the style of pointer and pin point. If [Custom] is selected, the direction of the pointer must points upward to correctly display.

Range limit	Sets the colors to indicate different ranges. **Dynamic limits** The low limit and high limit are decided by the register. See Example 2 above.
Scale	Sets the number of main and sub scale, the color of tick marks and scale label.

13.17. Trend Display

13.17.1. Overview

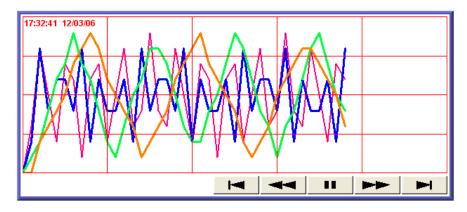Trend display objects draw curves of the data recorded by Data Sampling object.

13.17.2. Configuration

Click the Trend Display icon on the toolbar to open a Trend Display object property dialog box.
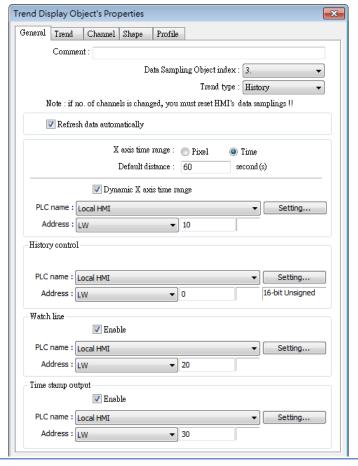Set up the properties, press OK button, and a new Trend Display object will be created.

13.17.2.1.   eMT, iE, XE, mTV Series

General Tab

Button	Description
⏮	Go to the earliest sampling data.
◀◀	Go to the previous time interval.
⏸	Click to stop auto-scrolling. When the new sampling data is generated, the display does not scroll, nor is the new data outside the display range displayed.
▶	Click to start auto-scrolling. The display scrolls as the new sampling data is generated.
▶▶	Go to the next time interval.
⏭	Go to the latest sampling data.

Setting	Description
Data Sampling Object index	Select a Data Sampling object as the source data.
Trend type	Select the mode of data source, either [Real-time] or [History]. **Real-time** In this mode, the display object shows all sampled data since the HMI started. The maximum number of records that can be sampled is set in [Max.data records] (Real-time mode) of the Data Sampling object. When the sampling data exceed this setting, the earlier data will be deleted.To show older data, use [History] mode. [Hold control]: Suspends the update of Trend Display. However, It does not stop the sampling process of Data Sampling object. **History** In this mode, the data comes from the history data files stored on HMI. . The history data files are sorted by dates and each is given an index. The system uses [History control] to select the history data files that are created on different dates. The system sorts the history data of sampling data by date; the

latest file is record 0 (typically the data sampled today), the second latest file is record 1, and so on. If the value of designated register in [History control] is n, the Trend Display object will display data record n.
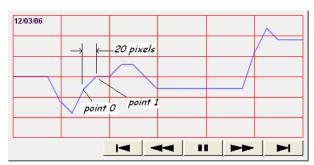
Here is an example to explain [History control]. If the designated register is LW-0, and the sampling data files available are pressure_20061120.dtl, pressure_20061123.dtl, pressure_20061127.dtl, and pressure_20061203.dtl, and it is 2006/12/3 today, based on the value of LW-0, the sampling data file which will be selected by [Trend Display] is shown as follows:

Value of LW-0	Selected sampling history data
0	pressure_20061203.dtl
1	pressure_20061127.dtl
2	pressure_20061123.dtl
3	pressure_20061120.dtl

If use with Option List object and select data source as [Dates of historical data], the history data will be sorted by date and displayed in Option List object, see "13.29 Option List".
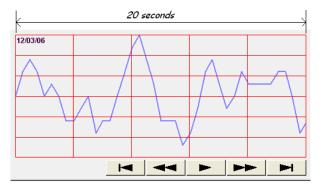
Pixel

[Distance] is used to set the distance between two sampling points, as shown in the following figure.

Time

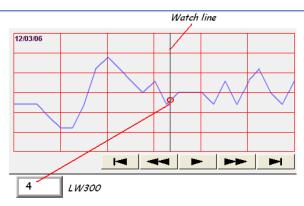[Distance] is used to set the X-axis in unit of time, as shown in the following figure.

Select [Time] for [X axis time range] and go to [Trend] » [Grid] and

	enable [Time scale]. Please refer to [Time scale] in the later section.
Dynamic distance between data samples/ Dynamic X axis time range	Designate a 32-bit word register for adjusting the distance between two sampling points (select Pixel), or the time unit represented by X-axis (select Time). If no value is entered, the default value will be used.
Refresh data automatically	If selected, every time when opening the window on which the Trend Display object in history mode is placed, the display is automatically refreshed every 10 seconds. Please note that: ● The refresh status can be observed from the control button of Trend Display object. Showing ▮▮ button: The automatic refresh feature is enabled. Showing ▶ button: The automatic refresh feature is disabled. ● When scrolling to the previous data, the automatic refresh feature is disabled, the ▶ button is shown. ● If [Refresh data automatically] check box is selected, when change back to the window, the display is refreshed, ignoring the control buttons. For example, select [Refresh data automatically], and scroll to the previous data, the automatic refresh feature is disabled. In this case, changing to another window and then change back will still refresh the display. ● If [Refresh data automatically] check box is not selected when building the project, the feature can still be enabled by pressing ▶ button on HMI. In this case, the automatic refresh feature is disabled, that is, even when change back to the current window, the display will not be refreshed.
Hold control	When the register is set ON, suspend the update of Trend Display. It does not stop the sampling process of Data Sampling object. This setting is available only in Real-time mode.
Watch line	Use the [Watch line] function to display a "watch line" when user touches the Trend Display object. It will also export the sampling data at the position of watch line to the designated word device and use Numeric Display objects to display the results, as shown in the following figure.

[Watch line] can also export sampling data with multiple channels. The system will consecutively write each channel to the specified address and the following addresses, in the same order as in [Data Sampling] object. The address assigned to [Watch line] is the start address, and sampling data for each channel will be exported to the word devices starting from "start address." If the data format of each channel is different, the corresponding address of each channel is arranged from the first to the last. If the watch register is LW-300, watch function will export each channel's data to the following addresses:

Register	Channel	Data format
LW-300	0	16-bit Unsigned (1 word)
LW-301	1	32-bit Unsigned (2 words)
LW-303	2	32-bit float (2 words)
LW-305	3	16-bit Signed (1 word)

| **Time stamp output**	Time stamp output
	Suppose the address is set to LW-n, then:
	If enabled, the system will use the time of the first sampling data as "time origin", and write the time stamp of the most recent sampled data (relative to "time origin") to [LW-n+2].
	When clicking on the curve, the time stamp of the closest sampled point will be written to [LW-n].
	Clear real-time data address (Data Sampling object) will clear the time origin as well.
	Time stamp is recorded in seconds.

✎**Note**
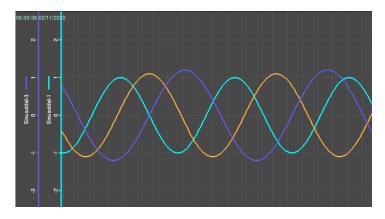
■ LW-n and LW-n+2 are both in 32-bit format.

■ LW-n is for both real-time and history mode, whereas LW-n+2 only applies to real-time mode.

■ This function is available upon enabling [relative time mode] in [Trend] tab.
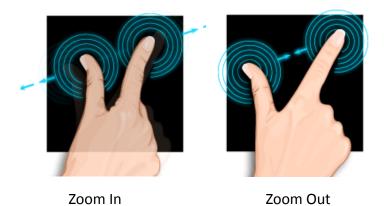
13.17.2.2.　cMT Series
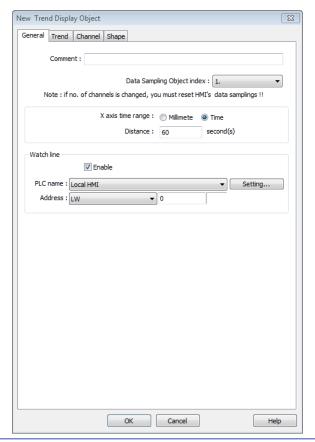
General Tab

The Trend Display on cMT Series combines Real-time mode and History mode. Drag left to scroll the Trend Display to view history data and drag right to view the latest sampling data. Pinch two fingers together to zoom out Trend Display or spread them apart to zoom in.

Zoom In　　　　　　　　Zoom Out

For more information about how sampling data is saved, see "8 Data Sampling".
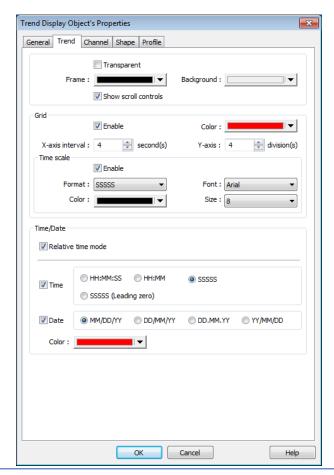
Setting	Description
Data Sampling Object index	Select a [Data Sampling] object as the source data.
Millimeter	See 13.1.2.1.
Time	See 13.1.2.1.
Watch line	See 13.1.2.1.

Trend Tab

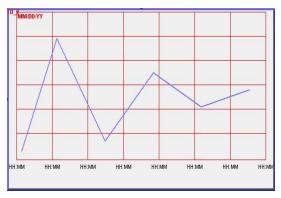| Setting	Description
Frame / Background	Select the color of frame and background.
Show scroll controls	Enable or disable the scroll control as shown in the following figure.
Grid	Set the number of dividing lines and the line color. The number of divisions depends on the setting in General tab. **X-axis interval** The number of vertical grid lines. ● Select [Pixel] / [Millimeter] in General tab: Select how many sampling point will be included between two vertical grid lines. ● Select [Time] in General tab: Select the time range between two vertical grid lines. **Y-axis interval** The number of horizontal grid lines.

Time scale	Select [Enable] check box to display the time scale along the x axis.

Format

The available time scale formats: HH:MM or HH:MM:SS.

Font / Color / Size
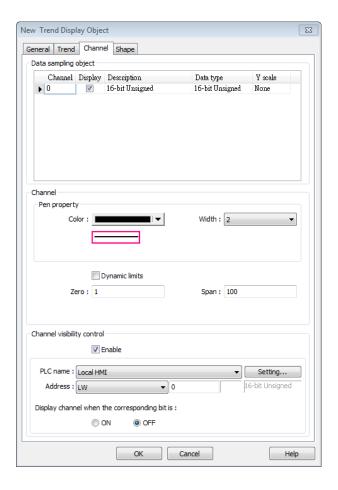
Select the font, font color, and font size of the time scale.

The default font size is 8.

Time / Date	The time of latest sampling data will be marked on the top left corner of the object. This group box is used to set the time display format and font color.

Channel Tab

Setting	Description
Y scale	Available only for cMT Series, see "13.17.2.3 Y Scale Usage".
Channel	Configure each sampling line's format and color. At most 64 channels could be configured.

Dynamic limits

● Not selected:

[Zero] and [Span] are used to set the low limit and high limit of sampling data. If the low limit is 50 and the high limit is 100 for one sampling line, [Zero] and [Span] must be set as [50] and [100], so that all the sampling data can be displayed in the trend display object.

● Selected

The low limit and the high limit are read from the designated word devices, as shown below. When address is LW-n , the register's address:

Data Format	16-bit	32-bit
Low limit	LW-n	LW-n
High Limit	LW-n+1	LW-n+2

For example, if LW-100 is used here, the low limit and the high limit will be read from:

Data Format	16-bit	32-bit
Low limit	LW-100	LW-100
High Limit	LW-101	LW-102

A typical usage of this is to zoom in and zoom out of Trend Display. (Not available for cMT Series). See Example 1.

Setting	Description
Channel visibility control	If [Enable] is selected, the bits of the assigned word register will be used to show/hide each channel. The first bit controls the first channel, and the second bit controls the second channel, and so on. For example, suppose there are 5 channels and LW-0 is used, channels which will be shown given the states of the control bits are:

Channel	Control Bit	State	Displayed
1	LW_bit-000	OFF	YES
2	LW_bit-001	ON	NO
3	LW_bit-002	ON	NO
4	LW_bit-003	OFF	YES
5	LW_bit-004	OFF	YES

Note on using this feature: Each control bits are not reserved for

the channel. If a particular channel is not displayed, the control bit is assigned to the next displayed channel. For example, if the third channel of the 5 channels is not displayed, only 4 channels will be displayed in Trend Display, and the used control bits will only be: LW_bit-000~003.

Example 1

The example explains how to zoom in or zoom out Trend Display. The feature described is not available for cMT Series.

In Channel tab select [Dynamic limits] check box. If the [Address] is set to LW-n, then LW-n controls the low limit where LW-n+1 controls the high limit.

Set [Address] to LW-0 and create two Numeric Input objects for entering the low / high limit. The address that controls the low limit is LW-0; the address that controls the high limit is LW-1. Let's suppose the data is between 0 and 30; set the [Low limit] to 0 and the [High limit] to 30, the trend curve is displayed as shown in the following figure.

To zoom out the Trend Display, enter a value greater than 30 in [High limit] as shown in the following figure.

To zoom in the Trend Display, enter a value less than 30 in [High limit] as shown in the following figure.

13.17.2.3.   Y Scale Usage

This feature is only available for cMT Series. The scale along the Y axis of a specific channel can be displayed. To enable Y Scale, [Grid] should first be enabled in [Trend] tab. Y Scale can be configured on the iPad as shown in the following steps.

1.   Tap the button on the upper right corner of Trend Display object.

2.   Tap [Trend Display Setting] » [Y Scale].

3.   Select the channels.

13.18. History Data Display

13.18.1. Overview

History Data Display object displays data stored by Data Sampling object. It differs from Trend Display in that History Data Display object uses a table to display data. In case when the trend display shows history data from today, the display will refresh every 10 seconds. The following is an example of a history data display object.

No.	Time	Date	Ch.0	Ch.1	Ch.2
3577	21:52	16/09/07	0	0	0
3576	21:52	16/09/07	0	0	0
3575	21:52	16/09/07	0	0	0
3574	21:52	16/09/07	0	0	0
3573	21:52	16/09/07	0	0	0
3572	21:52	16/09/07	0	0	0
3571	21:52	16/09/07	0	0	0
3570	21:52	16/09/07	0	0	0
3569	21:52	16/09/07	0	0	0
3568	21:52	16/09/07	0	0	0
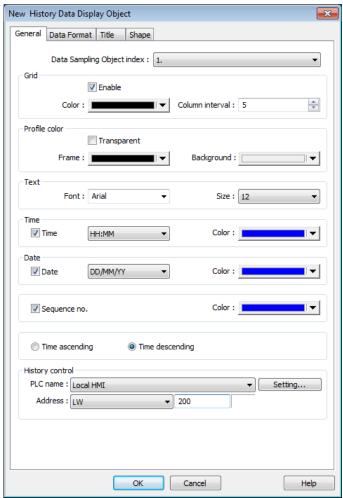
13.18.2. Configuration

Click the History Data Display icon on the toolbar to open a History Data Display object property dialog box. Set up the properties, press OK button, and a new History Data Display object will be created.

General Tab
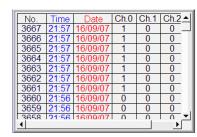
Setting	Description
Data Sampling object index	Select a Data Sampling object as the source data.
Grid	Shows grids between rows and columns. **Color** Change the color of grids. **Column interval** Change the width of each column. The figures below are the examples.
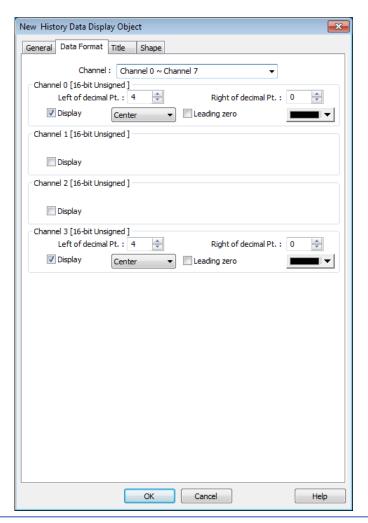
Profile color	Change the color of frame and background. Use [Transparent] to hide frames and background.
Time / Date	Enable or disable showing the time and date and configure its format. **Time ascending** Put earlier data at the top and the latest data at the bottom. **Time descending** Put the latest data at the top and the earlier data at the bottom.
History Control (eMT, iE, XE, mTV Series)	The history files are sorted by date and each file is given an index. The latest one is assigned index 0 (in most cases: today), the second latest file is assigned index 1, and so on. [History Control] is used to specify the history data to be shown.

Note

■ When using cMT-SVR, use the filter icon in the upper-right corner of History Data Display object on iPad to select the date and display the data.

Data Format Tab

Setting	Description
Channel	Each History Data Display object can display up to 64 channels. Check [Display] to select the channels to be shown on the screen. In the figure above, there are 4 channels (channel 0 to channel 3) in the Data Sampling object, and only Ch.0 and Ch.3 are selected. The data formats are shown next to channel name. The data format of each channel is decided by the corresponding Data Sampling objects. The result is shown below:
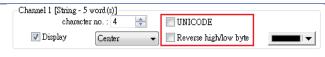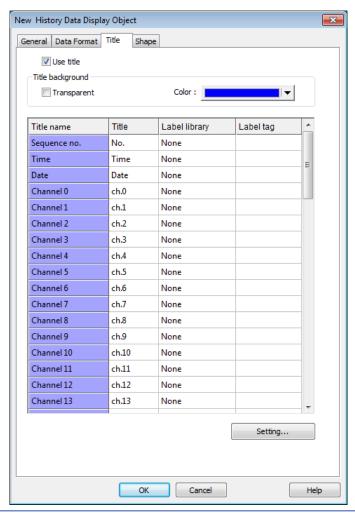
When display [String] format in History Data Display object, there are two additional options:
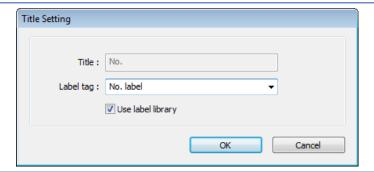
- Display in [UNICODE] mode
- Reverse high byte and low byte data and then display.

Title Tab

Setting	Description
Use title	Enable or disable title, which is marked as shown below:
Title background	**Transparent** When selected, hide the background for title area. **Color** Set the background color of title.
Setting	Defines the text to be shown on the title. Label Tag Library can be used for title in order to display the title in multiple languages. Click [Setting] and select [Use label library].

Title Setting

Title : No.

Label tag : No. label ▼

☑ Use label library

OK   Cancel

✎**Note**
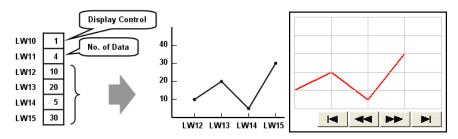
■ During off-line simulation, if the format of sampling data has been changed, please delete previous data records in C:\[EasyBuilder Pro directory]\HMI_memory\datalog to prevent the system from misinterpreting the old data records.

13.19. Data Block Display

13.19.1. Overview

Data Block is a combination of several word devices with continuous address, where the X axis of Data Block Display object represents the address and the numbers on the Y axis represent the data values in the corresponding address. Data Block Display object can display multiple data blocks. For example, it can display two data blocks LW-12~LW-15 and RW-12~RW-15 in trend curves simultaneously. It is very useful to observe and compare the difference of trend curves.
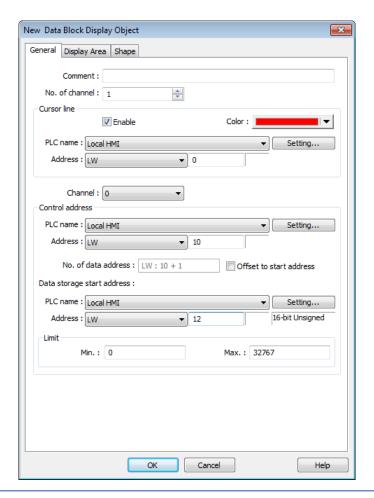
The display result

13.19.2. Configuration

 Click the Data Block Display icon on the toolbar to open the property dialog box. Set up the properties, press OK button, and a new Data Block Display object will be created.

General Tab

Setting	Description
Comment	Description of the object.
No. of channel	Set the no of channel for this object. Each channel represents one data block. The maximal number of channels is 12.
Cursor Line	If enabled, when user touches the [Data Block Display] object, it will display a vertical cursor line on it, and store the data on the line to the designated registers. See Example 1.
Channel	Select the channel to be configured.
Control address	Specify the control address also the data source. Control address is used to control and clear the drawn curve. After executing the operation below, the system will reset the control word to zero. Enter "0" = No action (default) Enter "1" = Draw (Without clear first) Enter "2" = Clear Enter "3" = Redraw **No. of data address** If control address is LW-n, then LW-n+1 stores the number of word

devices in each data block, i.e. the number of data. The maximum value is 1024.

Data storage start address

If [Offset to start address] is enabled, the [Offset value storage address] will be set as [Control address] + 2.

If select 16-bit data format, the address for each data will be start address, start address + 1, start address + 2 and so on.

If select 32-bit data format, the address for each data will be start address, start address + 2, start address + 4 and so on.

For more information about control address, see Example 2 to 5.

Limit	Set the minimum and maximum limit for the curve.

Note

■ The system can draw at most N curves, where N = 32 divided by the number of channel.
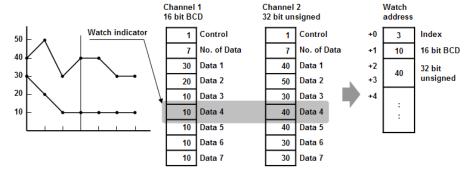
Example 1

How to use watch (Cursor Line) feature

Use "Watch" function to check the value of any point of the curve. When the user touches [Data Block] object, it will display a "cursor line", and the system will write the index and value of that data on the cursor line to the designated address.

Data Format	Index Value	Channel 1 Value	Channel 2 Value
16-bit	Address	Address + 1	Address + 2
32-bit	Address	Address + 2	Address + 4
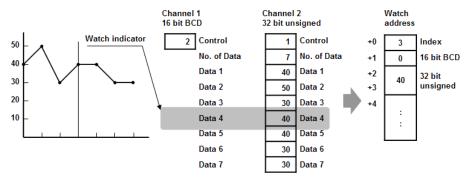
When watch address is set to LW-n, the value written into LW-n represents the channel index number to be called up. (Start form 0)

Note
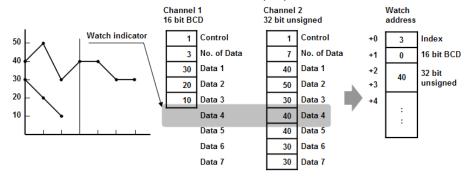
■ [Data Index] is a 16 bit unsigned integer. When the designated register of cursor line is 32 bit device, it will be stored in the bit 0-15.

■ If the channel to be viewed has no data, "0" will be displayed, as shown below. In the example, there is no data in channel 1, when the cursor points at Data 4, "0" will be displayed as shown below.
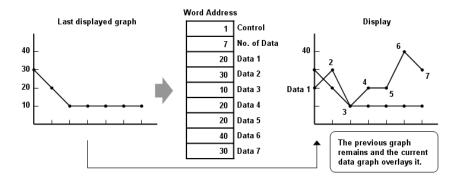
■ If there is less data in Channel 1, "0" will be displayed, as shown below.

Example 2

How to show a data block

1. Write the number of data to [No. of data address], i.e. "Control address+1"

2. Store the data consecutively beginning at [Data storage start address].

3. Write "1" to [Control address] to draw the curve without cleaning the plot. All previous curves will not be erased.

4. The system will write "0" to [Control address] after marking the plot.

✎Note

■ Do not change the content of [Control address], [No. of data address] and [Data storage start address] between step 3 and step 4 above as doing so might cause error for the trend curve plot.
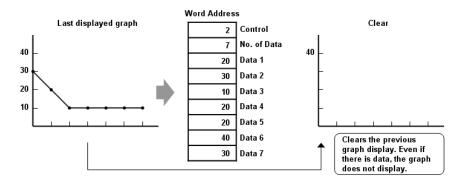
Example 3

How to clear the graph

1. Write "2" to [Control address], all the trend curves will be cleared.
2. The system will write "0" to [Control address] after the trend curve is cleared.
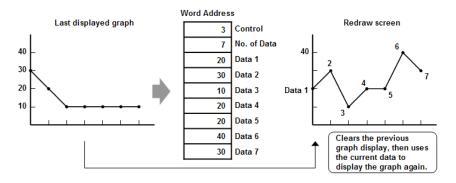
Example 4

How to clear the previous trend curve and display new one

1. Write the number of data to [No. of data address], i.e. "control address+1"
2. Store the data consecutively beginning at [Data storage start address].
3. Write "3" to [Control address], the previous trend curves will be cleared and the new content in data block will be plotted on the screen.
4. The system will write "0" to [Control address] after the trend curve has been plotted.

Example 5

How to use offset mode
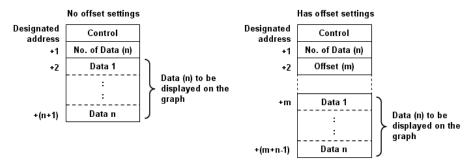
If [Offset to start address] is selected, [Control address], [No. of data address], and [Offset value storage address] will use 3 consecutive addresses.

For example, assume the total number of channels is 3 (start from 0 to 2), and the [Control address] are LW-0, LW-100, and LW-200, respectively. Then, the other addresses will be set as follows: (In the example, format 16-bit Unsigned is used and [Offset value storage address] are all m).

Item	Channel 0	Channel 1	Channel 2
Control Address	LW-0	LW-100	LW-200
No. of data address	LW-1	LW-101	LW-201
Offset value storage address	LW-2 (=m)	LW-102 (=m)	LW-202 (=m)
Data 1	LW-0+m	LW-100+m	LW-200+m
Data 2	LW-1+m	LW-101+m	LW-201+m
…	…	…	…

The following figure on the left shows the result when offset mode is not used while the figure on the right shows the result when offset mode is used.

✎ Note

■   When [Control address] is set to LW-n, [No. of data address] and [Offset value storage address] are as follows:

Data Type	16-bit	32-bit
Control address	LW-n	LW-n
No. of data address	LW-n+1	LW-n+2
Offset value storage address	LW-n+2	LW-n+4
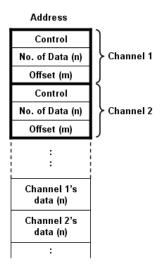
■   If the control registers are 32-bit devices, only bit 0-15 will be used for control purpose, bit 16-31 will be ignored. (as illustrated below)
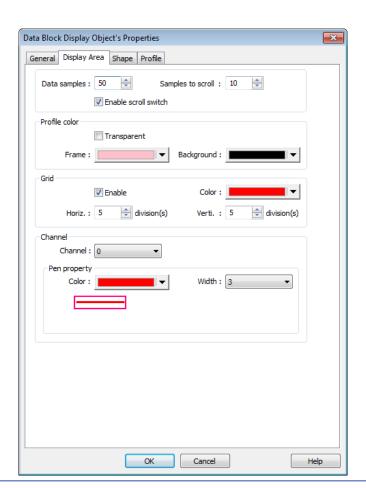
■   When the value in [Control address] is not zero, the system will read [No. on data address] and [Offset value storage address].

■   It is recommended to use [Offset to start address] for data block display with multiple channels and the same device type. As shown in the following figure, The control words of

channel 1 is located from LW-n, the control words of channel 2 is located from LW-n+3, and so on.

Display Area

Setting	Description
Description	**Data samples** Configure the maximal number of data samples (points) to be displayed.

	Samples to scroll Configure the number of data samples being scrolled. **Enable scroll switch** Clicking ◄◄ ►► displays the previous or next data point. Clicking ⏮ ⏭ displays the first or the last data point.
Profile	Set the color of the frame and background of the object. **Transparent** Hides the background. Color selection will not be available.
Grid	Set the number of horizontal and vertical divisions shown by grid.
Channel	Set the color, width and style of each curve.

13.20. XY Plot

13.20.1. Overview
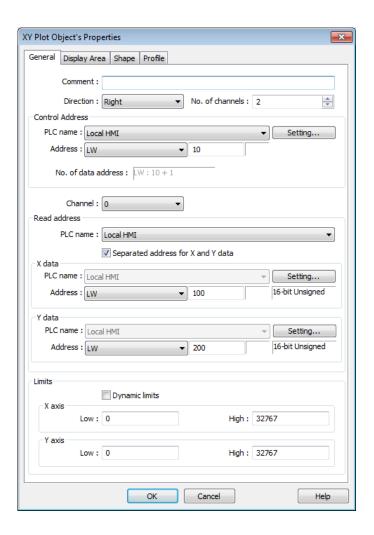
XY Plot object is used to display values for two variables (x,y) for a set of data, where the data comes from word registers. Up to 16 channels can be displayed simultaneously. This object facilitates data observation and analysis. Additionally, negative numbers can be displayed as well.

13.20.2. Configuration

Click the XY Plot icon on the toolbar to open a [XY Plot] object property dialog box.

General Tab

Setting	Description
Direction	There are four selections, right, left, up or down.
No. of channels	Set the number of channels for observation.
Control address	Controls the operation of all channels simultaneously. When the [Control address] is LW-n, assigning values to LW-n will issue commands to XY plot according to the table below. Meanwhile, LW-n+1 l controls the number of data points plotted. After operation, the [Control address] will be reset to 0.

Control address	Value	Result
LW-n	1	Plots point on XY curve. (The plotted points are kept.)
	2	Clears all XY curves.
	3	Clears then plots new XY curve.
LW-n+1	Any number	Controls the number of data points plotted.

No. of data address

Controls the number of data points. Each channel can plot up to 1023 points.

Setting	Description
Channel	Select a channel to configure.
Read Address	**PLC name** Select a PLC which will be the source of [X data] and [Y data] and designate a read address. The format of the data register blocks used for the display channels depends on whether [Separated address for X and Y data] and/or [Dynamic limits] has been selected. See Example 1.
Dynamic limits	● When **not** selected (See Example 2) The Low and High limits can be set by entering constants. The Low and High limits are used for calculating X and Y range in percentage. ● When selected (See Example 3) A zoom effect can be created by changing the Low / High Limits.

Example 1

The format of the data register blocks used for the display channels depends on whether [Separated address for X and Y data] has been selected, and if [Dynamic limits] has been selected. The following explains the situations where 16-bit register is used:

● If [Separated address for X and Y data] is **not** selected, and set [Read address] to LW-n:

	Select [Dynamic limits]		**Not** select [Dynamic limits]	
	X data	**Y data**	**X data**	**Y data**
Low Limit	LW-n	LW-n+2	Constant	Constant
High Limit	LW-n+1	LW-n+3	Constant	Constant
1st data	LW-n+4	LW-n+5	LW-n+0	LW-n+1
2nd data	LW-n+6	LW-n+7	LW-n+2	LW-n+3
3rd data	LW-n+8	LW-n+9	LW-n+4	LW-n+5
4th data	LW-n+10	LW-n+11	LW-n+6	LW-n+7

● If [Separated address for X and Y data] is selected, and set [X data] to LW-m, [Y data] to LW-n:

	Select [Dynamic limits]		**Not** select [Dynamic limits]	
	X data	**Y data**	**X data**	**Y data**
Low Limit	LW-m+0	LW-n+0	Constant	Constant
High Limit	LW-m+1	LW-n+1	Constant	Constant
1st data	LW-m+2	LW-n+2	LW-m+0	LW-n+0
2nd data	LW-m+3	LW-n+3	LW-m+1	LW-n+1
3rd data	LW-m+4	LW-n+4	LW-m+2	LW-n+2
4th data	LW-m+5	LW-n+5	LW-m+3	LW-n+3

Example 2

When [Dynamic limits] is not selected, the Low and High limits can be set. The Low and High limits are used for calculating X and Y range in percentage.

$$\text{Scale } (\%) = \frac{\text{Read Address Value} - \text{Low Limit}}{\text{High Limit} - \text{Low Lmit}}$$

If [Separated address for X and Y data] is **not** selected and the address is LW-n, the corresponding limits are retrieved from the addresses as shown in the following table.
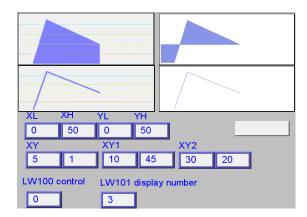
Data format	16-bit	32-bit
X axis low limit	LW-n	LW-n
X axis high limit	LW-n+1	LW-n+2
Y axis low limit	LW-n+2	LW-n+4
Y axis high limit	LW-n+3	LW-n+6
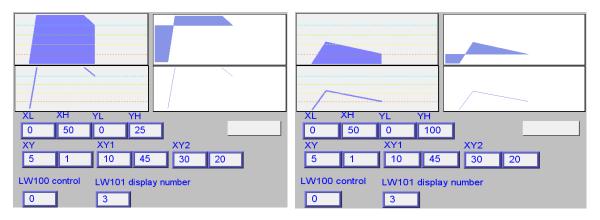
Example 3

If **[Dynamic limits]** is selected, a zoom effect can be created by changing the setting of Low / High Limits.

In the following example, XL=X low limit, XH=X high limit, YL=Y low limit, YH=Y high limit, and XY, XY1, XY2 are three XY data. When changing the high limits of X and Y axis, the result is shown below:
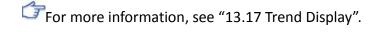
Original

Change the high limit of Y axis to 25. (zoom in)

Change the high limit of Y axis to 100 (zoom out)

For more information, see "13.17 Trend Display".

Note
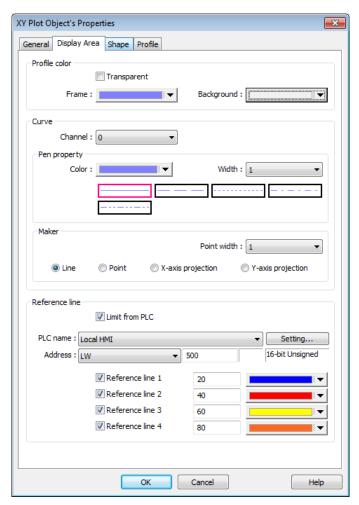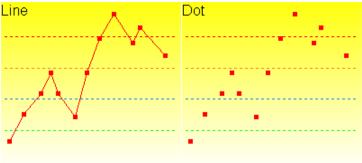
- For cMT Series, on the screen of the visualization device directly pinch two fingers together to zoom out or spread them apart to zoom in.
- X and Y data can be set to different formats. For example: If X data uses 16-bit unsigned, Y data uses 32-bit signed, please note the address setting.
- When using a Tag PLC, such as AB tag PLC, X and Y must be in the same format. When using different formats a warning will be shown.
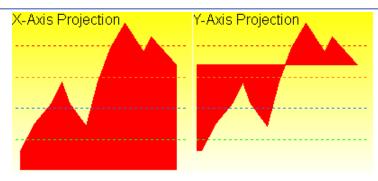
Display Area Tab

Setting	Description
Profile color	Select the color of the frame and the background, or select [Transparent] check box to hide the frame and background.
Curve	For each channel select the properties of color, width, and line style.
Maker	There are four different types of XY plot. The result is shown below:

See Example 4.

Reference line	Up to 4 horizontal reference lines can be shown on the graph. Fill in high, low limits and Y axis percentage values. Different colors can be selected for each reference line. If [Limit from PLC] is selected, designate a register to be the read address of reference line.
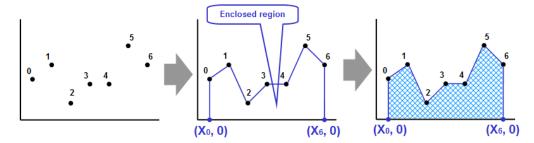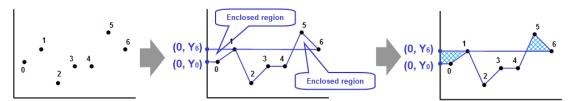
Example 4

The curve shown in the following figure is drawn with 7 points numbered from P0 to P6.

The steps the system draws the X-axis Projection are:

1. Calculates the two points in X-axis – $(X_0, 0)$ and $(X_6, 0)$.
2. Link all the points in the order of $(X_0, 0)$, P0… P6, $(X_6, 0)$ and returns to $(X_0, 0)$ at last.
3. Fill out all enclosed areas.

Similarly for Y-axis projection:

Note

■   XY Plot can be drawn repeatedly up to 32 times:

1 channel➜32 times

2 channels➜16 times

The way to calculate: 32 divided by the number of channels.

13.21. Alarm Bar and Alarm Display

13.21.1. Overview

Alarm Bar and Alarm Display objects are used to display alarm messages which are defined in Event (Alarm) Log objects. When the trigger conditions are met, events or alarms will be displayed as they occur in chronological order in Alarm Bar or Alarm Display object.
Alarm Bar scrolls all alarm messages in one single display line, whereas Alarm Display shows alarm messages in multiple lines.

☞For more information, see "7 Event Log".
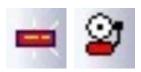
Alarm Bar - Displays alarm messages in one scrolling line.

Alarm Display – Displays alarm messages in multiple lines.
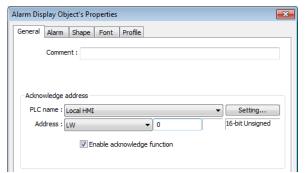
13.21.2. Configuration

Click the Alarm Display or Alarm Bar icon on the toolbar to open the object property dialog box. Set up the properties, press OK button, and a new object will be created.

General Tab

The difference between these two objects is that Alarm Display allows an [Acknowledge address] to be set.
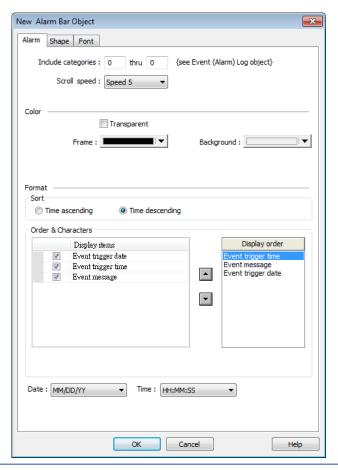
If [Enable acknowledge function] check box is selected, the [Acknowledge value] selected for the associated event, specified in Alarm (Event) Log will be written to the [Acknowledge address] designated in Alarm Display.

Note

■ When using cMT-SVR, press and hold the event on the screen to acknowledge an event; drag a finger on the screen to scroll.

The following are general settings of these two objects:

Alarm Tab

Setting	Description
Include categories	Events in the selected category will be displayed. The categories are set in Event (Alarm) Log object. For example, if the category is set to "2 to 4" here, only events in categories 2, 3, 4 will be displayed. For more information, see "7 Event Log".
Scroll speed	This selection is only available for Alarm Bar. Select one of the speed settings at which the messages scroll.

Format	Time ascending
	Latest alarm is placed last in the list (the bottom).
	Time descending
	Latest alarm is placed first in the list (the top).
	Display order
	Select the items to be displayed and use the up and down arrow buttons to adjust the display order of the alarms.
	Date
	Displays the date tag with each alarm message. The four formats of date tag:
	MM/DD/YY、DD/MM/YY、DD/MM/YY、YY/MM/DD
	Time
	Displays the time tag with each alarm message. The four formats of time tag:
	HH:MM:SS、HH:MM、DD:HH:MM、HH
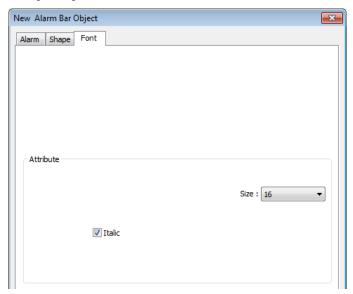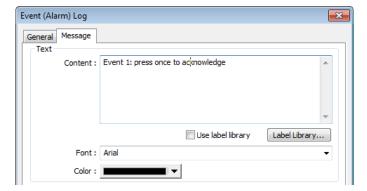
Font Tab

Set the font size or select [Italic].

The font, color, and content of the alarm messages displayed in Alarm Bar and Alarm Display objects are set in Alarm (Event) Log object:
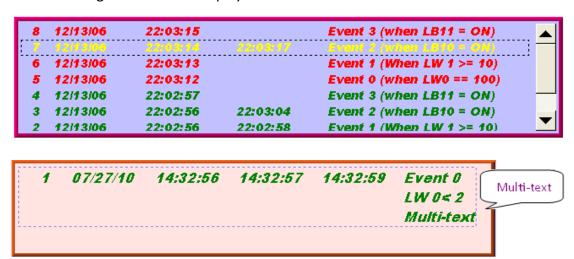
13.22. Event Display

13.22.1. Overview

Event Display object is used to display event messages which are defined in Event (Alarm) Log and have met a trigger condition. The triggered events are displayed in the chronological order. Event Display object displays not only the date and time the event occurs, but also the time the event is acknowledged, the time the event returns to normal, and the event message. Multi-lined messages can also be displayed.

8	12/13/06	22:03:15		Event 3 (when LB11 = ON)
7	12/13/06	22:03:14	22:03:17	Event 2 (when LB10 = ON)
6	12/13/06	22:03:13		Event 1 (When LW 1 >= 10)
5	12/13/06	22:03:12		Event 0 (when LW0 == 100)
4	12/13/06	22:02:57		Event 3 (when LB11 = ON)
3	12/13/06	22:02:56	22:03:04	Event 2 (when LB10 = ON)
2	12/13/06	22:02:56	22:02:58	Event 1 (When LW 1 >= 10)

| 1	07/27/10	14:32:56	14:32:57	14:32:59	Event 0
					LW 0 < 2
					Multi-text

Multi-text
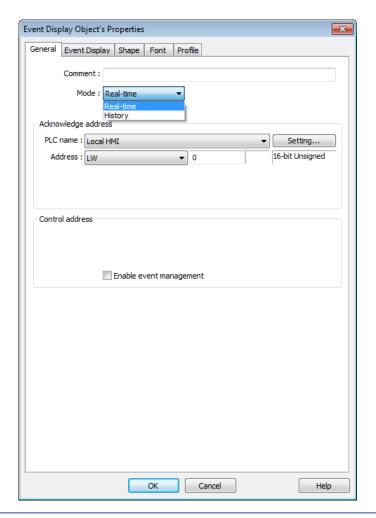
13.22.2. Configuration

Click the Event Display icon on the toolbar to open an Event Display object property dialog box. Set up the properties, press OK button, and a new Event Display object will be created.

General Tab

13.22.2.1.   eMT, iE, XE, mTV Series

Setting	Description
Mode	The available modes are: [Real-time] and [History]. ● Real-time All the events triggered since HMI starts up are displayed. ● History The system reads the event log in HMI memory and displays them. The content can be updated by changing window. In case when the trend display shows history data from today, the display will refresh every 10 seconds.
Acknowledge address	When in Real-time mode, and an event is acknowledged by touching an active display line, the [Acknowledge value] specified in Event (Alarm) Log object, Message tab, is output to the [Acknowledge address] of Event Display object. For more information, see "7 Event Log".

Acknowledge value for Event/Alarm Display object

Acknowledge value : 11

History	When in History mode, and if:
Control	● [Enable reading multiple histories] is **not** selected

Daily event log files can be displayed. A history control address can be designated. The value in the designated register is used as an index to select historical files.

Index value 0 displays the latest file.

Index value 1 displays the second latest file.

Index value 2 displays the third latest file, and so on.

If control address to LW-100, and four data log exist with dates:

EL_20100720.evt, EL_20100723.evt, EL_20100727.evt, and EL_20100803.evt.

Each index value in the control word corresponds to a record according to the table below:

Value in LW-100	The corresponding record
0	EL_20100803.evt
1	EL_20100727.evt
2	EL_20100723.evt
3	EL_20100720.evt

● [Enable reading multiple histories] is selected

Displays a list of events triggered in multiple days. If [History control] address is set to LW-n, the LW-n to LW-n+1 form a range of log selection.

Number of days

The data range starts from the number in LW-n. The value in LW-n+1 represents how many days to be included from the start to days before.
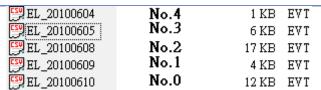
Example: As illustrated below, if LW-n = 1, and LW-n+1 = 3, then the range of data will start from 20100609, and include the data of 2 days before (20100609 included). However, since the data of 20100607 does not exist in this example, the data displayed will only include 20100609 and 20100608.

EL_20100604	No.4	1 KB	EVT
EL_20100605	No.3	6 KB	EVT
EL_20100608	No.2	17 KB	EVT
EL_20100609	No.1	4 KB	EVT
EL_20100610	No.0	12 KB	EVT

Index of the last history

The range of data will start from the number in LW-n and end in LW-n+1. If LW-n = 1, and LW-n+1 = 3, the data displayed will include data No.1, No.2, No.3. If the number entered in LW-n+1 is greater than the number of event log files, LW-n+1 will not be effective and only the data specified by LW-n is displayed.

The maximum size of data that can be displayed is 4MB; the exceeding part will be ignored.

The following shows how data will be stored when the data size is too big.

5 history data, each 0.5MB → Data displayed: 8 x 0.5MB

5 history data, each 1MB → Data displayed: 4 x 1MB

5 history data, each 1.5MB → Data displayed:

2 x 1.5MB+1 x 1MB (partial)
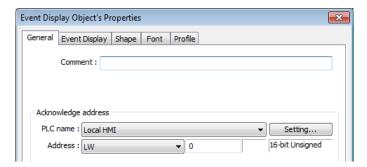
	Enable event management
Control address	If this check box is selected, writing a specific value into register LW-n and LW-n+1, where n is an arbitrary number, will control [Event Display] object with different commands as shown below:

Address	Value	Command
LW-n	0	Display all events.
	1	Hide [Confirmed] events.
	2	Hide [Recovered] events.
	3	Hide [Confirmed] or [Recovered] events.
	4	Hide [Confirmed] and [Recovered] events.
LW-n+1	1	Delete a single selected event.

13.22.2.2.   cMT-SVR Series

For cMT-SVR, all the events occur are displayed and updated in real-time.
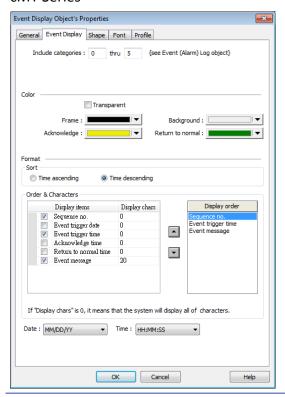
Press the filter icon in the upper-right corner of the object and set the start and end date. If the dates are not set, all the events are displayed.
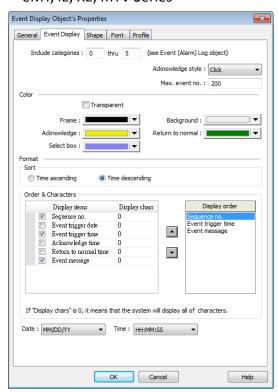
Event Display Tab

cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Include categories	Events in the selected category will be displayed. The categories are set in Event (Alarm) Log object. For example, if the category is set to 2 to 4 here, only events in categories 2, 3, 4 will be displayed. For more information, see "7 Event Log".
Acknowledge style	Select [Click] or [Double Click] to acknowledge each single event. When an event occurs the user can tap the event line once or twice to acknowledge the new event. When acknowledged, the text color of the event will change to the selected color, and the acknowledge value associated with that event will be sent to the register designated in [Acknowledge address]. If the address is set to LW-100, and the acknowledge
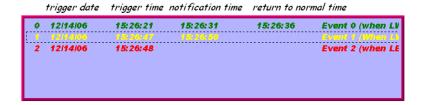
	value is set to 31, when user acknowledges the event, value 31 is written to LW-100. This can be used in conjunction with Indirect Window object so that when an event is acknowledged, the corresponding message window is displayed.
Max. event no.	The maximum number of events to be displayed in this Event Display object. When the number of the displayed events equals to the set maximum number, the new coming event will overwrite the latest event.
Color	Different colors indicate different event states, such as acknowledged, returns to normal, or selected. The system draws a highlight box around the latest selected event.

Format	

Time ascending
Latest event is placed last in the list (the bottom).
Time descending
Latest event is placed first in the list (the top).
Order & Characters
Select the items to be displayed and use the up and down arrow buttons to adjust the display order of the events.
Date
Displays the date tag with each event message. The four formats of date tag:
MM/DD/YY、DD/MM/YY、DD/MM/YY、YY/MM/DD
Time
Displays the time tag with each event message. The four formats of time tag:
HH:MM:SS、HH:MM、DD:HH:MM、HH
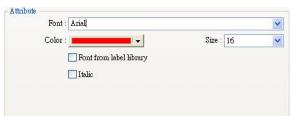
Font Tab

In Real-time mode: Users may select Italic font and set the font size. The font is displayed according to the setting in Event Log object.

In History mode: Users may select Italic font and set the font size, font and color, or tick the [Font from label library] check box.

13.23. Data Transfer (Trigger-based)

13.23.1. Overview

Data Transfer (Trigger-based) object can transfer values from the source register to the destination register. The data transfer operation can be activated by changing the state of the designated bit register, or by manually pressing the object.
For cMT Series, only touch trigger mode is available.
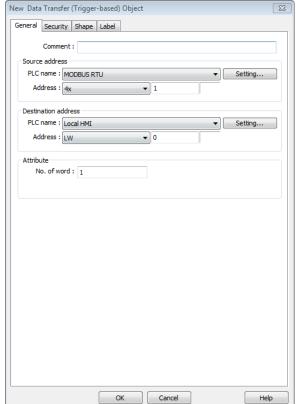
13.23.2. Configuration
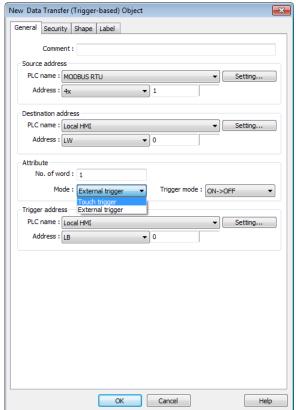
Click the Data Transfer (Trigger-based) icon on the toolbar to open the property dialog box. Set up the properties, press OK button, and a new Data Transfer (Trigger-based) object will be created.

General Tab

cMT Series   eMT, iE, XE, mTV Series

Setting	Description
Source address	Data Transfer object reads the data from [Source Address].
Destination address	Data Transfer object writes the data to [Destination Address].
Attribute	**No. of words** The number of words to be transferred from [Source Address] to [Destination Address]. The unit is word. **Mode** **Touch trigger** Press the object to activate data transfer operation. **External trigger** The data transfer operation is activated when the state of the designated bit address changes. There is a further selection to make of whether the data transfer operation is activated after Off to ON, ON to OFF transition, or at both of the changes of state.
Trigger address	Specify a bit address for [External trigger] mode.

Note

■ When using Data Transfer Trigger Based object, place the control bit addresses in the same window in order to trigger Data Transfer. If the Data Transfer Trigger Based object is placed in the common window, when the state of the control bit addresses placed in any window changes, Data Transfer is triggered.

13.24. Backup

13.24.1. Overview

Backup object can transmit recipe data (RW, RW_A), event log, recipe database, sampling data, and operation log to an external device (SD card, USB disk), in a specified time range or format. For example, when the event log is saved in a SD card, a USB disk can be inserted when HMI power is still ON, and use Backup object to copy the data into USB disk from SD card, and then remove USB disk without turning off HMI power. The data saved in USB disk can be used on PC for analyzing. When the system is backing up, the state of system register [LB-9039] is set ON. With [e-Mail] option, information can be sent to configured email contacts.

13.24.2. Configuration
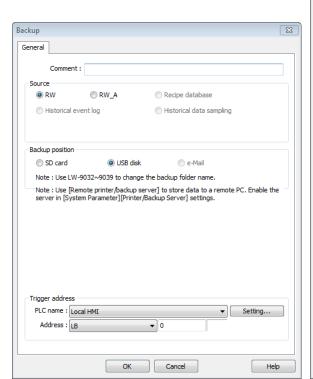
For eMT, iE, XE, mTV Series, click Backup icon on the toolbar to open a [Backup] object property dialog box. Set up the properties, press OK button, and a new Backup object will be created.

For cMT Series, click Backup icon on the toolbar to open a [Backup] object managing dialog box, click [New] to open a [Backup] object property dialog box. Set up the properties, press OK button, and a new Backup object will be created.

General Tab

cMT Series	eMT, iE, XE, mTV Series
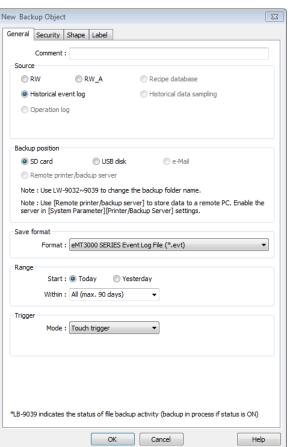
Setting	Description
Source	**[RW], [RW_A], [Recipe database], [Historical event log], [Historical data sampling]** Select one from the above for the source. When backing up [Historical data log], use [Data Sampling object index] to select the one to back up.
Backup position	Select the destination where the source files will be copied to. **SD card / USB disk** The external device connected to HMI. If using cMT series, SD card and USB disk can only save [RW], [RW_A], and [Recipe database]. **Remote printer/backup server** (eMT, iE, XE, mTV Series) To select this, enable MT remote printer/backup server at: [Menu] » [Edit] » [System Parameters] » [Printer/Backup Server]. ☞ For more information, see "26 EasyPrinter".

	E-mail
	To use e-mail, go to [System Parameters] » [e-Mail] tab to configure first. And then go to Backup object » [e-Mail] tab to configure the recipient address, subject, and message.
Save format	Select the desired format to back up the file.
	eMT, iE, XE, mTV Series:
	● HMI Event Log File (.evt) / HMI Data Log File (.dtl)
	● Comma Separated Values (.csv)
	When back up event log in .csv format, open the csv file in EXCEL.

The [Event] column means:

0 = Event is triggered

1 = Event is acknowledged

2 = Event returns to normal

EasyConverter can be used to easily convert HMI Event Log File (.evt) and HMI Data Log File (.dtl) to .xls or .csv format.

● SQLite Database File (.db)

cMT Series:

● SQLite Database File (.db)

● Comma Separated Values (.csv)

Range	**Within**
	Select the number of days. For example, [Yesterday] is selected at [Start], and [2 day(s)] is selected here, which means the files obtained yesterday and the day before yesterday will be backed up. Select [All] to save all files in the system, the maximum is 90 days.
Trigger	**Mode**
(eMT, iE, XE,	There are three ways to activate Backup function.
mTV Series)	**Touch trigger**
	Touch the object to activate backup operation.
	External trigger (bit)
	Register a bit device to trigger the backup operation. Select whether the backup operation is activated after Off to ON, ON to OFF transition, or at both of the changes of state.

External trigger (word)

Users can specify the number of days to backup data using [Trigger address]. [Trigger address] usage (suppose LW-n is used):

LW-n: Will start to back up when the value changes from 0 to 1.

LW-n+1: The start date of backup.

LW-n+2: The number of days for backup. (The maximum: 90 days).

```
Syntax                                              ☒
┌─ LW : 0 ─────────────────────────────────────────┐
│    Set 1 to trigger backup activity               │
└───────────────────────────────────────────────────┘
┌─ LW : 0 + 1 ─────────────────────────────────────┐
│    Define backup start day                        │
│                                                   │
│    0 : today                                      │
│    1 : yesterday                                  │
│    2 : the day before yesterday                   │
│    n : and so on                                  │
└───────────────────────────────────────────────────┘
┌─ LW : 0 + 2 ─────────────────────────────────────┐
│    Define backup range                            │
│                                                   │
│    Unit : day, max. value : 90                    │
└───────────────────────────────────────────────────┘
                                    [    Close    ]
```

Trigger address (cMT Series)	When the state of the designated register is set ON, the backup operation is activated. When the backup operation is done, the state of the designated register is set OFF.

Note

■   All history files should have been saved in memory, either HMI memory, USB disk or SD card. Otherwise, the Backup object will not work.

■   The maximum number of days for backup is 90 days. (Not including cMT Series)

For cMT Series, see "7 Event Log" and "8 Data Sampling" that explain the mechanism of synchronizing data to external device.

13.25. Media Player

13.25.1. Overview

At the first time using Media Player object in the project, download the project to HMI via Ethernet. EasyBuilder Pro installs Media Player driver automatically.
Media Player object plays video files with controls such as seek, zoom, and volume adjustment to provide maintenance instructions or procedures on video so as to enable on-site operators to perform tasks efficiently.
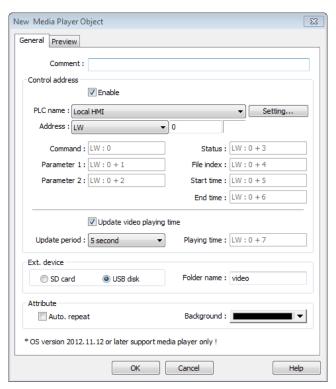
13.25.2. Configuration

Click the Media Player icon on the toolbar to open a Media Player object property dialog box. Set up the properties, press OK button, and a new Media Player object will be created.

General Tab

Setting	Description
Control address	● Selected
	Designate a word register to control the object operations.

● Not selected

No manual control. Video will be played automatically when the designated window opens.

Command (control address + 0)

Enter a value in the Command register to designate which action is executed.

Parameter 1 (control address + 1)

Enter a value in Parameter 1 associated with each command action.

Parameter 2 (control address + 2)

Enter a value in Parameter 2 associated with each command action.

Status (control address + 3)

Indicates the status or errors.

File index (control address + 4)

The file number in the designated folder. It is recommended to file the video name with a number.

Start time (control address + 5)

The start time of the video (second). 0, normally.

End time (control address + 6)

The end time of the video (second). (The time length of the video)

Update video playing time

If enabled, the elapsed playing time of video will be written into [Playing time] register at a rate set by [Update period] in seconds.

Update period

Update period of [Playing time], range from 1 to 60 (second).

Playing time (control address + 7)

The elapsed playing time of video (Second). Normally between start time and end time.

Ext. device	Play video files in SD card / USB disk. **Folder name** The folder name of video files stored in SD card or USB disk. Files must be stored in root directory. Subdirectories won't be accepted. (For example, "example\ex" is an invalid directory.) [Folder name] cannot be empty, must be alpha-numeric, and all in ASCII character.
Attribute	**Auto. repeat** When finish playing all the video files, replay from the first file. Ex: Video 1 > Video 2 > Video 1 > Video 2 **Background** The background color of the object.

📝**Note**

■ The data format for control address is 16-bit Unsigned or 16-bit Signed. If using 32-bit

Unsigned or 32-bit Signed, only the previous 16 bits will be effective.

Control command

The following are the settings of different commands.

- **Play index file**

  [Command] = 1

  [Parameter 1] = file index

  [Parameter 2] = ignore (set 0)

Note

- ■ Files are stored with file names in ascending order.
- ■ If the file cannot be found, [Status] bit 8 is set ON.
- ■ Please stop the playing video before switching to another.

- **Play previous file**

  [Command] = 2

  [Parameter 1] = ignore (set 0)

  [Parameter 2] = ignore (set 0)

Note

- ■ If [File index] is zero, the same file is replayed.
- ■ If the file cannot be found, [Status] bit 8 is set ON.

- **Play next file**

  [Command] = 3

  [Parameter 1] = ignore (set 0)

  [Parameter 2] = ignore (set 0)

- ■ If there are no more files, the index 0 file is played.
- ■ If the file cannot be found, [Status] bit 8 is set ON.

- **Pause / Play Switch**

  [Command] = 4

  [Parameter 1] = ignore (set 0)

  [Parameter 2] = ignore (set 0)

- **Stop playing and close file**

  [Command] = 5

  [Parameter 1] = ignore (set 0)

  [Parameter 2] = ignore (set 0)

- **Start playing from the designated time**
  [Command] = 6
  [Parameter 1] = target time (second)
  [Parameter 2] = ignore (set 0)

📝**Note**

■ Parameter 1 (target time) must be less than the ending of time or it plays the last second.

- **Forward**
  [Command] = 7
  [Parameter 1] = target time (second)
  [Parameter 2] = ignore (set 0)

📝**Note**

■ Going forward to the designated second in [Parameter 1]. If the video is paused, the forwarding action will be started by playing.
■ When the designed time is later than the end time, it plays the last second.

- **Backward**
  [Command] = 8
  [Parameter 1] = target time (second)
  [Parameter 2] = ignore (set 0)

📝**Note**

■ Going Backward to the designated second in [Parameter 1], if the video is paused, the backward action will be started by playing.
■ When the designed time is earlier than the beginning time, it plays from beginning.

- **Adjust volume**
  [Command] = 9
  [Parameter 1] = volume (0 ~ 128)
  [Parameter 2] = ignore (set 0)

📝**Note**

■ Default volume is 128.

- **Set video display size**
  [Command] = 10
  [Parameter 1] = display size (0 ~ 16)
  [Parameter 2] = ignore (set 0)

Note

- [Parameter 1 = 0]：Fit video image to object size.
- [Parameter 1 = 1 ~ 16]：Magnification from 25% ~ 400% in 25% increments where 1 = 25%, 2 = 50%, 3 = 75% and so on.

- **Status (control address + 3)**

When playing a video the system sets [File Open (bit00)] and [File Playing (bit01)] to ON. If the file cannot be found, or an invalid command is entered, the Command Error bit 08 is set ON. If the file format is not supported, or a disk I/O error occurs, during playback (for example, USB disk unplugged), the File Error bit 09 is set ON.

00: File Opened / Closed   (0 = closed, 1 = opened)
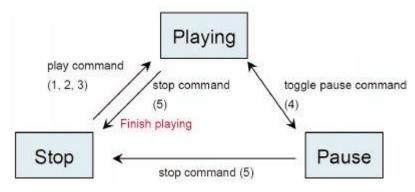01: File Playing   (0 = not playing, 1 = playing)
08: Command Error   (0 = accepted, 1 = incorrect)
09: File Error   (0 = accepted, 1 = incorrect)

Note

- The figure shows the status value associated with each state:
  Stop = 0, Pause = 1, Playing = 3

- [Command], [Parameter 1], and [Parameter 2] are write addresses. All others are read only.

Preview Tab

Users can test whether the video format is supported by using the preview function.

Setting	Description
Forward << / Backward >>	Go forward or backward of the video. (in minutes)
Play / Pause	Select to start playing video or pausing.
Stop	Stop playing and close the video file. To test another video, please stop playing the current video first.
Load	Select a video to preview.

Note

■   Only one video file can be played at one time.

■   If [control address] is not enabled and [Auto. repeat] is not selected, after finish playing the first file, the system will stop playing and close the video file.

■   If [control address] is not enabled, the system will find the first file in the designated folder and start to play (in ascending order of the file name).

■   If the file can be previewed, the format is supported. If the video image quality is poor, please adjust the resolution.

■   The supported formats: mpeg4, xvid, flv...etc.

Click the icon to download the demo project. Please confirm your internet connection before downloading the demo project.

13.26. Data Transfer

13.26.1. Overview

Data Transfer object is similar to Trigger-based Data Transfer object. They transfer the data from source to destination register. The difference is that Data Transfer object transfers data based on time schedule, and is able to transfer data in bits.
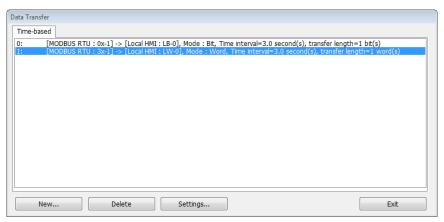
When using cMT Series, Data Transfer object is divided into two modes: [Time-based] and [Bit trigger]. In these two modes, the system automatically detects the state of the designated bit register and executes data transfer. [Time-based] mode is the same as described earlier, where [Bit trigger] mode transfers data when the state of the designated bit register changes. For the detail of [Bit trigger] mode, see "13.26.2.2 Data Transfer Bit Trigger".

13.26.2. Configuration

Click Data Transfer icon on the toolbar to open the Data Transfer management dialog box. Click [New] and configure the properties. All the defined Data Transfer can be viewed from the dialog box as shown in the following figure.

eMT, iE, XE, mTV Series

cMT Series

13.26.2.1.   Data Transfer Time-based

General Tab

Click the [New] button in the Data Transfer management dialog box.

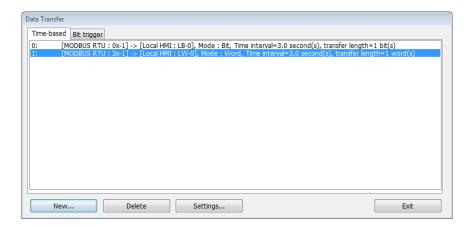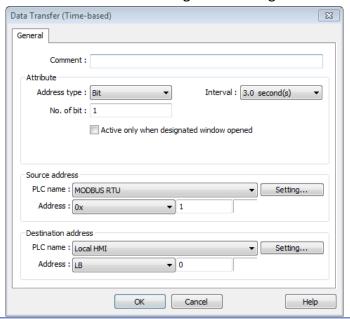| Setting	Description
Attribute	**Address type** Select the data type, either [Bit] or [Word]. **No. of bits /No. of words** When [Bit] is selected in [Address type], set the number of bits transferred each time when data transfer is triggered. When [Word] is selected in [Address type], set the number of words transferred each time when data transfer is triggered. **Interval** Select the time interval of data transfer, for example, when 3 seconds is set, the system will transfer data every 3 seconds. Specifying a short time interval or a big number of data to transfer may cause an overall performance of system decrease. Therefore, it is recommended that users choose a longer time interval and a smaller amount of data to transfer. When a short interval is inevitable, be aware of the interval must be longer than the data transfer operation. For example, if the data transfer operation takes 2 seconds, set the interval longer than 2 seconds.
Source address	Data Transfer object reads the data from [Source Address].
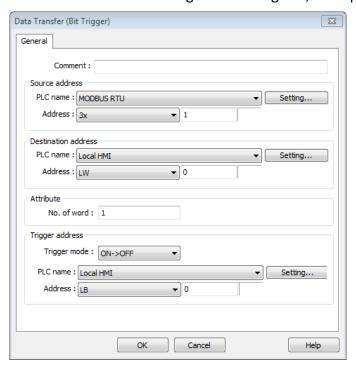
Destination address	Data Transfer object writes the data to [Destination Address].

13.26.2.2.   Data Transfer Bit Trigger

General Tab

Click the [New] button in the Data Transfer management dialog box, and open [Bit trigger] tab.

Setting	Description
Source address	Data Transfer object reads the data from [Source Address].
Destination address	Data Transfer object writes the data to [Destination Address].
No. of word	Set the number of words transferred each time when data transfer is triggered.
Trigger address	Set the register that controls data transfer and select the trigger mode. **Trigger mode** Trigger data transfer when the state of the designated register changes from Off to ON, ON to OFF, or at both of the changes of state.

13.27. PLC Control

13.27.1. Overview

PLC Control object can execute commands when it is triggered.

13.27.2. Configuration

Click the PLC Control icon on the toolbar to open the PLC Control Object management dialog box. To add a PLC Control object, click [New], set up the properties, press OK button and a new PLC Control object will be created.
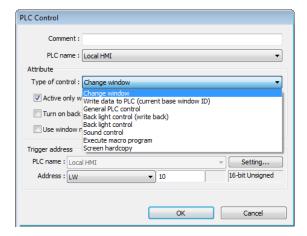

Click [New] and the following dialog box appears. See "13.27.2.1 Type of Control".

📝**Note**
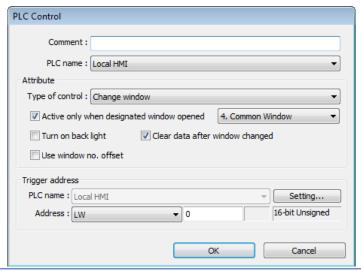
■   The [PLC Control] and [Backlight Control] options are not available for cMT Series.

13.27.2.1. Type of Control

● **Change window**

Setting	Description
Active only when designated window opened	Allow this operation only if a particular screen is displayed.
Turn on back light	The backlight is turned ON when the window object is changed. (Not available for cMT Series)
Clear data after window changed	Reset the value at trigger address to zero when the window object is changed.
Use window no. offset	Select the check box and select a window offset, the new window no. to change to will be the value in [Trigger address] plus the offset. For example, if [Trigger address] is LW-0 and offset is set to -10. When the value in LW-0 is 25, the system will change to window no. 15 (25-10=15). The range of the offset is -1024 to 1024. The [Clear data after window changed] check box is not available if [Use window no. offset] is selected.

✎Note

■ If [LB-9017] is set ON, the write-back function will be disabled, the new window number is not written back into a designated address.

Place a valid window number in the designated trigger address to change the base screen to the new window number. The new window number is written back into the designated address.

For example, if current window is window no. 10, and [Trigger address] is set to LW-0,

When LW-0 is changed to 11, the system will change the current window to window no. 11,

and then write 11 to LW-1.

When the window is changed, the new window number is written back into the address that is calculated by [Trigger address] and the data format, as shown in following table.

Data Format	Trigger address	Write address
16-bit BCD	Address	Address + 1
32-bit BCD	Address	Address + 2
16-bit Unsigned	Address	Address + 1
16-bit Signed	Address	Address + 1
32-bit Unsigned	Address	Address + 2
32-bit Signed	Address	Address + 2

● **Write data to PLC (current base window)**

Each time the base window is changed, the new window number will be written into the [Trigger address].

● **General PLC Control (eMT, iE, XE, mTV)**

Transfer word data blocks from PLC to HMI, and vise-versa, and the transfer direction is controlled by the value in the [Trigger address].

Value in [Trigger address]	Action
1	Transfer data from PLC register → HMI RW register
2	Transfer data from PLC register → HMI LW register
3	Transfer data from HMI RW register → PLC register
4	Transfer data from HMI LW register → PLC register

Four consecutive word registers are used as described in the following table:

Address	Purpose	Description
[Trigger address]	Determine the direction of data transfer	The valid values are listed in the above table. When a new control code is written into the register, HMI will start to transfer. After data transfer is finished, the value will be set to 0.
[Trigger address] +1	The size of data to transfer.	The unit is word.
[Trigger address] +2	Offset to the start address of PLC register	Assume the value is "n", where n is an arbitrary number, the start address of PLC register is [Trigger

		address + 4 + n]. Take an OMRON PLC as an example: If [Trigger address] uses DM-100, [Trigger address + 2] will be DM-102. If the value in DM-102 is 5, the start address of data source would be DM-109 (100 + 4 + 5 = 109).
[Trigger address] +3	Offset to the start address of LW or RW memory in HMI	Take OMRON PLC as an example: If set [Trigger address] to DM-100, [Trigger address + 3] will be DM-103. If the value in DM-103 is 100, the start address of memory in HMI is RW-100 or LW-100.

Example 1

To use PLC Control object to transfer 16 words data in OMRON PLC, starting from address DM-100, to the HMI address, starting from RW-200. The setting is shown below:

1. Firstly, create a PLC Control object, set [Type of control] to [General PLC control], and set [Trigger address] to DM-10, that is, to use the four sequential registers start from DM-10 to control data transfer.

2. Confirm the data size and the offset addresses.
   Set DM-11 to 16, since the number of words to transfer is 16 words.
   Set DM-12 to 86, which indicates the address of data source is DM-100 (100=10+4+86).
   Set DM-13 to 200, which indicates the destination address is RW-200.

3. Set DM-10 according to the direction of data transfer.
   If set DM-10 to 1, the data will be transferred from PLC to HMI RW register,
   If set DM-10 to 3, the data will be transferred from HMI RW register to PLC.

● **Back light control (write back) (eMT, iE, XE, mTV)**

When [Trigger address] is turned ON, HMI backlight will be turned ON/OFF and [Trigger address] will be turned OFF. Any touch on the screen will turn the backlight on.

● **Back light control (eMT, iE, XE, mTV)**

When [Trigger address] is turned ON, HMI backlight will turn ON/OFF and the state of [Trigger address] will not be changed.

- **Sound control**

When the state of the designated [Trigger address] changes, the HMI will play the sound selected from the sound library. There is a further selection determines whether the sound is played after Off to ON, ON to OFF transition, or at both of the changes of state.

- **Execute macro program**

Select a pre-defined Macro from the drop-down list. When the state of the designated [Trigger address] changes, the selected Macro is executed. There is a further selection determines whether the Macro is executed after Off to ON, ON to OFF transition, or at both of the changes of state. If select [Always active when ON], the macro will be executed repeatedly. (The shortest time interval between runs is 0.5 second.)

- **Screen hardcopy**

When the state of the designated [Trigger address] changes, print the selected screen. There is a further selection determines whether the screen is printed after Off to ON, ON to OFF transition, or at both of the changes of state.

There are three options to specify the source window for hardcopy:

Current base window

Print the base window at the time the operation is activated.

Window no. from register

Print the window designated by the value in a designated address. If the window number is valid, the screen is printed.

Designate window no.

Directly select a base window to be printed.

If not specifying any printer, there are other options such as SD card or USB disk.

The printer can be set in [System Parameter Settings] » [Model] tab.

Note

- The [Printer] setting is not available for cMT Series. The window hardcopy file is saved in iPad Photo folder.
- A background printing procedure is performed when the printed window is not the current base window.
- If the hard-copied window is not the current base window, its [Direct Window] and [Indirect Window] objects will not be printed.

13.28. Scheduler

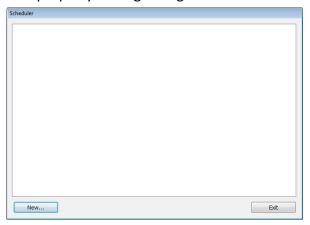### 13.28.1. Overview

Scheduler object turns bits ON/OFF, or writes values to word registers at designated start times. It works on a weekly basis.

13.28.2. Configuration

Click the Scheduler icon on the toolbar to open the Scheduler management dialog box, click [New] to open the Scheduler property setting dialog box.
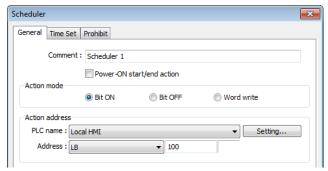
The following two demonstrations explain the usage of Scheduler.

Example 1
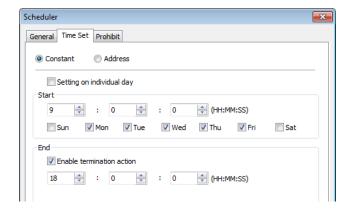
A motor is scheduled to power - ON at 9:00 and power – OFF at 18:00, Monday to Friday.

We are using LB-100 to control the motor state. LB-100 will be set ON at 9:00 and OFF at 18:00.

1. Click the Scheduler icon on the toolbar to open the Scheduler management dialog box, click [New].

2. In [General] tab, select [Bit ON] in [Action mode] and set [Action address] to LB-100.

3. In [Time Set] tab, select [Constant].
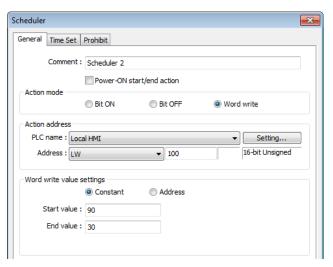
4. Enter [Start] time as 9:00:00 and select Monday to Friday. Do not select [Setting on individual day].

5. Enter [End] time as 18:00:00 and select [Enable termination action] check box.

6. Click [OK], a new Scheduler object will be created on the [Scheduler] list.

Example 2

A thermal heater is scheduled to heat up to 90°C at 08:00 and cool down to 30°C at 17:00, Monday to Friday. LW-100 is used to store the set point value.
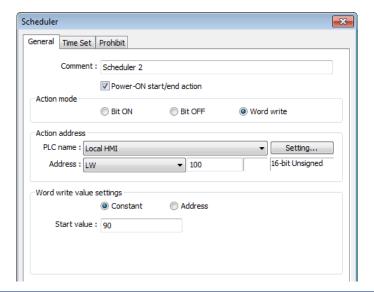
1. Click the Scheduler icon on the toolbar to open the Scheduler management dialog box, click [New].

2. In [General] tab, select [Word write] in [Action mode] and set [Action address] to LW-100.

3. Select [Constant] for [Word write value settings] and enter 90 in [Start value].


4. In [Time set] tab select [Constant].

5. Enter [Start] time as 8:00:00 and select Monday to Friday. Do not select [Setting on individual day].

6. Enter [End] time as 17:00:00 and select [Enable termination action] check box.

7. Return to [General] tab and enter 30 in [End value].

8. Click [OK], a new schedule object will be created on the [Scheduler] list.

General Tab

Setting	Description
Power ON start/end action	Execute the defined action when the HMI is powered ON. ● Enabled When HMI is powered ON within the scheduled time range, the start action will be performed automatically. When HMI is powered ON outside the scheduled time range, the termination action will be executed. ● Disabled When the HMI is powered ON at a time later than the start time, the start action will not be performed, but the termination action will be performed. When the termination action is not defined, the scheduled range is not recognized and no action is performed.
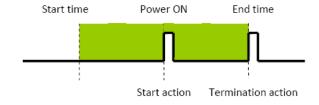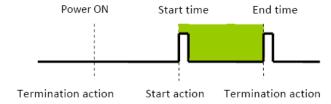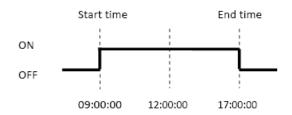
Action mode	Choose the action to do at the given time.

Bit ON

At the start time, set the designated bit ON. At the end time, set the designated bit OFF.
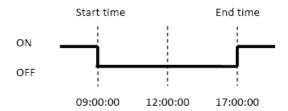
Example: Start time : 09:00:00 End time : 17:00:00

Bit OFF

At the start time, set the designated bit OFF. At the end time, set the designated bit ON.

Example: Start time : 09:00:00 End time :17:00:00
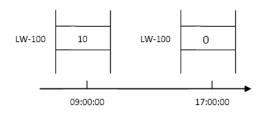
Word write

The [Write start value] entered here is transferred to the designated [Action address] word register at the start time. At end time, the [Write end value] entered here is written to the [Action address]. The valued can be entered manually or be set by using [Address] mode. In [Address] mode, the value in the specified address is the start value where the value in [Address + 1] is the end value.

Example: Device address: LW-100

Start time: 09:00:00 End time: 17:00:00

Write start value: 10 Write end value: 0

Use register: If control address is LW-n, then enter 10 in LW-n and enter 0 in LW-(n+1).

✎**Note**
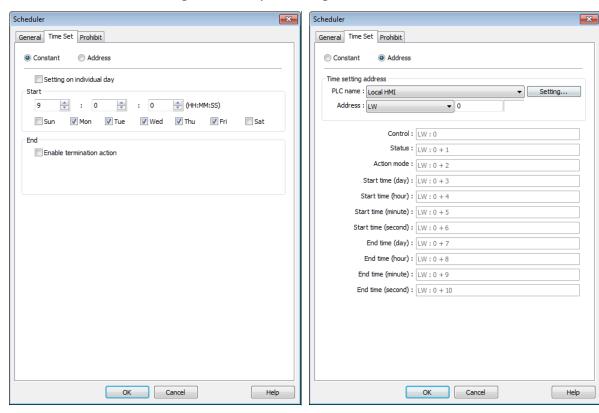
■   Only is an [End time] is set in the [Time set] tab will the [Write end value] box appear.

Time Set

Specify start time and end time. [Constant] allows specifying a date or period and time. [Address] allows controlling the time by the designated address.
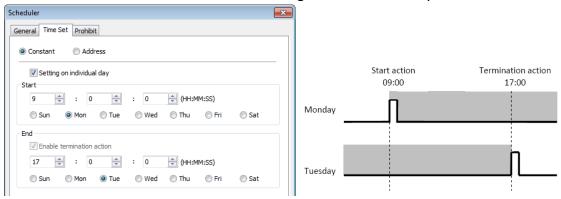
●   Constant

Setting on individual day

If [Setting on individual day] is selected

The same start time and end time can be assigned to different days of the week.

Note
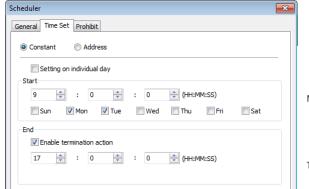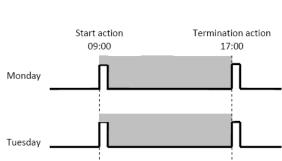
■ Start and end time must be entered.

■ Start and end time must be on a different time, or same time but different day.

If [Setting on individual day] is not selected
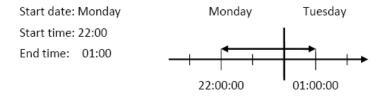
Start time and end time entered must start and end within 24-hours.

Note

■ Start time and end time must be on a different time, different day.

■ If an end time is earlier than a start time, the end action will occur in the next day.

● Address

The scheduler object retrieves the start/end time and day of week information from word registers, enabling all parameters to be set and changed under PLC or user control.

Designated as the top address in a block of 11 sequential registers which are used to store time setting data.

The format of the 11 word registers should normally be 16-unsigned integer. If a 32-bit word address is chosen, only bits 0-15 are effective, and bits 16-31 should be written as zero.

The following describes each register.

Control (Time setting address + 0)

When [Control] bit is ON, the HMI will read and update [Action mode], [Start time], and [End time] values.

Bit 0: no action 1: read times/action mode

✎Note

■ HMI will not regularly read the data from [Action mode] (address + 2) to [End time]
(address + 10). Please turn [Control] ON when the settings are changed.

Status (Time setting address + 1)

When the read operation is completed, Bit00 of this register turns ON. If time data read is out
of range or incorrect in any way Bit01 turns ON.
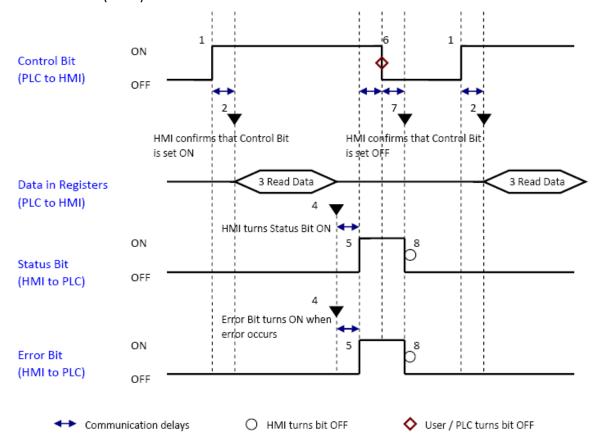
Bit 00: Status bit: Read operation completed. (0: reading or reading not started. 1:
reading completed.)
Bit 01: Error bit: Start or end time format incorrect. (0: corrected 1: error)

✎Note

■ After the scheduler reads the data and the status is turned ON (The value in [Address + 1]
= 01), the control bit must be turned OFF (address = 0). The status bit and error bit will be
turned OFF (1→0) at the same time.

Action mode (Time setting address + 2)

Enable/disable [Enable termination action] and [Setting on individual day]. Whatever the [Enable termination action] bit is, all the time data, from [Control] to [End time (second)], will be read.
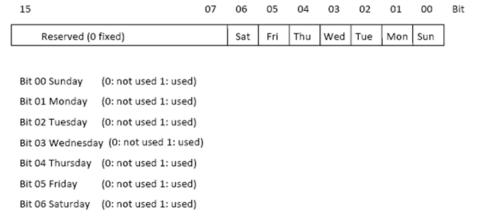
Bit 00 Enable termination action (0: Disabled 1: Enabled)
Bit 01 Setting on individual day (0: Disabled 1: Enabled)

Note

■   If [Enable termination action] is OFF, all 11 registers are still read but end time is ignored.

■   If [Setting on individual day] is ON, make sure that all start end times are entered. If more than one start / end day bit is ON, and error will occur.

Start/End Day (Start Day: Time setting address + 3, End Day: Time setting address + 7)

Designates which day of week is used to trigger the start or end action.

Bit 00 Sunday   (0: not used 1: used)

Bit 01 Monday   (0: not used 1: used)

Bit 02 Tuesday   (0: not used 1: used)

Bit 03 Wednesday (0: not used 1: used)

Bit 04 Thursday   (0: not used 1: used)

Bit 05 Friday   (0: not used 1: used)

Bit 06 Saturday   (0: not used 1: used)

Start/End Time (Start Time: Time setting address + 4 to + 6, End Time: Time setting address + 8 to + 10)

Hour: 0 – 23 Minute: 0 – 59 Second: 0 - 59

Values outside these ranges will cause error.

Note
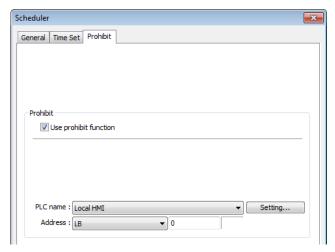
■   16-bit unsigned integer format must be used; BCD format is not supported here.

■   End time depends on [Action mode] (address + 2). [Enable termination action] (Bit 00) and [Setting individual day] (Bit 01) are related:

Setting individual day	Enabled	Disabled	
Enable termination action	Enabled	Enabled	Disabled
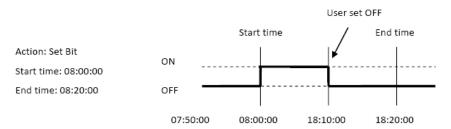
Prohibit tab

Before the scheduled action is performed, the HMI will read the specified bit state. If it is ON, the scheduled start/end action will be skipped. Otherwise, it will be performed normally.

📝Note

■ Up to 32 scheduler objects are allowed.
■ A time schedule applies one action only when the start time is reached.

■ [Write start/end value] and [Prohibit] bit is read only once before start action. After that, even to change the state of [Prohibit] bit or [Write start/end value], the end action and the value written will not be affected. Also, to read data of [Write start/end value] and [Prohibit] bit, there is a delay of start action due to the communication.
■ Each time RTC data is changed, scheduler list entries that possess both start and end times will be checked for in-range or out-range conditions. For in-range, the start action will occur. If the end action is not set, the new range is not recognized, the action will not occur.
■ If several Scheduler objects are set to the same start time or end time, the action is performed in ascending order of the schedule number.
■ In [Time Set] » [Address] mode, the system will read [Control] word regularly. The length of the period depends on the system.
■ In [Time Set] » [Address] mode, when start time and end time is out- range, error occurs in the set action time. (Note: BCD is not an acceptable format)
■ In [Time Set] » [Address] mode, the action will not start up until the first time the time data is successfully updated.
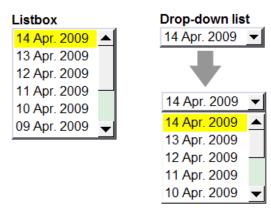
13.29.   Option List

13.29.1. Overview

Option List object displays a list of items that the user can view and select. Once the user selects an item, the corresponding data will be written to a word register.

There are two forms of this object – [List box] and [Drop-down list]. The [List box] lists all items and highlights the selected one. The [Drop-down list] normally displays only the selected item. Once the object is pressed, the system will display a list (which is similar to list box) as shown in the following figure.
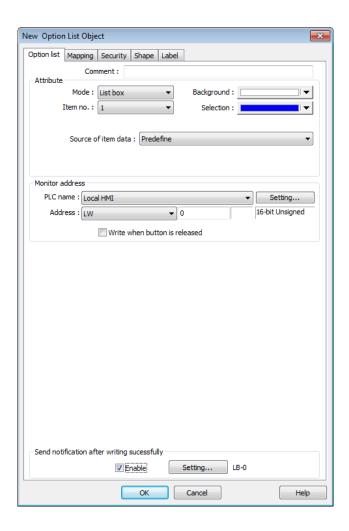
13.29.2. Configuration

Click the Option List icon on the toolbar to open an Option List object property dialog box. Set up the properties, press OK button, and a new Option List object will be created.

General Tab

Setting	Description
Attribute	**Mode:** The list style, either [List box] or [Drop-down list].
	Item no.: Set the number of items for the object. Each item represents a state displayed in the list and the corresponding value will be written to the [Monitor address].
	Background: Set background color.
	Selection: Set background color for the selected item.
	Source of item data: There are 4 sources available: [Predefine], [Dates of historical data], [Item address], and [User account]. See 13.29.2.1..
Monitor address	The corresponding value of the selected item will be written to [Monitor address].
	Write when button is released
	If this check box is selected, the selected item value will be written to [Monitor address] after the button is released.

Send notification after writing successfully	Set On/Off the designated bit address after successfully writing data to PLC.

📝Note

■ For cMT Series, the [Dates of historical data] and the [write when button is released] selections are not available.

13.29.2.1. Source of item data
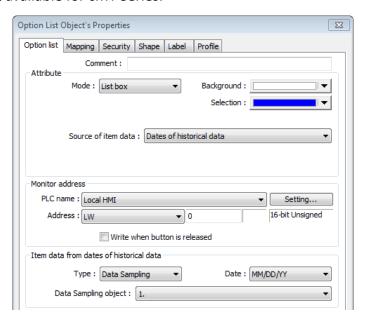
● **Predefine**

The list is manually defined in [Mapping] tab.
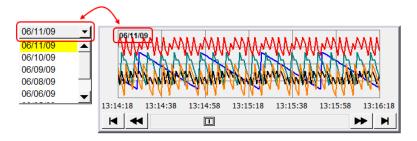
The number of items can be adjusted by [Item no.], and each item represents one state. Each item has a corresponding value which will be written to [Monitor address].

● **Dates of historical data**

This selection is not available for cMT Series.

Option List object can be used with historical data display objects, such as Trend Display object, History Data Display object and Event Display object to control which history file should be shown. The figure below is an example of Option List used with Trend Display.
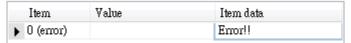
Setting	Description
Type	Two options are available: [Event (Alarm) log] and [Data sampling].
Date	Set the date format. YYYY means a four digits year (EX: 2012), YY means a two digits year (EX: 12), MM means month and DD means day.
Data Sampling object	Select which Data Sampling object is displayed when [Type] is [Data Sampling], and it should be the same as the [Data sampling object index] configured in [Trend Display] or [History Data Display].

Note
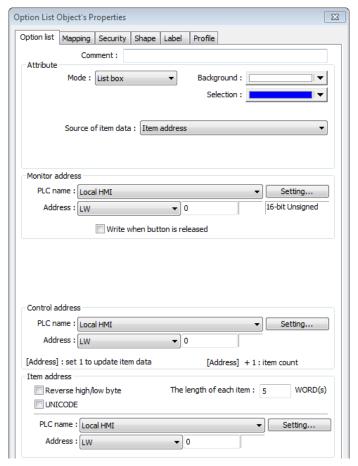
■ In [Dates of historical data] mode, since the system automatically reads the historical data and finds the date information, it is not necessary to configure in the [Mapping] tab.

■ The error message displayed in Option List can be modified in [Mapping] tab.

Item	Value	Item data
▶ 0 (error)		Error!!

● **Item address**

The list will be read from the given [Item address] and controlled by [Control address]. The following options will be available:
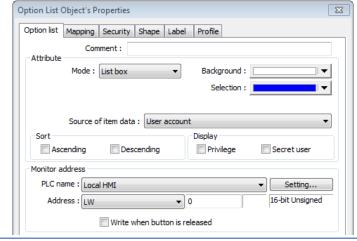
Setting	Description
Control address	[Address]: If the value at this address is changed to 1, the option list would be replaced by items defined at [Item address]. After updating, the value will be restored to 0. [Address + 1]: Define the number of items in [Item address].
Item address	Assign the item address **UNICODE** The item will use UNICODE characters, such as Chinese characters. **The length of each item** Define the number of letters for each item, the unit is Word.

Note

■ The UNICODE characters used here should be used by Text object, so that EasyBuilder Pro will compile the needed fonts and download these fonts to HMI, then the UNICODE letters can be correctly displayed.

■ [The number of items] multiplied by [The Length of each item] must be less than 1024 words.

■ The system automatically disables [Mapping] tab in [Item address] mode.

● **User account**

If [Enhanced Security] mode is enabled, [User account] would appear in the [Source of item data] and it lists the names of users.

Setting	Description
Sort	Select the sorting method from [Ascending] of [Descending].
Display	If [Privilege] is selected, the privileges for each user will be displayed in option list. If [Secret user] is selected, even though it is defined to be hidden in [System parameter settings] » [Security] » [Enhanced Security], the users will still be displayed in [Option List].

📝Note
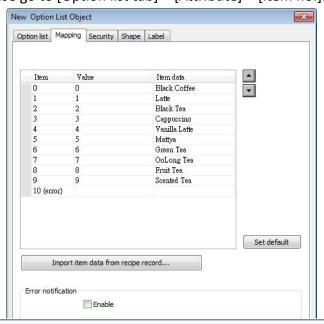
■   The address that controls user index is [Control Address +2 (LW-n+2)] which is set in [System Parameters] » [Security] » [Enhanced Security].
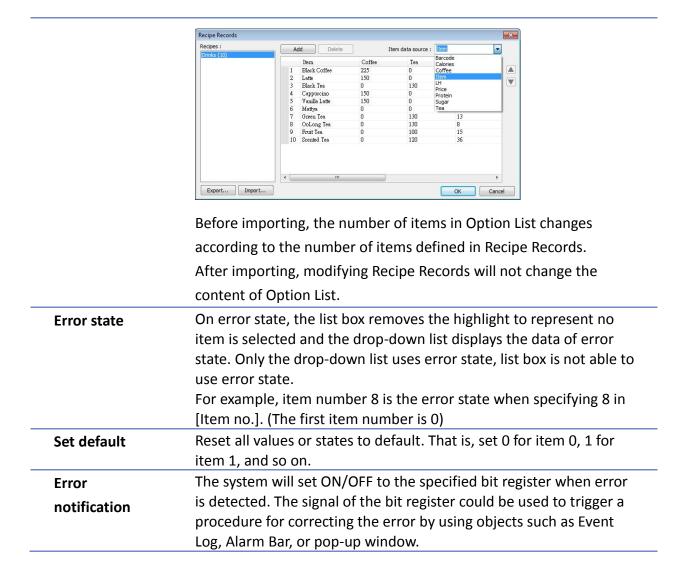
Mapping Tab

This table displays all available states/items, their item data and values. To change the number of available items, please go to [Option list tab] » [Attribute] » [Item no.].

Setting	Description
Item	The system lists all available items. Each item represents a state that will be displayed in the list. This field is read-only.
Value	Here user can assign value for each item, basing on the following two criteria: For reading: If the value in [Monitor address] is changed, the object selects the first-matched item. If no item is matched, the status goes to error state and signals the notification bit register (if requested). For writing: The system writes this value to [Monitor address] when user selects an item.
Item data	Text displayed for each item. The Option List object displays the text of all items in the list for users to review and select.
Import item data from recipe record	This feature is enabled when select [Recipe-Selection] as [Monitor address]. Click [Import item data from recipe record] to open the [Recipe Records] setting dialog box. Select [Item data source], the data belonging to the selected column will all be imported to Option List object.

Before importing, the number of items in Option List changes according to the number of items defined in Recipe Records.
After importing, modifying Recipe Records will not change the content of Option List.

Error state	On error state, the list box removes the highlight to represent no item is selected and the drop-down list displays the data of error state. Only the drop-down list uses error state, list box is not able to use error state. For example, item number 8 is the error state when specifying 8 in [Item no.]. (The first item number is 0)
Set default	Reset all values or states to default. That is, set 0 for item 0, 1 for item 1, and so on.
Error notification	The system will set ON/OFF to the specified bit register when error is detected. The signal of the bit register could be used to trigger a procedure for correcting the error by using objects such as Event Log, Alarm Bar, or pop-up window.

13.30. Timer

13.30.1. Overview
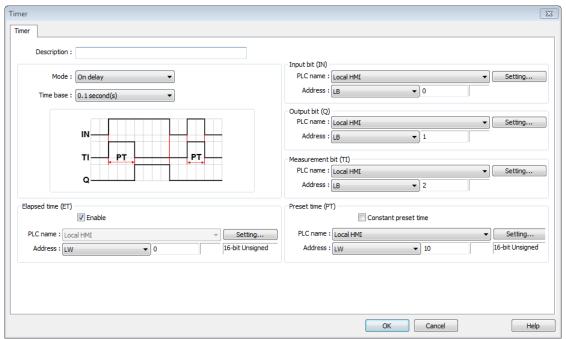
Timer object is a switch that can be used to control the mode to count time. The modes are explained later. Timer object uses the following 6 variables:

Timer Variable	Type	Description
Input bit (IN)	Bit	The main switch of Timer.
Measurement bit (TI)	Bit	Turns ON when the Timer begins counting time.
Output bit (Q)	Bit	Activated when the Timer finishes counting time.
Preset time (PT)	Word	Presets a time before the Timer begins counting time.
Elapsed time (ET)	Word	Displays the elapsed time.
Reset bit (R)	Bit	Resets the elapsed time (ET) to 0.

13.30.2. Configuration

Click the Timer icon on the toolbar to open the property dialog box as shown in the following figure.

Note
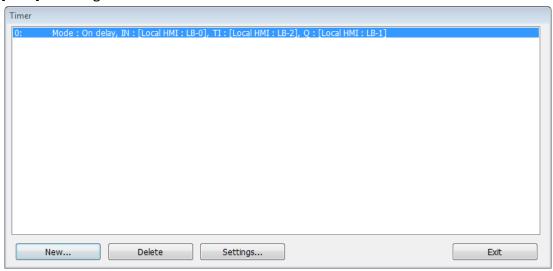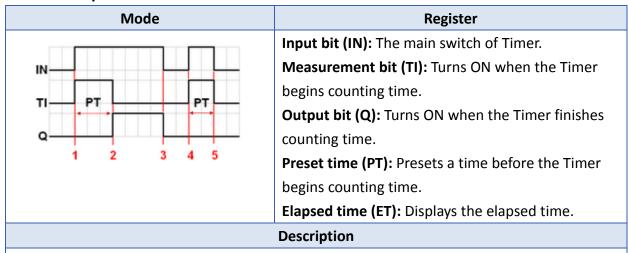
■   [Constant preset time] is only available for cMT series.

If use cMT Series, clicking the Timer icon on the toolbar will open the Timer managing window, click [New] to configure.

● **On delay**

Mode	Register
	Input bit (IN): The main switch of Timer. **Measurement bit (TI):** Turns ON when the Timer begins counting time. **Output bit (Q):** Turns ON when the Timer finishes counting time. **Preset time (PT):** Presets a time before the Timer begins counting time. **Elapsed time (ET):** Displays the elapsed time.
Description	

Period 1: When the IN turns ON, TI turns ON and the ET starts counting. The Q remains OFF.
Period 2: When the ET equals to the PT, the TI turns OFF and the Q turns ON.
Period 3: When the IN turns OFF, the Q turns OFF and the ET is reset to 0.
Period 4: When the IN turns ON, the TI turns ON and the ET starts counting. The Q remains OFF.
Period 5: Turns IN OFF before the ET reaches the PT, the TI turns OFF, and the ET is reset to 0. Since the ET doesn't reach the PT, the Q remains OFF.

● **Off delay**

Mode	Register
	Input bit (IN): The main switch of Timer. **Measurement bit (TI):** Turns ON when the Timer begins counting time. **Output bit (Q):** Turns OFF when the Timer finishes counting time. **Preset time (PT):** Presets a time before the Timer begins counting time. **Elapsed time (ET):** Displays the elapsed time.
Description	

Period 1: When the IN turns ON, the TI remains OFF and the Q turns ON, the ET is reset to 0.
Period 2: When the IN turns OFF, the TI turns ON and the Q remains ON, the ET starts counting.
Period 3: When the ET equals to the PT, the Q and TI turn OFF.
Period 4: When the IN turns ON, the TI remains OFF and the Q turns ON, the ET is reset to 0.
Period 5: When the IN turns OFF, the TI turns ON and the Q remains ON, the ET starts counting.
Period 6: Turns the IN to ON before the ET reaches the PT, the TI turns OFF, the Q remains ON, and the ET is reset to 0,.

● **Pulse**

Mode	Register
	Input bit (IN): The main switch of Timer. **Measurement bit (TI):** Turns ON when the Timer begins counting time. **Output bit (Q):** Turns ON when the Timer begins counting time and turns OFF when the Timer finishes counting time. **Preset time (PT):** Presets a time before the Timer begins counting time. **Elapsed time (ET):** Displays the elapsed time.
Description	

Period 1: When the IN turns ON, the TI and Q turn ON simultaneously, and the ET starts counting.
Period 2: When the ET equals to PT, the TI and Q turn OFF simultaneously. Since IN is turned OFF when counting time, the ET is reset to 0.
Period 3: When the IN turns ON, the TI and Q turn ON simultaneously, and the ET starts counting.
Period 4: When the ET equals the PT, the TI and Q turn OFF simultaneously.

● **Accumulated ON delay**

Mode	Register
	Input bit (IN): The main switch of Timer. **Measurement bit (TI):** Turns ON when the Timer begins counting time. **Output bit (Q):** Turns ON when the Timer finishes counting time. **Preset time (PT):** Presets a time before the Timer begins counting time. **Elapsed time (ET):** Displays the elapsed time. **Reset bit (R):** Resets ET to 0

Description

Period 1: When the IN turns ON, the TI turns ON and the elapsed time ET starts counting, the Q remains OFF.
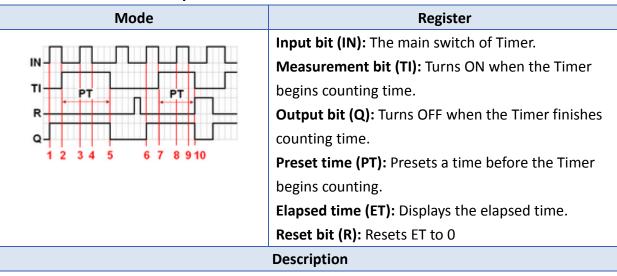**Period 2**: When the IN turns OFF, if the ET doesn't reach the PT, the TI turns OFF, and at the same time the Q remains OFF. The ET is in the retentive state.
Period 3: When the IN turns ON, the TI turns ON. The timer measurement starts again and the ET starts counting from the kept value. The Q remains OFF.
Period 4: When the ET reaches the PT, the TI turns OFF and the Q turns ON.
Period 5: When the IN turns OFF, the Q turns OFF. Turning ON the reset bit R will reset the ET to 0, and then the reset bit turns OFF.

● **Accumulated OFF delay**

Mode	Register
	Input bit (IN): The main switch of Timer. **Measurement bit (TI):** Turns ON when the Timer begins counting time. **Output bit (Q):** Turns OFF when the Timer finishes counting time. **Preset time (PT):** Presets a time before the Timer begins counting. **Elapsed time (ET):** Displays the elapsed time. **Reset bit (R):** Resets ET to 0

Description

Period 1: When the IN turns ON, the TI remains OFF and the Q turns ON.
Period 2: When the IN turns OFF, the TI turns ON and the Q remains ON. The ET starts counting.
Period 3: When the IN turns ON, the TI and Q remain ON, and the ET is in the retentive state.
Period 4: When the IN turns OFF again, the ET starts counting from the kept value.
Period 5: When the ET equals to the PT, the TI and Q turn OFF simultaneously. Turning ON the reset bit R will reset the ET to 0, and then the reset bit turns OFF.

13.31.   Video In and Video In (USB Camera)

13.31.1.   Overview

Certain HMI models provide the Video Input feature. By installing a surveillance camera, user can monitor the site on HMI. The video images can be stored in external devices and then analyzed on PC. This feature can be utilized in different places for monitoring, such as vehicles or buildings.

eMT3070A support USB camera video input. Supported OS Versions: 20140116 or later. eMT3120A/eMT3150A support NTSC and PAL analog video systems. For hardware, HMI provides 2 channels for Video Input. User can freely switch the channel, and capture real-time images even when Video Input is paused.
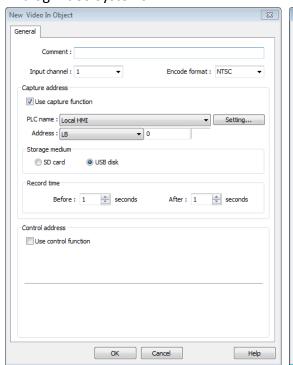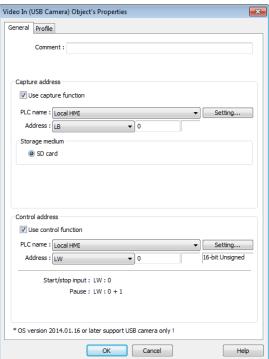
13.31.2.   Configuration

Click the Video In icon on the toolbar to open the property dialog box. Set up the properties, press OK button, and a new Video In object will be created.

General Tab

Analog Video Systems   USB Camera

Setting	Description
Input channel	Select the Video Input channel from channel 1 or channel 2. (Analog video systems)
Encode format	Select the format from NTSC or PAL. (Analog video systems)
Capture address	Select [Use capture function] check box and configure the settings. **Capture address** Designate the address that triggers image capturing. **Storage medium** Designate the storage device.

System	Storage Device
Analog video system	Select SD card or USB disk to save the captured images. The images of channel 1 will be saved in "VIP1" folder in the chosen storage and so on.
USB Camera	Only saves the captured images in SD card.

Record time

Set a period of time to capture the images.

System	Method
Analog video system	- The longest period can be set from 10 seconds before triggering [Capture address] to 10 seconds after triggering. - The time interval of image capturing is once every second. - The captured .jpg file will be named in the following format: Before or after [Capture address] is triggered: YYYYMMDDhhmmss.jpg The moment that [Capture address] is triggered: YYYYMMDDhhmmss@.jpg For example, set [Record time] "Before" and "After" to "5" seconds. When the state of [Capture address] changes from OFF to ON, the system will start capturing one image per second, from 5 seconds before the triggering time to 5 seconds after the triggering time, which is 11 images in total including the one captured at the triggering moment.

	USB Camera	Only the image of the triggering moment is captured. The name format: YYYYMMDDhhmmss.png.
Control address	**Use control function** If enabled, enter certain value to the control address and the following addresses can control Video Input object. For example, if the designated control address is LW-n (n is any address), enter certain value to the designated addresses will execute commands as the following table.	

Address	Value	Command
LW-n	0	Stop displaying image
	1	Open channel 1 and display the image on HMI
	2	Open channel 2 and display the image on HMI
	3	Open channel 1 but don't display the image on HMI (Capture function operable)
	4	Open channel 2 but don't display the image on HMI (Capture function operable)
LW-n+1	1	Pause / resume the video
LW-n+2	1~100	Adjust the contrast ratio (Analog video systems)
LW-n+3	1~100	Adjust the brightness (Analog video systems)

- After changing the value in [Control address (LW-n)], the system will keep the new value.
- After changing the value in [Control address + 1 (LW-n+1)], the system will execute the command and then reset the value to 0.
- If [Use control function] check box is not selected, the system will play the image of the selected channel.
- If [Display adjustment] check box is selected, the contrast ratio and brightness can be adjusted. (Analog video systems)
- The USB Camera is controlled by LW-n (value 0 or 1) and LW-n+1.

📝**Note**
- Only one channel can be opened at a time.
- Real-time images can still be captured when Video In is paused.
- Recommended analog video systems and resolutions:

	1:1	**50%**
NTSC	720 x 480	360 x 240
PAL	720 x 576	360 x 288

- If the USB Camera is removed during video playing, the image will not be loaded even though the USB Camera is returned. If [Control address] is selected, please stop and then restart video input. If [Control address] is not selected, please switch to another screen and then return, or restart HMI.
- When using USB Camera, the maximum size of Video In object is 572x430.
- When using USB Camera, the resolution of the run-time video image is determined by the resolution supported by the USB Camera that is closest to the size of Video In object . The resolution supported by the USB Camera may not be identical to the size of the object. The same resolution of Video In object and USB Camera image is recommended.
- When using USB Camera, the right and bottom edge of the Video In object will keep a distance of 50 pixels away from the window edge to prevent the run-time video image from exceeding the window.
- When using USB Camera, the background color of Video In object is black. If the resolution of the run-time video image is smaller than Video In object, the empty area is colored black. The same resolution of Video In object and USB Camera image is recommended.
- The tested and available USB Cameras are: Logitech C170, Logitech C310, Logitech C910, LifeCam VX-2000.
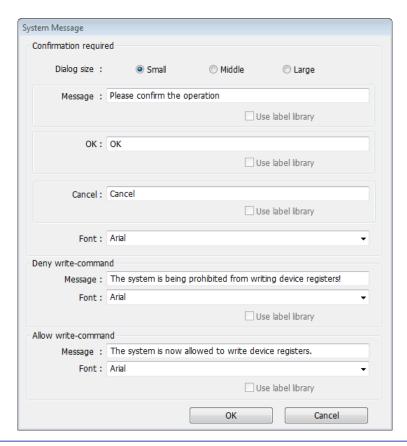
13.32. System Message

13.32.1. Overview

If objects use [Display confirmation request] or [local HMI supports monitor function only] is turned on/off, the corresponding messages configured here will be displayed in pop-up message boxes.

13.32.2. Configuration

Click the System Message icon 🖼 on the toolbar to open the setting dialog box.

System Message

Setting	Description
Dialog Size	Select the size for pop-up window and texts.
Confirmation required	If an object uses [Display confirmation request], this message would pop up when the object is used. [Message] shown on confirmation dialog box, and the text label of the 2 buttons, [OK] and [Cancel], can be set. Please use the same font for the labels of [Message], [OK] and [Cancel]. Additionally, only when selecting

	[Label Library] for [Message], the use of Label Library for [OK] and [Cancel] buttons can be enabled.
Deny write-command	Displays when system tag LB-9196 (local HMI supports monitor function only) is turned ON.
Allow write-command	Displays when system tag LB-9196 (local HMI supports monitor function only) is turned OFF.

✎Note

■ cMT-SVR does not support adjusting dialog size and using system tag LB-9196.

13.33. Recipe View

13.33.1. Overview

Recipe View object can be used to display a specific recipe. All items and values of the recipe can be viewed by using this object.
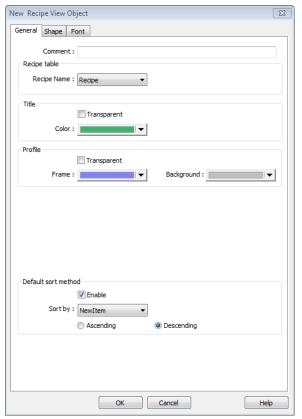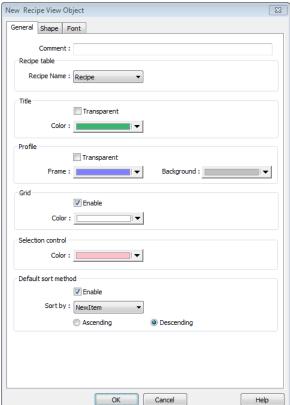
13.33.2. Configuration

Click the Recipe View icon on the toolbar to open a Recipe View object property dialog box. Set up the properties, press OK button, and a new Recipe View object will be created.

General Tab

cMT Series   eMT, iE, XE, mTV Series

The name of each part of the Recipe View object is shown in the following figure.

| Setting	Description
Recipe table	Choose the recipe name or look for other recipes from the drop-down list.
Title	The item name assigned in [System Parameter Setting] » [Recipe]. **Transparent** If selected, the title row has no shading; the color selection is not available.
Profile	The frame and background color of the object can be set. **Transparent** Select to hide the background, the color selection is not available.
Grid (N/A for cMT)	The dividing lines between columns and rows. **Enable** Select to show the grid.
Selection Control (N/A for cMT)	Change the shading color of the selected row.
Default sort method	Configure how the records are sorted. [Ascending] and [Descending] can be selected.

Note
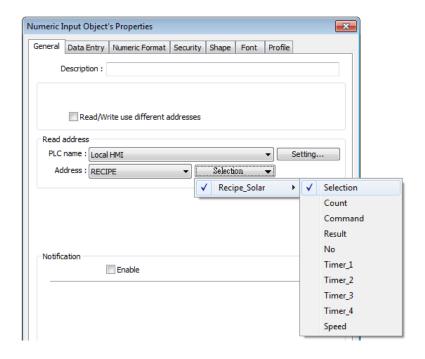
■ There are 4 system registers that can be used to view/update/add/delete recipe database:
Selection
Current selection of record in Recipe View object, and it is numbered from zero. If the first record is chosen, the value of Selection will be 0. When the value of Selection is changed, the corresponding values will be updated, such as "No", "Timer_1", "Timer_2", as shown in the following figure.

Count

Show the number of records in current recipe.

Command

Enter certain value will send command to the selected record.

Enter "1": Add a new recipe record to the last row.

Enter "2": Update the selected recipe record.

Enter "3": Delete the selected recipe record.

Enter "4": Delete all recipe records.

Result

View the result of executing commands.

Displays "1": Command successfully executed.

Displays "2": The selected record does not exist.

Displays "4": Unknown command.

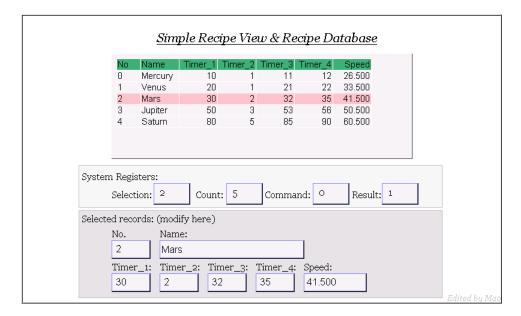Displays "8": Records reach limit (10000 records), no new records can be added.

☞Please go to [System Parameter Settings] » [Recipes] tab to create the recipe data before using Recipe View object. See "5 System Parameter Settings".

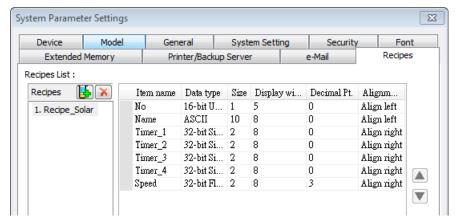☞About creating recipes, see "24 Recipe Editor".

Example 1

In this example, a recipe database is created to be displayed by Recipe View object. When you select a recipe record on Recipe View object, the value of [Selection] and the corresponding values will change accordingly. When finish designing, you can modify the recipe database by entering a value in [Command].
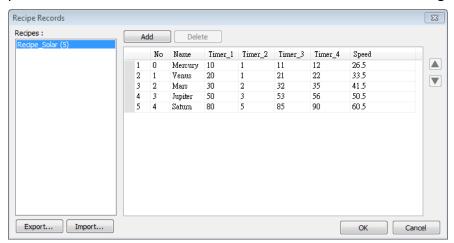
Simple Recipe View & Recipe Database

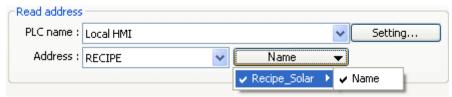1.   Create a recipe as shown in the following figure.

2.   Use Recipe Records to create a number of records as shown in the following figure.

3.   Create a Recipe View object and use the recipe database created in the preceding steps.

4.   Create 4 Numeric Input objects using registers "Selection", "Count", "Command", and "Result".

5.   Create corresponding input objects for "No", "Name", "Timer_1", …, "Timer_4", "Speed".

For example, "Name" is an ASCII item with size "10". Create an ASCII Input object and set device type to "RECIPE" » "Name".

6. The project is then completed.

7. As shown above, "Mars" is selected and the corresponding items are also updated. There are 5 records so the "Count" displays "5". Try selecting different rows of the Recipe View object. Fields "Name", "Timer_1", …will change accordingly.

8. Try the following operations:

● Add:

To add current data as a new record, enter "1" in "Command".

● Update:

To update recipe database, enter "2" in "Command".

● Delete:

To delete the selected record, enter "3" in "Command".

● Sort the items.

● Click the title to change the order.

13.34.   Flow Block

13.34.1. Overview

Flow Block object displays the flow status of the blocks in the pipe or the status of the transportation lines. Unlike Moving Shape object which requires a precise measurement between two points when drawing a straight line provided by users, the blocks flow at a fixed interval in a horizontal or vertical straight line.
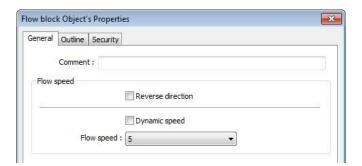
The features of Flow Block:

- Each section of the Flow Block must be a horizontal or vertical straight line and the blocks flow at a fixed interval within it.
- Dynamic speed and direction adjustment (Speed and direction can be controlled by a designated register.
- Security mechanism (Interlock), which hides Flow Block when the status of designated bit is invalid.

13.34.2. Configuration

Click on the Flow Block icon on the toolbar or select [Objects] » [Flow Block] to create object.
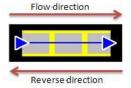
General Tab

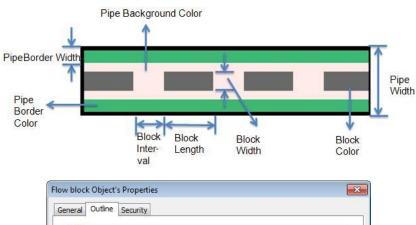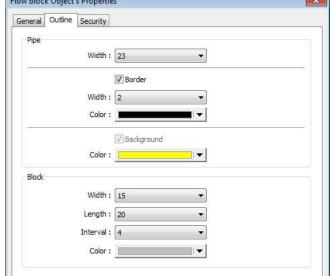| Setting	Description
Reverse direction	The blocks flow in the direction the object is drawn (the blue arrow). If select this check box, the blocks flow in the opposite direction.

Dynamic speed	**Read address**
	The direction and speed at which the blocks flow can be controlled by a designated register. The valid rage is -25 to 25. When a negative value is entered, the blocks flow in a reversed direction.
	Setting
	Displays the address and format of the designated register. [System register], [Index register], and [Tag Library] can be set here.
Flow speed	25 flow speed levels, the valid range is 0 to 25 when [Dynamic speed] is not selected. A larger value indicates a faster speed.

Outline Tab

For setting the outline property of Flow Block. The following illustration shows each item.

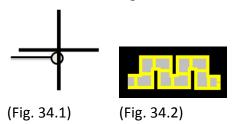| Setting	Description
Pipe	Sets the properties of the pipe within which the blocks flow. The background color, border width and color can be set. When the [Border] check box is selected, the background color must be set.

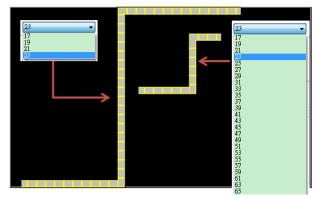| Block	Sets the properties of blocks. Width, length, interval and color can be set here.

✎**Note**

■ If both [Reverse direction] and [Dynamic speed] check boxes are selected in [General] tab, when entering a negative value in the designated register of dynamic speed, the blocks flow in the direction the object is drawn.

■ To avoid the pipe lines from overlapping when drawing a turn, there is a minimum width planned at each turn. As shown in Fig. 34.1, the sign on the cross cursor defines the minimum width. Fig. 34.2 demonstrates that each turn is drawn in the minimum width.
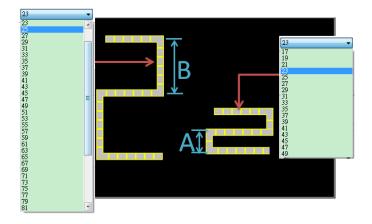

(Fig. 34.1)   (Fig. 34.2)

The valid range of the length, width, and height of the Flow Block can be adjusted according to the size of the object drawn and the size of the window.

As shown in the following figure, when the size of the Flow Block is larger, the valid range is restricted to prevent the flow block from exceeding the window size. When the size of the object is smaller, the adjustment range will be larger.
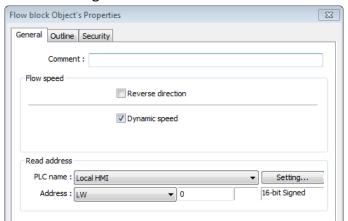

To prevent the flow block from overlapping itself, when the distance between two lines is shorter (Section A), the valid range is restricted. When the distance is longer (Section B), the adjustment range will be larger.

Example 1

The demonstration below shows how to use [Dynamic speed] to control the direction and speed of Flow Block by a designated word register.

1. Create a Flow Block object and select [Dynamic speed] check box. Set [Address] to LW-0, and set the format to 16-bit Signed.

2. Create a Numeric Input object, set [Address] to LW-0. The high limit is 25, and the low limit is -25. The format is 16-bit Signed.

3. Execute simulation or download the project to HMI. When entering a positive value in LW-0, the blocks flow in the direction the section is drawn. A larger value indicates a faster speed. When a negative value is entered, the blocks flow in a reversed direction, and the smaller value indicates a faster speed. When 0 is entered, it stops flowing.
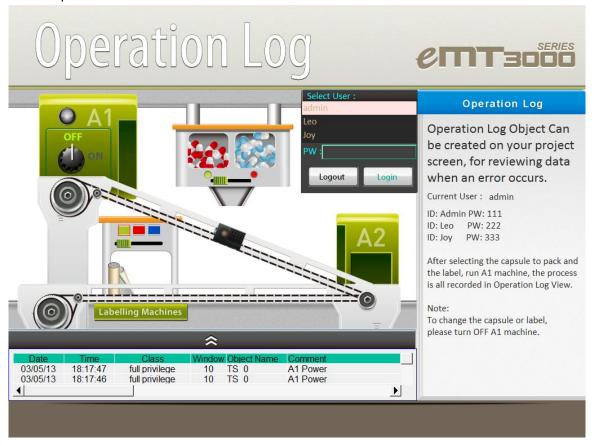
Click the icon to download the demo project. Please confirm your internet connection.

13.35. Operation Log

13.35.1. Operation Log Settings

13.35.1.1. Overview

Operation Log records user's operation steps and displays the record in real-time. When an error occurs, use operation log to analyze the problem. The backup tables can be used to review the process in order to resolve the errors.
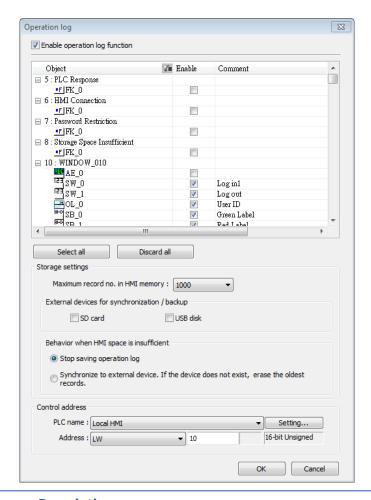
13.35.1.2. Configuration

Select the objects to be recorded. Click [Objects] on the main menu, point to [Operation Log], click [Operation Log Settings], and then select [Enable operation log function] check box.

Setting	Description
Object	When Operation Log is enabled, the objects with write function are listed in the setting dialog box sorted by window numbers. [Filter]: By clicking ▼= icon, the objects with write function are listed. Users can filter out the objects that need not to be recorded, and the log displays only the selected objects.
Enable	The selected objects are recorded by Operation Log.
Comment	The description of the object as shown in the following figure.

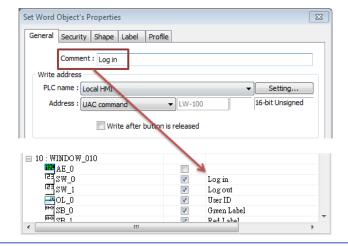|	
Select all	Selects all the listed objects. If [Filter] is used, clicking [Select all] only selects the objects in the list.
Discard all	Discards all the selected objects. If [Filter] is used, clicking [Discard all] only discards the objects in the list.
Storage settings	Sets the way the records are stored. **Maximum record no. in HMI memory** Sets the maximum number of records that can be stored in HMI memory. **External devices for synchronization / backup** Stores backup data to SD card or USB disk. **Behavior when HMI space is insufficient** When HMI memory space is insufficient, two options are provided: [Stop saving operation log]: Stops saving new records in order to keep the earlier records. [Synchronize to external device]: Stores the Operation Log to the external device. When the device does not exist, the HMI clears the oldest records in its memory.
Control address	Entering different values in the control address sends corresponding commands to Operation Log and returns the result of executing the command. If control address is LW-n (where n is an arbitrary number), the address that returns the result of executing the commend is LW-n+1. Control address (LW-n): (1): Clear all records. (2): Copy the records to the USB disk. (3): Copy the records to the SD card. (4): Copy the records to the USB disk and clear the records in HMI memory. (5): Copy the records to the SD card and clear the records in HMI memory. Execution result (LW-n+1): (0): Processing. (1): Execution succeeded. (2): The device does not exist. (3): The record does not exist. (4): Unknown error.

Note

■ Operation Log can only record the operation of the objects that are manually triggered. Objects that cannot be manually triggered are not recorded, such as Time Based Data Transfer object.

■ When running off-line or on-line simulation, Operation Log is stored under EasyBuilder installation directory: HMI_memory\operationlog\operationlog.db

■ Triggering Macro with a Set Bit object generates two records, the triggering of bit and the triggering of Macro.

13.35.2. Operation Log View
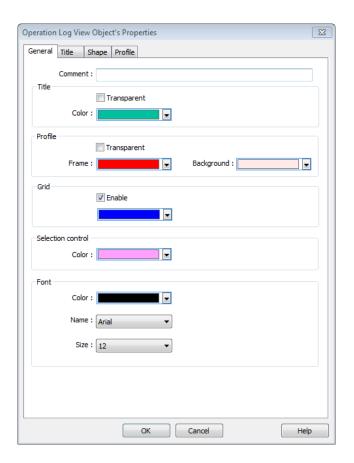
13.35.2.1.   Overview

Operation Log View can be used to review the Operation Log.
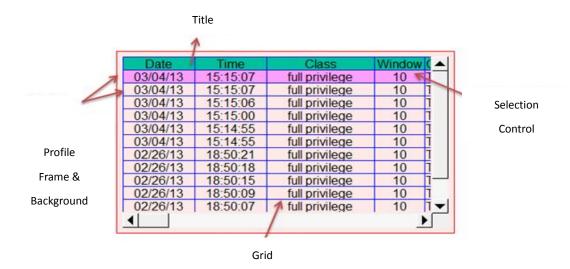
13.35.2.2.   Configuration

Before using Operation Log View, please follow the steps described in the preceding part to finish Operation Log Settings. Click [Objects] on the main menu, point to [Operation Log], and then click [Operation Log View].

General Tab
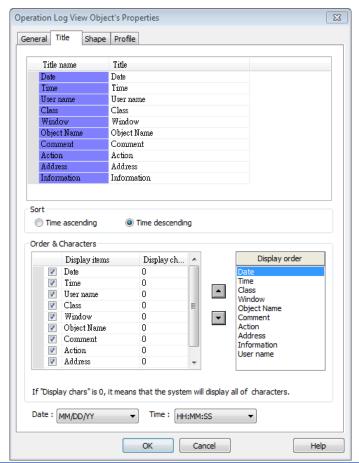
Setting	Description
Title	Sets the color of the title row. **Transparent:** If selected, the title row will be transparent. The color selection is not available.
Profile	Sets the color of the frame and background of the object. **Transparent:** Hides the frame and background. The color selection is not available.
Grid	Sets the color of the dividing lines between the columns and rows. **Enable:** If selected, displays the grid, otherwise, hides the grid.
Selection control	Sets the color of the selected row.
Font	Sets the color, font, and font size of the text displayed in Operation Log View object.

Title Tab

Setting	Description
Title	Sets the title displayed in Operation Log View object.
Sort	Sorts the records in time ascending or descending order.
Display order	Sets the order of the displayed item. If [Display chars.] is 0, all characters are displayed.
Date / Time	Sets the format of date and time displayed in Operation Log View object.

13.35.3. Operation Log Printing

13.35.3.1. Overview

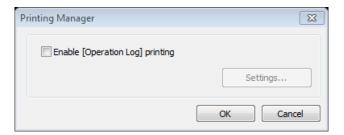Operation Log Printing can generate an Operation Log sheet by printing out using a printer or by saving as JPEG file into an external device. Before using this function, please go to Operation Log Settings to finish the settings.
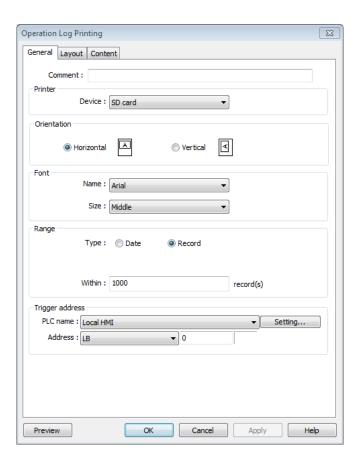
13.35.3.2.　　Configuration

Select "Enable [Operation Log] printing" check box and click [Settings] button to open the Operation Log Printing dialog box.
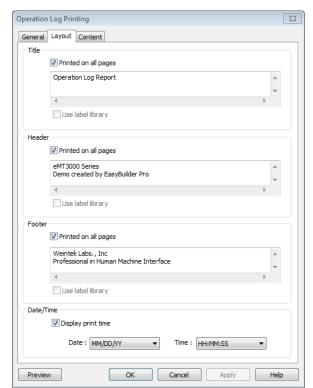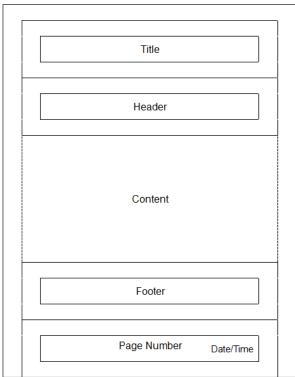
General Tab

Setting	Description
Printer	Select the device to save the Operation Log sheet. If a printer is selected, the paper size should be A4. If an external device is selected, the Operation Log sheet is saved as a JPEG file. The system generates a folder named "operationlogsheet", and the files saved in the folder are named "*print date_sequence number*". For example, the first JPEG file saved on 2013/05/08 is named 130508_0000 and so on.
Orientation	Sets the layout of the Operation Log sheet to be horizontal or vertical.
Font	Sets the font and the font size to of the Operation Log sheet. The following table lists the corresponding size.

Size	Title	Content
Large	20 pt.	16 pt.
Middle	16 pt.	12 pt.
Small	12 pt.	8 pt.

Setting	Description
Range	Sets the range of the Operation Log to be included in the sheet. **Date** Sets the range by date, counted from the start day through the number of days entered. The maximum available range is 30 days. **Record** Sets the range by the number of records. The maximum available range is 10000 records.
Trigger address	Sets the register to control Operation Log Printing. When the register is set ON, it starts printing. When the printing is done, the register is set OFF automatically.
Preview	Preview the result before generating the Operation Log sheet.

Layout Tab
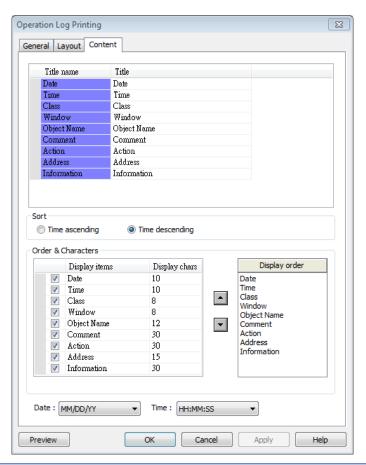
The layout of each part is shown in the above figure.

Setting	Description
Title	Sets the content of the title. The title is limited to one line. **Printed on all pages** If selected, the title is shown on each page; otherwise, the title is shown on the first page.
Header	Sets the content of the header. The header can have 5 lines in maximum. **Printed on all pages** If selected, the header is shown on each page; otherwise, the header is shown on the first page.
Footer	Sets the content of the footer. The footer can have 5 lines in maximum. **Printed on all pages** If selected, the footer is shown on each page; otherwise, the footer is shown on the last page.
Date/Time	If selected, the date/time the in the sheet is shown on the lower-right corner of each page; otherwise, the date/time is not shown.
Page number	Shown on each page.

Content Tab

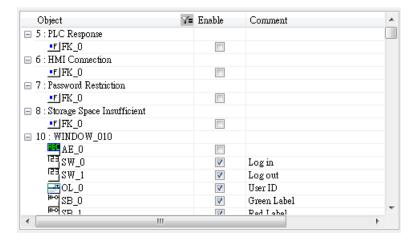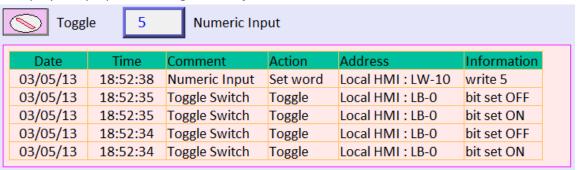| Setting	Description	
Title	Sets the title displayed.	
Sort	**Time ascending**	
	The latest record is placed at the bottom.	
	Time descending	
	The latest record is placed at the top.	
Date/Time	Sets the format of date and time displayed.	

13.35.3.3.   Demonstration

Example 1

The following demonstration explains how to create an Operation Log project.

1. Create a Toggle Switch object and a Numeric Input object on window number 10.
2. Go to Operation Log Settings; enable the Toggle Switch object and Numeric Input object on window number 10.

3. Create an Operation Log View object and finish relevant settings.

4. Run off-line simulation; trigger Toggle Switch and Numeric Input object. Operation Log is displayed by Operation Log View object.

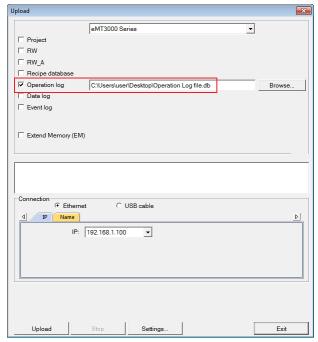| Date	Time	Comment	Action	Address	Information
03/05/13	18:52:38	Numeric Input	Set word	Local HMI : LW-10	write 5
03/05/13	18:52:35	Toggle Switch	Toggle	Local HMI : LB-0	bit set OFF
03/05/13	18:52:35	Toggle Switch	Toggle	Local HMI : LB-0	bit set ON
03/05/13	18:52:34	Toggle Switch	Toggle	Local HMI : LB-0	bit set OFF
03/05/13	18:52:34	Toggle Switch	Toggle	Local HMI : LB-0	bit set ON

Click the icon to download the demo project. Please confirm your internet connection.
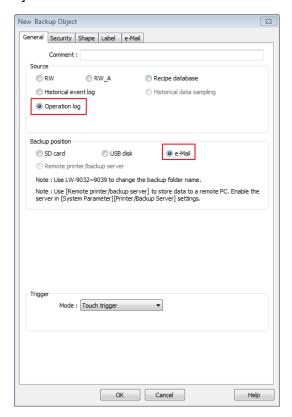
Example 2

Upload Operation Log to PC by using Utility Manager or use Backup object to send the file by email.

● Upload by Utility Manager

1. Open Utility Manager, click [Upload].

2. Select [Operation log], enter file name and HMI IP, and then click [Upload].

● Send the sheet by e-mail

1. Open [System Parameter Settings] » [e-Mail] tab. Set e-mail server and the address of recipient and sender.

2. Create a Backup object, under [Source] select [Operation log], and under [Backup position] select [e-Mail].

☞ For more information about e-Mail settings, see "5 System Parameter Settings".

13.36. Combo Button

13.36.1. Overview

Combo Button can execute multiple commands. The former way was to overlay multiple objects in the same position, and the commands are executed in the order of the layer of the objects. This takes time to test the order when planning the project. Combo Button allows users to easily set multiple commands with one object, and freely adjust the order of executing commands.

The following are the features of Combo Button:

● Executes multiple commands.
● Allows adjusting the order of executing multiple commands.
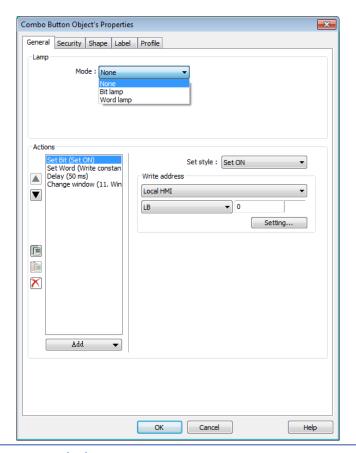● Displays the state in Bit or Word Lamp.

13.36.2. Configuration

Click the Combo Button icon on the toolbar to open a Combo Button object property dialog box. Set up the properties, press OK button, and a new Combo Button object will be created.

General Tab

| Setting	Description
Lamp	The mode to display the state of a designated bit or word register.
	None: Not using lamps to show states.
	Bit Lamp
	Displays the state of a designated bit address.
	[Invert Signal] Reverses the display of ON / OFF states. For example, if [Invert signal] check box is selected, when the designated bit is OFF, the object displays ON state.
	Word Lamp
	Displays the state according to the value of a designated word register.
	[No. of state]: The number of states used by the object. The state is numbered from 0, so the number of states minus 1 will be the state number. If the value in the word register is ≥ [No. of states] defined in Attribute, the highest state will be displayed.
	If the number of states is set to 8, the valid states will be 0, 1, 2, …, 7. In this case if the word value is 8 or higher, the system will display the state 7 shape.
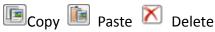
Actions	There are four types of actions: [Delay], [Set Bit], [Set Word], and [Change window]. A combo button can execute up to 8 actions. ▲ ▼ Change the order of the actions. ⬚Copy ⬚ Paste ✖ Delete Copy, paste, or delete the selected actions.
Add	**Delay** Delays the action for a few seconds. A combo button can set one [Delay] action only. **Set Bit** Sets the designated bit ON or OFF.

Set style	Description
Set ON	Set ON the designated bit of the device.
Set OFF	Set OFF the designated bit of the device.
Toggle	Alternates the bit state each time pressed.
Momentary	Holds the bit ON only while button is pressed.

Set Word

Sets the value in the designated register.

| Set style	Description
Write Constant Value	Writes a constant value to the designated register.
JOG+	Increases value in register by a set amount in [Inc. value] each time when the button is pressed, to the [Upper limit].
JOG-	Decreases value in register by a set amount in [Dec. value] each time when the button is pressed, to the [Bottom limit].
Dynamic limits	Sets the Upper / Bottom limit by a designated register. When Dynamic Address is LW-n, where n is an arbitrary number, set upper limit when using [JOG+], and bottom limit when using [JOG-].

Change Window
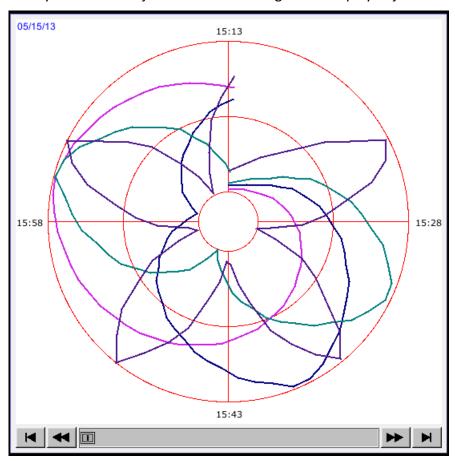
Switch to the designated window. A combo button can only set one [Change Window] action, and this action is always the last one executed.

13.37.   Circular Trend Display

13.37.1. Overview

Circular Trend Display object draws the trend curve of Data Sampling in a polar coordinate system, where y-axis represents the radial coordinate and the x-axis represents the angular coordinate. The way to use this object is similar to using Trend Display object.
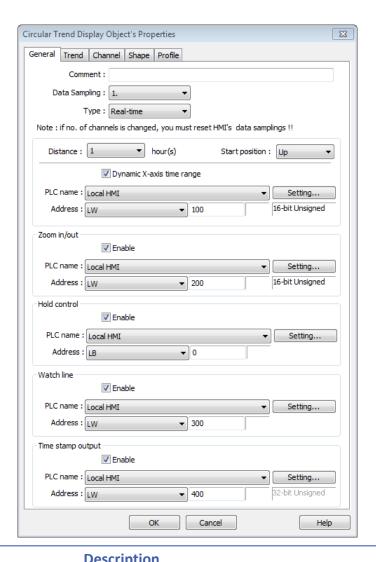

13.37.2. Configureation

Click the Circular Trend Display icon on the toolbar to open the property dialog box. Set up the properties, press OK button, and a new Circular Trend Display object will be created.

General Tab

Setting	Description
Data Sampling	Selects the data source for drawing the trend curve.
Type	Selects the type of the trend from [Real-time] or [History].
	Real-time
	In this mode, it displays a fixed number of sampling data from the moment HMI starts to present. The number of sampling data is determined by the [Max. data records (real-time mode)] setting of Data Sampling object. If the number of sampling data exceeds this number, the earlier data will not be displayed. To display earlier data or the data in other days, please select [History] mode.
	[Hold control] address can be used to pause refreshing the display. This only stops displaying new data in the Circular Trend Display object, and the data is still being sampled by

Data Sampling object.

History

In this mode, it displays the sampled data sorted by date. Select the data source from [Data Sampling], and then use [History control] address to view the records of different dates.

Note

If [Show scroll control] check box in Trend Tab is not selected, the earlier data cannot be viewed when exceeding the specified [Distance].

For example: Set [Distance] to 1 (hour.), then sampling data earlier than one hour is not displayed.

Refresh data automatically	If enabled, the window in which the Circular Trend Display object (in history mode) is placed will be refreshed every 10 seconds.

● The scroll controls can be used to check the refresh status.

If ▮▮ button is displayed, the Circular Trend Display will be automatically refreshed.

If ▶ button is displayed, the Circular Trend Display will stop being refreshed.

● Scrolling backward and viewing earlier data will disable [Refresh data automatically]. The button displayed is ▶ at this moment.

● If [Refresh data automatically] is selected, the display is refreshed when change back to this window, regardless of the use of scroll controls.

Example: If [Refresh data automatically] is selected, scrolling to the earlier display stops auto-refresh. At this moment change to another window and then change back, the Circular Trend Display is still refreshed.

If [Refresh data automatically] is not enabled when building the project, to enable it directly on HMI, simply press ▶. Please note that auto-refresh remains disabled after window change.

Distance	Defines the time length that the circle represents, the unit is hour, the range is 1 to 24 (hours).
Start position	The position from where to start drawing the trend curve. (Up)　　　　　　　　　　　　　(Right) (Down)　　　　　　　　　　　(Left)
Dynamic X-axis time range	If selected, a word register can be designated to control the time length of Circular Trend Display. The unit is hour. If no value is entered, the distance is set to default.
Zoom in / out	Enlarge or reduce the size of the object. The maximum size is 10 times larger. If 0 is entered in the designated register, the effect equals entering 1, the object remains the original size.
Hold control	When the register is set ON, suspend the update of Circular Trend Display. It does not stop the sampling process of Data Sampling object. This setting is available only in Real-time mode.
History control	History data is sorted by date. The system uses [History control] to select the history data that are created in different dates and then displays it by Circular Trend Display object. If the value of the designated register in [History control] is 0, the Circular Trend Display object displays the latest

record. If the value is 1, the second latest record is displayed and so on. This setting is available only in History mode.

If use with Option List object and select data source as [Dates of historical data], the history data will be sorted by date and displayed in Option List object, see "13.29 Option List".

In the following example, when history control address is set to LW-0, and there are 4 sampling data: 20061120.dtl, 20061123.dtl, 0061127.dtl, 20061203.dtl. The corresponding data selected by the value in history control address is as the following list.

Value in LW-0	The sampling data displayed
0	20061203.dtl
1	20061127.dtl
2	20061123.dtl
3	20061120.dtl

Watch line

Displays a watch line when user touches the Circular Trend Display object, and the sampling data at the position of the watch line is output to the designated register. To display sampling data with multiple channels, the system consecutively writes the data of each channel to the designated word register and the following registers. If the data format of each channel is different, the channels are sorted by the data format of its corresponding register.

In the following example, when watch address is set to LW-0, and there are 4 sampling data, the format of each data is: 16-bit Unsigned, 32-bit Unsigned, 32bit Signed, and 16-bit Signed. The corresponding watch address is as the following list.

Channel	Data Format	Data Length	Watch Address
0	16-bit Unsigned	1 Word	LW-0
1	32-bit Unsigned	2 Words	LW-1
2	32-bit Signed	2 Words	LW-3
3	16-bit Signed	1 Word	LW-5

Time stamp output

If selected, the system will start counting time from the first data sampled, and output the elapsed time counted of
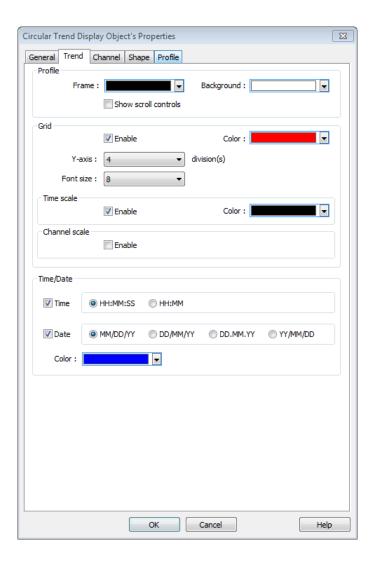
the latest data sampled to the register designated in [Time stamp output + 2]. When pressing a point on the trend curve, the relative time of the nearest data sample is then output to [Time stamp output address].
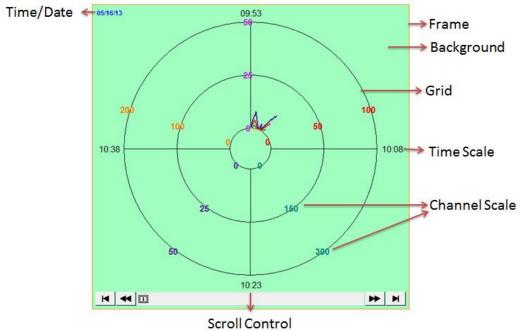
Note

The format of the register designated in [Time stamp output] and [Time stamp output + 2] must be 32-bit. [Time stamp output + 2] is only available for Real-time mode while [Time stamp output] is available for Real time mode and History mode.
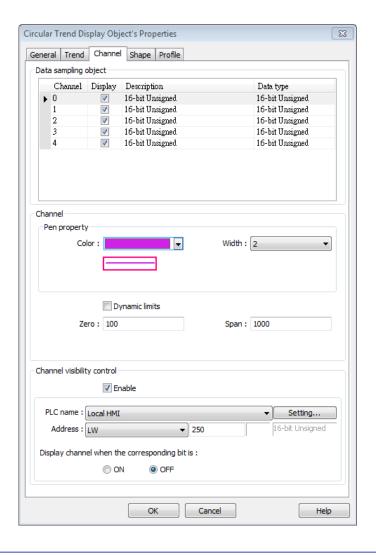
Trend Tab

Setting	Description
Profile	**Frame**
	Sets the color of the frame of the object.
	Background
	Sets the color of the background of the object.
	Show scroll controls
	The scroll controls are displayed for scrolling to view the sampling data of other time range. The minimum scrolling unit is determined by the setting of [Distance] in General tab. If [Show scroll controls] check box is not selected, the earlier data cannot be viewed when exceeding the specified [Distance]. For example: Set [Distance] to 1 (hour.), then sampling data earlier than one hour is not displayed.
Grid	Sets the number and the color of the dividing lines.
	Y-axis
	Sets the number of divisions on Y axis.
	Font size
	Sets the size of the font which labels the time scale or channel scale.
	Time scale
	If enabled, displays the time scale. When the time length is longer than 1 hour, the scale division is 1 hour. When the time length is set to 1 hour, the scale

division is 15 minutes.

Channel scale

If enabled, displays the channel scale. The color of the font which labels the channel scale corresponds to the setting of the trend curve of each channel.

Time / Date	**Time**
	Sets the display format of time.
	Date
	Sets the display format of date.

Channel Tab

Setting	Description
Channel	Sets the style and the color of the trend curve, and the upper and lower limit of data that can be drawn on the trend curve. Up to 8 channels are supported simultaneously.

Not selecting [Dynamic limits]

The upper and lower limits of the data are set by constants.

Selecting [Dynamic limits]

The upper and lower limits are set by the designated register. When the address is LW-n, the corresponding addresses are as the following list.

Data format	16-bit	32-bit
Lower limit	LW-n	LW-n
Upper limit	LW-n+1	LW-n+2

Channel Visibility Control

If [Enable] is selected, the bits of the designated word register will be used to show/hide each channel. First bit (Bit-0) controls the first channel; second bit (Bit-1) controls the second channel, and so on.

Display channel when the corresponding bit is:

If [ON] is selected, when the corresponding bit is OFF, the channel is hidden. If [OFF] is selected, when the corresponding bit is ON, the channel is hidden. In the following example, the control address of channel visibility is set to LW-0 and each channel shows when the corresponding bit is OFF. If there are 5 channels, the visibility of the channels is as the following list.

Channel	Control address	Bit state	Display
0	LW_bit-000	OFF	YES
1	LW_bit-001	ON	NO
2	LW_bit-002	ON	NO
3	LW_bit-003	OFF	YES
4	LW_bit-004	OFF	YES