DELTA ELECTRONICS, INC.
www.delta.com.tw/industrialautomation

DOP-B_M_EN_20100531

DOP-B Series HMI User Manual

www.delta.com.tw/industrialautomation

Preface

Thank you very much for purchasing DELTA's DOP-B Series Human Machine Interface (hereinafter "HMI") products.

This manual will be helpful in the installation, operation and specifications of Delta HMI product and HMI Screen Editor software program. Before using the product, please read this user manual to ensure correct use.

You should thoroughly understand all safety precautions (DANGERS, WARNINGS and STOPS) before proceeding with the installation, wiring and operation. If you do not understand please contact your local Delta sales representative. Place this user manual in a safe location for future reference.

  📖 **Using This Manual**

    ■ **Contents of this manual**

- This manual is a user guide that provides the information on how to install and operate Delta HMI products and Screen Editor software program.

    ■ **Who should use this manual**

This user manual is intended for the following users:

- Those who are responsible for designing.
- Those who are responsible for installing or wiring.
- Those who are responsible for operating or programming.

    ■ **Important precautions**

Before using the product, please read this user manual thoroughly to ensure correct use and store this manual in a safe and handy place for quick reference whenever necessary. Besides, please observe the following precautions:

- Install the product in a clean and dry location free from corrosive and inflammable gases or liquids.
- Ensure that HMI is correctly connected to a ground. The grounding method must comply with the electrical standard of the country.
- Do not modify or remove wiring when power is applied to HMI.
- Before starting the operation, make sure the emergency stop equipment can be energized and work at any time.
- Do not touch the power supply during operation. Otherwise, it may cause electric shock.

NOTE

The content of this manual may be revised without prior notice. Please consult our distributors or download the most updated version at http://www.delta.com.tw/industrialautomation.

Table of Contents

About this Manual...

User Information

Be sure to store this manual in a safe place.

Due to constantly growing product range, technical improvement and alteration or changed texts, figures and diagrams, we reserve the right of this manual contained information change without prior notice.

Coping or reproducing any part of this manual, without written consent of Delta Electronics Inc. is prohibited.

Technical Support and Service

Welcome to contact us or visit our web site (http://www.delta.com.tw/industrialautomation/) if you need any technical support, service and information, or, if you have any question in using the product. We are looking forward to serve you needs and willing to offer our best support and service to you. Reach us by the following ways.

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Chapter 1 Introduction

1.1 DOP-B Series Human Machine Interface (HMI)

DOP-B series HMI is manufactured by adopting easy-to-use software and high-speed hardware to provide a powerful and stable programmable interface. Screen Editor software program is a user-friendly program editor of DOP-B series HMI for Windows. Please refer to the following section for an introduction to its features and functions.

1.2 Features

■ **External Controller Serial Drivers Support**

DOP-B series HMIs support more than twenty brands of external controllers, including Delta, Omron, Siemens, Mitsubishi, etc. All of the newly supported communication protocol information could be found on our website (http://www.delta.com.tw/industrialautomation/) for upgrade to meet the users' requirements. (All other trademarks in this manual are property of their respective companies.)

■ **Windows® Fonts Support**

Screen Editor software program also provides all fonts used by Windows®.

■ **Quick Execution and Communication Macro**

Screen Editor software program is able to handle complicated calculations by executing macros. In addition, the users can create a communication protocol by using communication macro command and connect to the specific system or the controller via the COM port.

■ **Rapid USB Upload/Download**

Not only RS-232, the users also can use Screen Editor to upload and download screen data and programs via USB interface. Screen Editor software program shortens the upload / download time by using USB interface.

■ **Recipes**

Screen Editor software program provides a useful recipe editor that is similar to Microsoft Excel for the users to edit recipe easily and input multiple recipes simultaneously. When the users need to download multiple recipes simultaneously, the recipe function can swap

internal memory of HMI. After the users finish editing the recipes, the users can download the recipes individually.

■ **Direct Communication with Three External Controllers**

DOP-B series HMI is capable of connecting to three different or the same controllers directly via three communication ports.

■ **Support Multiple Controllers Connections**

One DOP-B series HMI is able to connect to multiple controllers in serial through RS-485 interface of COM2 and COM3 ports. [NOTE 1].

■ **Simulation Function** [NOTE 2]

Screen Editor software program provides simulation feature which allows the users to develop and debug software on a PC connected to DOP-B series HMI before downloading it to DOP-B series HMI.

Off-line Simulation: When the editing and compile operation is completed, the users can use off-line simulation function to simulate HMI operation and check if it is correct on a stand-alone a PC directly without connecting to the controller.

On-line Simulation: When the editing and compile operation is completed, the users can use on-line simulation function to simulate HMI operation and check if it is correct on a stand-alone PC directly with connecting to the controller.

■ **USB Host Port (USB Host) Equipped**

DOP-B series HMI has a built-in USB Host interface for the connection to USB disk, card reader and printer with a USB socket. The users can save data, copy programs, print the screen immediately and increase the data storage space.

■ **Print Function**

DOP-B series HMI supports the printers which have COM port or USB interface.

■ **Multiple Security Protection**

DOP-B series HMI provides passwords to protect the designer's intellectual property rights and also for the users to set the user priority for important elements. Only the users whose priority is higher than the element can use the element.

■ **Multi-language Support**

Up to 16 languages can be selected and used without installing a multilingual operating system. A multi-language environment is very important and enables the users to work more efficiently.

NOTE

1) The controller should provide RS-485 interface.

2) Off-line/On-line simulation functions are only provided for some parts of the controllers. Also, the execution time of on-line simulation only can continue 30 minutes. After the simulation time has finished, HMI will return to the main screen of Screen Editor V2.0 software program from simulation window automatically.

3) When executing simulation function, the resolution of PC screen should be set to 24bit and higher, otherwise the simulation function may not work normally.

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Chapter 2 Working with Hardware Devices

2.1   Usage of SD Card and USB Disk

■ **SD Card**

SD card (supports SDHC) can be used to save and transmit data. The supporting file format is FAT32. Before using a SD card, reformatting (FAT32) via HMI is needed. Only SD card that formatted by HMI can be used on both HMI and Windows® OS system. (Even it can be read/written in some format, but faults may occur due to different format among Win95/98/2000/XP versions)

■ **USB Disk**

USB disk can be used to save data. It also can be used to copy data from HMI and its format is FAT32 as well. When using USB disk to save data, we recommend that the storage capacity should be less than 2GB and the users should enter system screen first and then remove the USB disk. Follow this process can ensure that the data is saved completely in USB disk.

There are two kinds of methods for removing the USB disk:

1. Press SYS button for 3 seconds to enter intro the system setting screen. Then, the users could choose the function to remove the USB disk.

2. Create a "Remove storage" button on the screen first. After settings and compile operation is completed, pressing this button is able to remove the USB disk. For more information on "Remove storage" button, please refer to section 3.8.2.7 in Chapter 3.

Please use the above two methods to remove the USB disk to ensure that the data is saved completely in USB disk.

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Chapter 3 Creating and Editing Screens

In this chapter, it will introduce general functions of Screen Editor software program with Windows. The user can use it to design what he wants. Detail information for each function will be discussed in following chapters.

3.1 Screen Editor Setup

■ **Recommended System Requirements**

- CPU: Intel® Pentium 4.1 or greater

- Memory: 1GB RAM or greater

- Hard Disk: 400MB and above free hard disk space

- Monitor Display: 1024 × 768 resolution higher full-color display recommended

- Printer: Printer compatible with Windows® 2000 / Windows® XP

- Operation System: Windows® 2000 / Windows® XP / Windows® Vista / Windows® 7

■ **Software installation**

The user can download the Screen Editor software program via the link below:
http://www.delta.com.tw/product/em/download/download_main.asp?act=3&pid=3&cid=2&tpid=3

To start the Delta HMI Screen Editor software program setup, please refer to the following steps:

Step 1: Please start-up your computer to Win2000/WinXP system (Fig. 3-1-1).
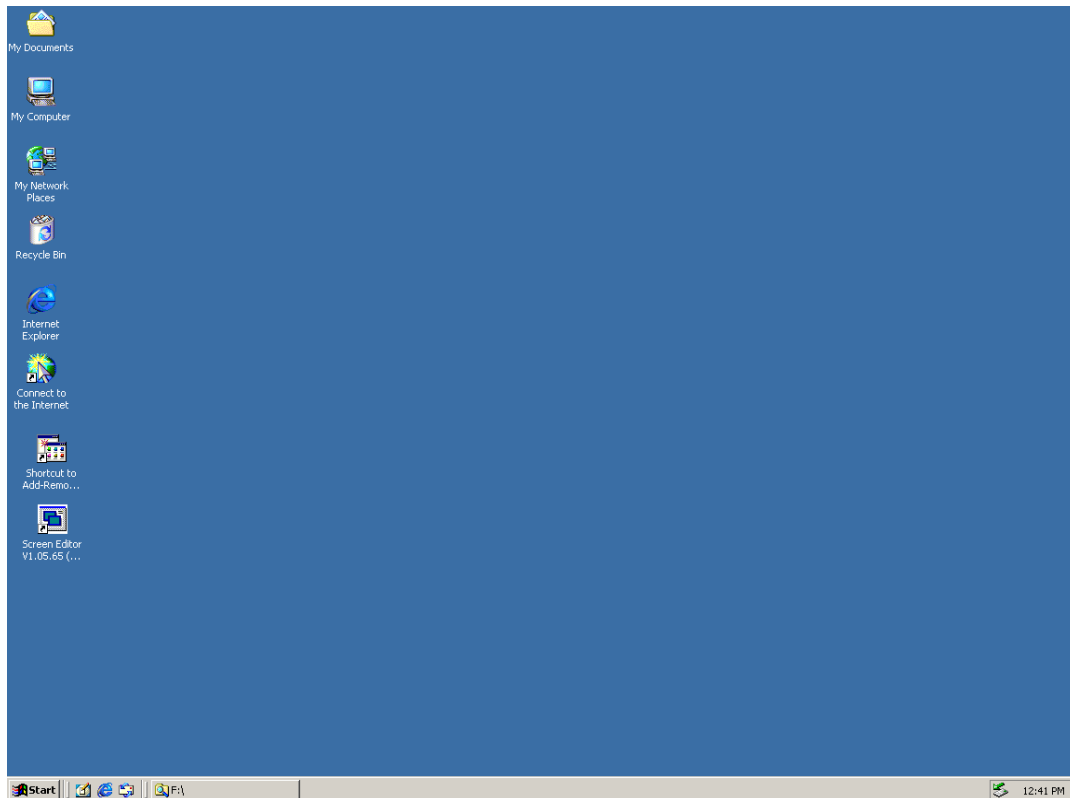
Fig. 3-1-1 Open Microsoft Windows

Step 2: Execute **setup.exe** from Windows taskbar by clicking **"Start" > "Run"**. After pressing **OK**, system will setup automatically and you will get the following dialog box to select the desired display language (Fig. 3-1-2).
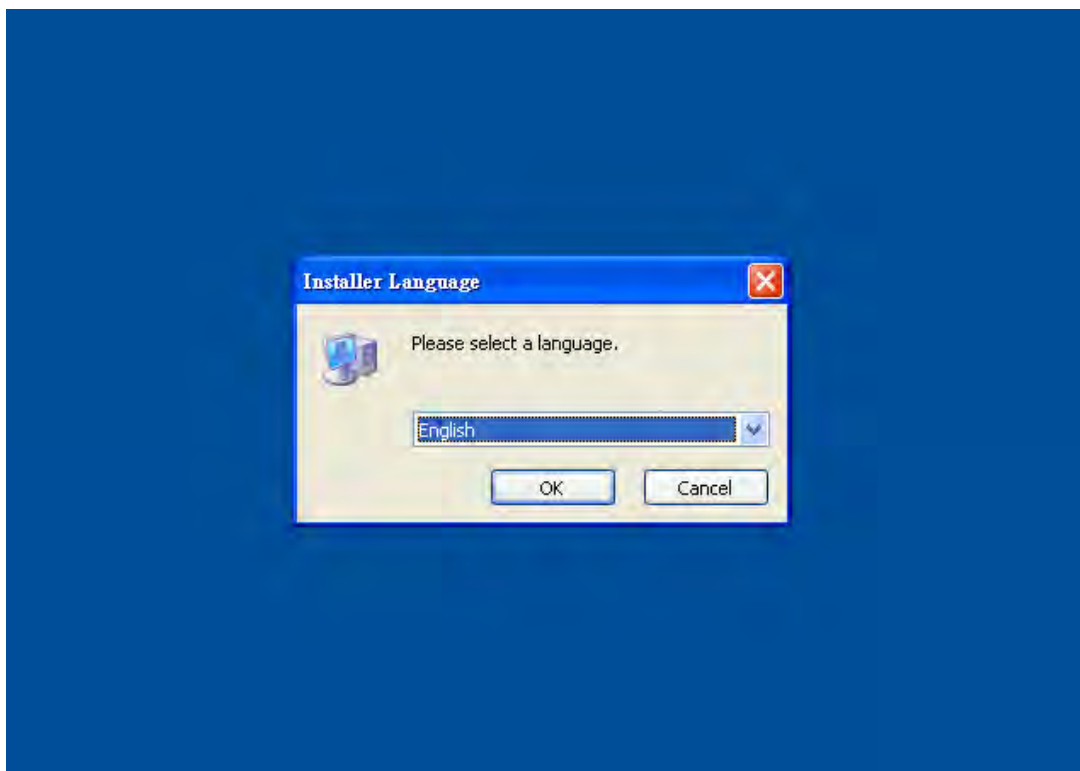
Fig. 3-1-2 Select Language

After pressing **OK**, system will setup automatically and you will get the following dialog box to choose destination location (Fig. 3-1-3).
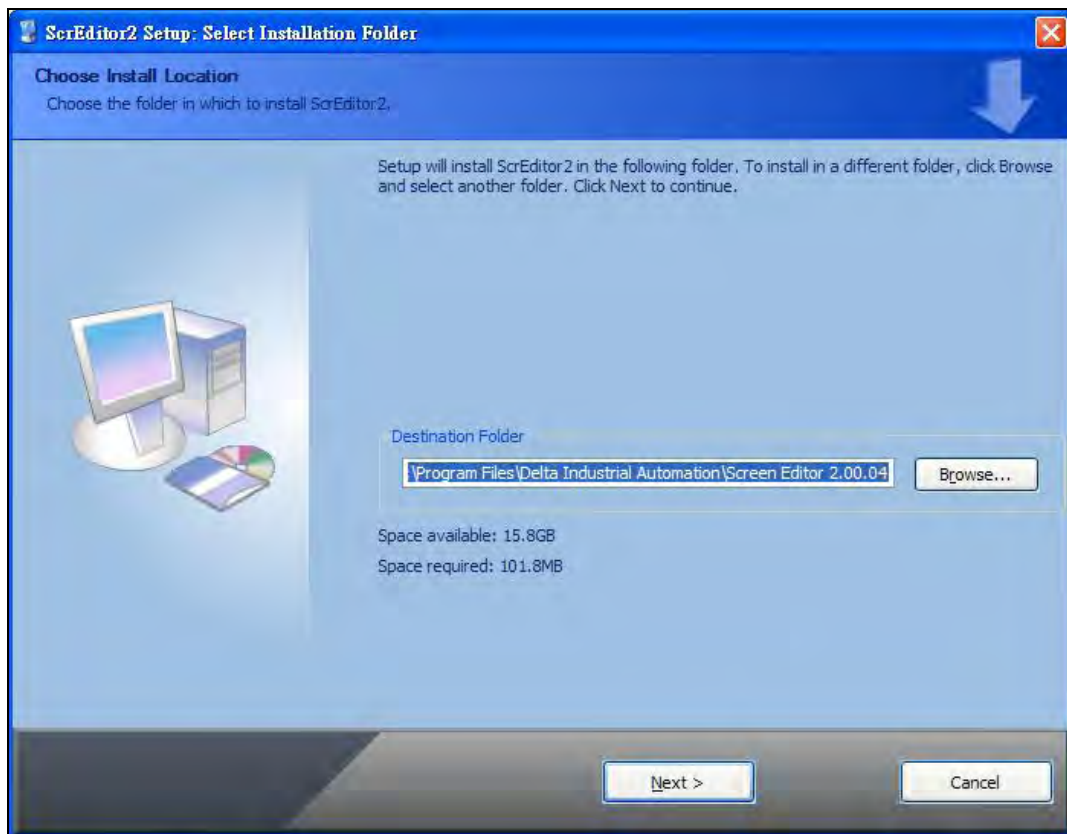
Fig. 3-1-3 Directory for installing Screen Editor software program

To select the default directory **C:\Program Files\Delta Industrial Automation\Screen Editor 2.00.XX**, click **Next>** for the next step. Setup will install in the directory indicated in the Destination Directory box at the bottom of the dialog box.

To select a directory other than the default directory, click **Browse**. A list of available directories appears. Highlight the desired directory for Screen Editor and click **OK**, then **Next>** for the next step. If necessary, click **<** **Back** button to take you back through Setup dialog boxes one by one.

Please remember the location of the destination directory. If the destination directory is missing or changed, the user cannot upgrade the software successfully.

Step 3: After pressing **Next**, system will ask you to select the installation software, i.e. Screen Editor (Fig. 3-1-4).
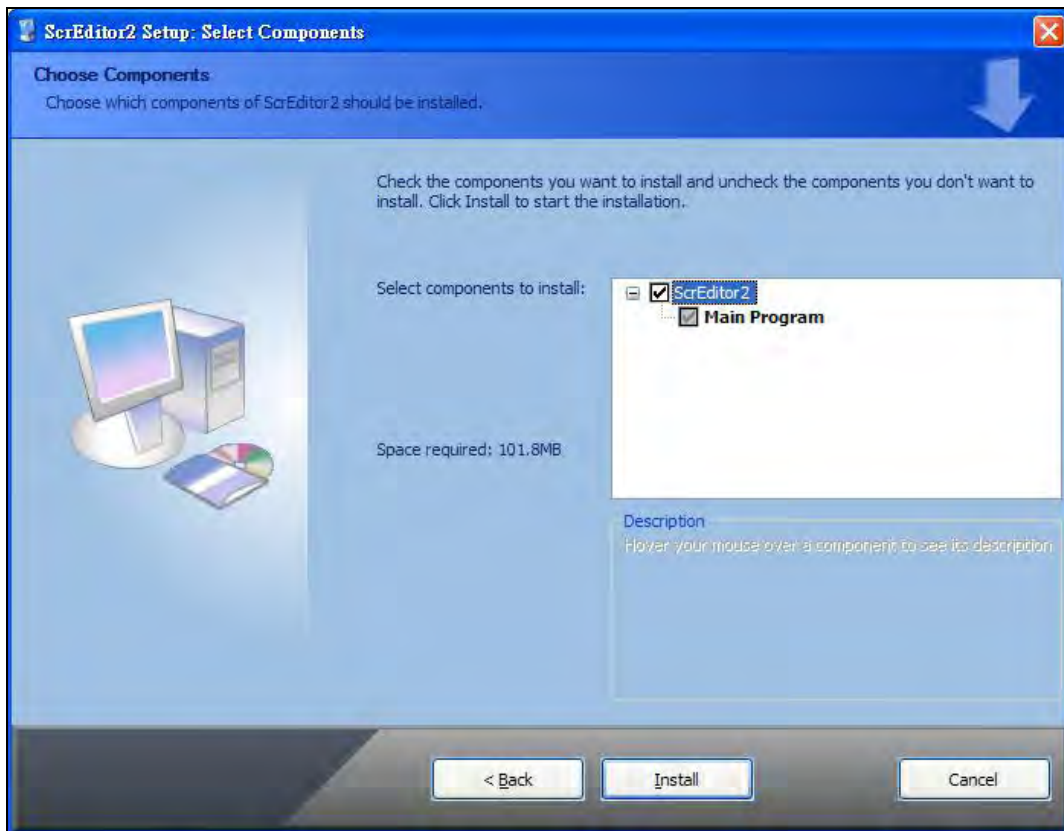
Fig. 3-1-4 Select Screen Editor software program

Step 4: Then click **Install** button to start Screen Editor Installation (Fig. 3-1-5, Fig. 3-1-6).
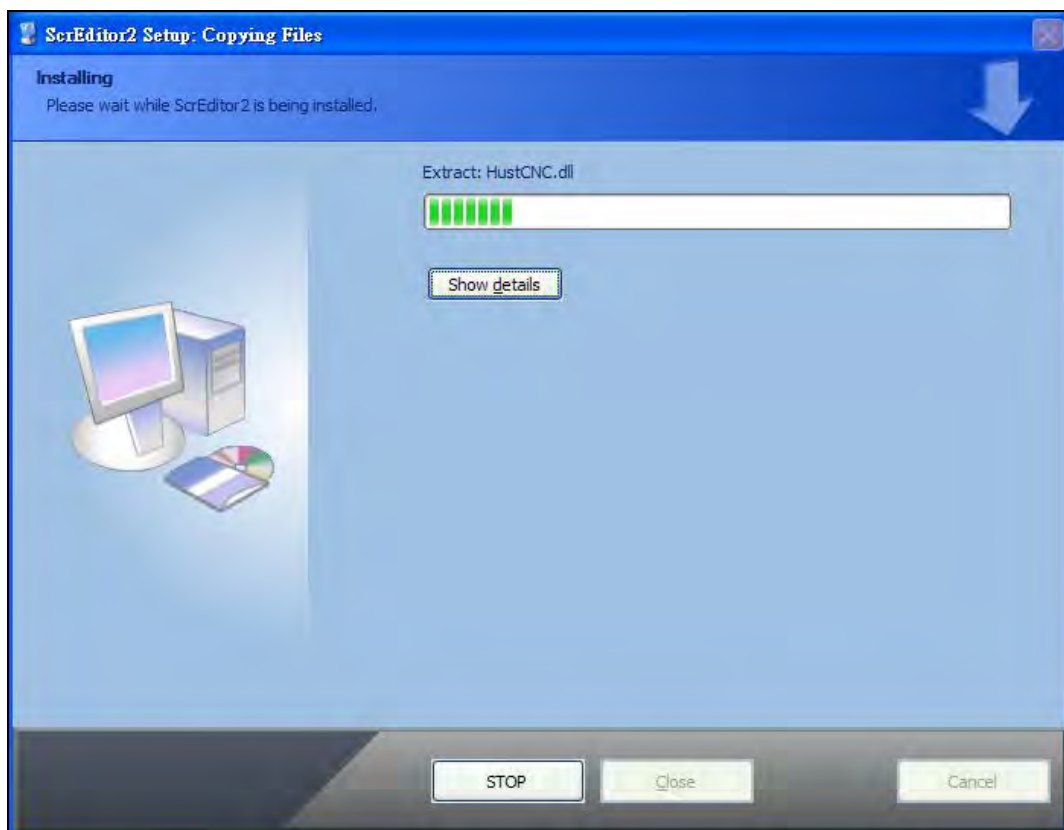
Fig. 3-1-5 Starting Screen Editor installation
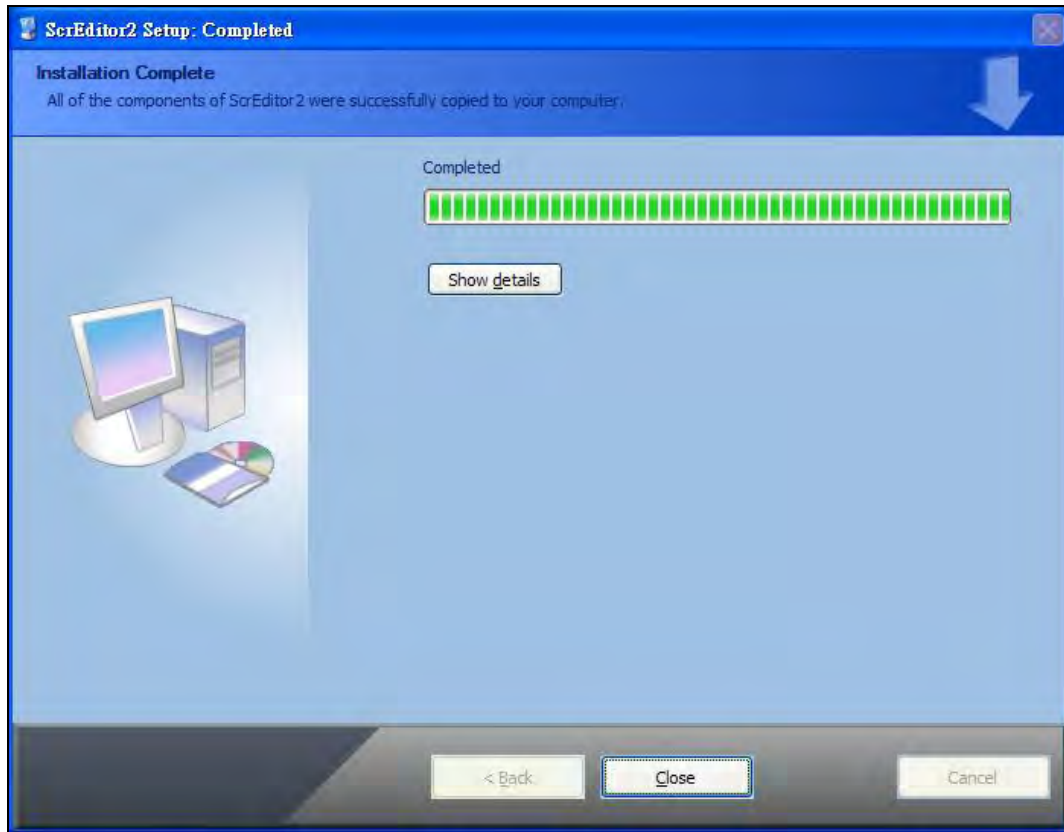
Fig. 3-1-6 Finish installing Screen Editor

Step 5: After finish installing Screen Editor software program (Fig. 3-1-6), the system will ask you to install HMI USB driver, please click **Yes** to install.
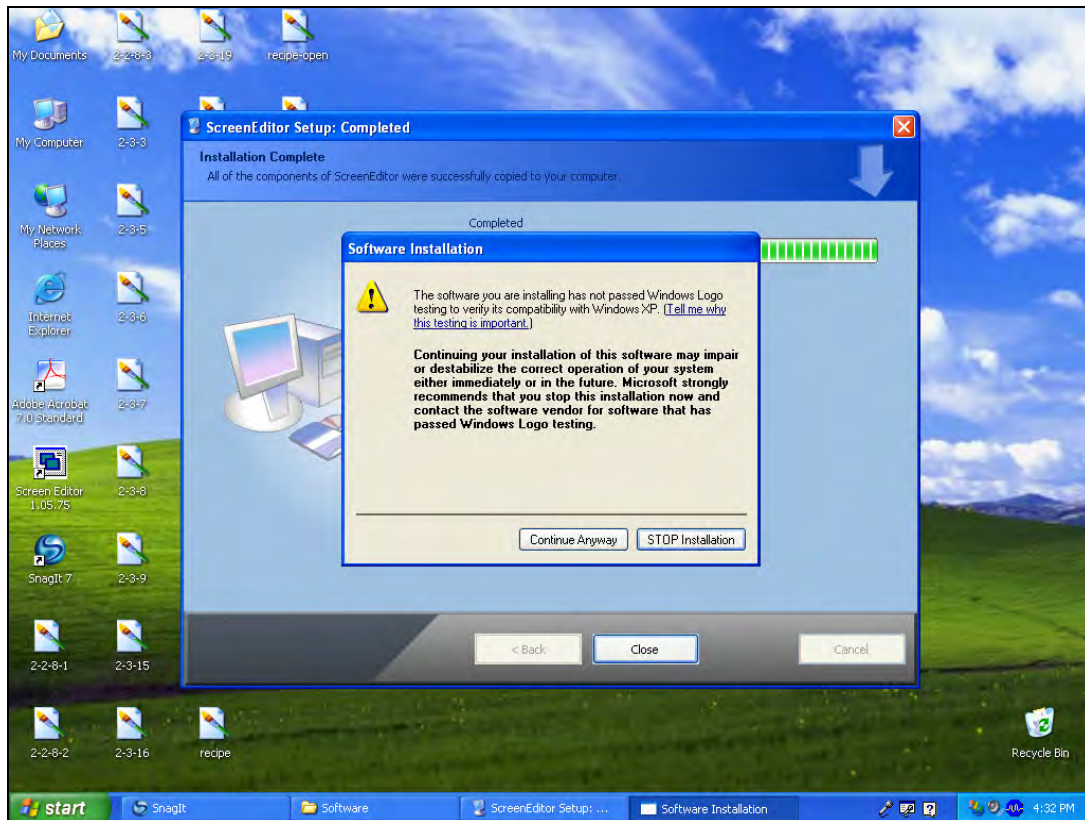
Fig. 3-1-7 Install HMI USB driver

Step 6: After installing HMI USB driver, click **Close** to complete the installation. After the installation is completed, connect HMI and PC by communication cable via USB port. Wait for few seconds and activate Screen Editor software program. Then choose **Tools > Get Firmware Information**. At this time, if there is no error message and the firmware information shows up successfully, it indicates that Screen Editor software program has been installed and the user can use PC to communicate with HMI via USB port without problem.

■ **Software upgrade (ScrEdit-Path Setup)**

When receiving the software upgrade technical announcement, the user can download the upgrade software program, Patch_DOPB_yyyymmdd at Delta's website. The upgrade software program includes the firmware and the enhanced functions. Before installing the upgrade software program, the user needs to confirm if the software destination directory is the default setting, i.e. C:\Program Files\Delta Industrial Automation\Screen Editor 2.00.XX. Please ensure that the destination directory is the default setting or the user could not perform the upgrade successfully.

[Installation methods of Patch_DOPB_yyyymmdd]

Step 1: Click Patch_DOPB_yyyymmdd direcly under Windows and the system will start the installation (Fig. 3-1-8). The user can click **Install** button to upgrade your Screen Editor.

Step 2: During installation, the user can click **Show details** button to see the detailed items (Fig. 3-1-9).
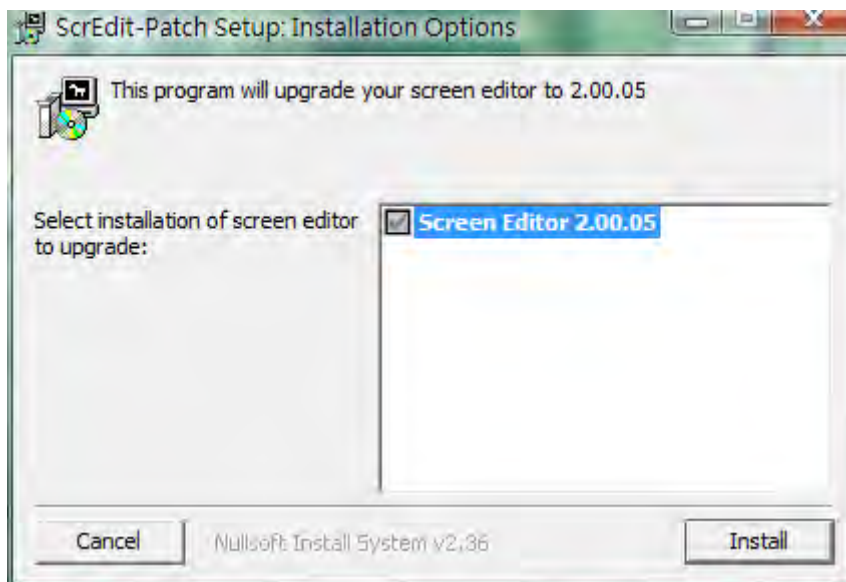
Fig. 3-1-8 Install Patch_DOPB_yyyymmdd
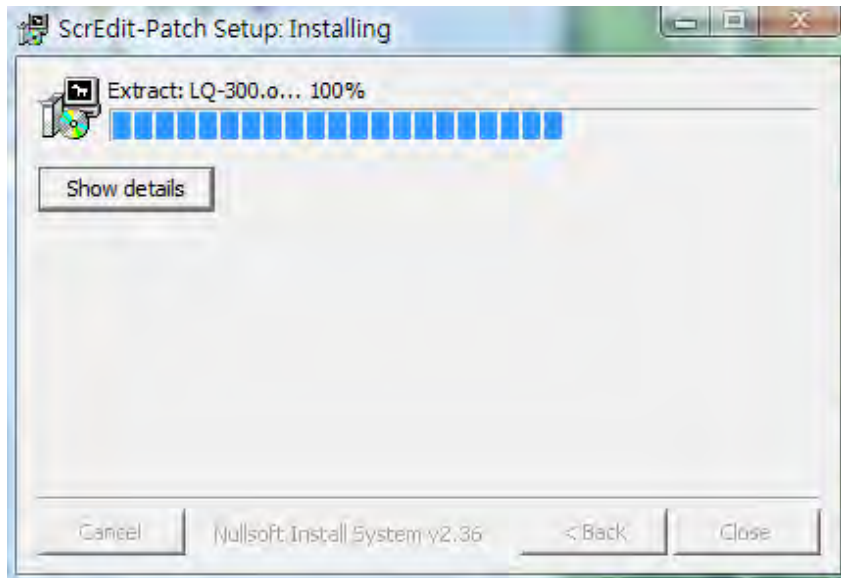
Fig. 3-1-9 Starting installation
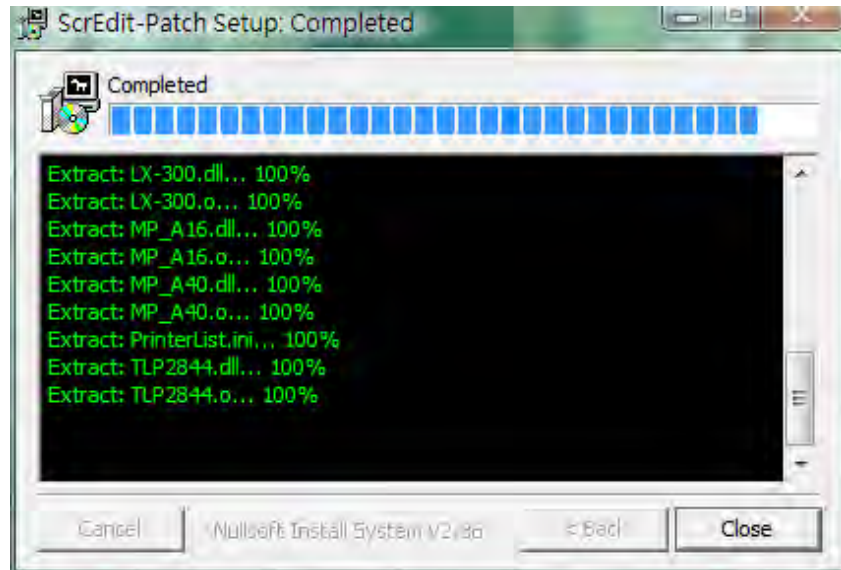
Fig. 3-1-10 Show details
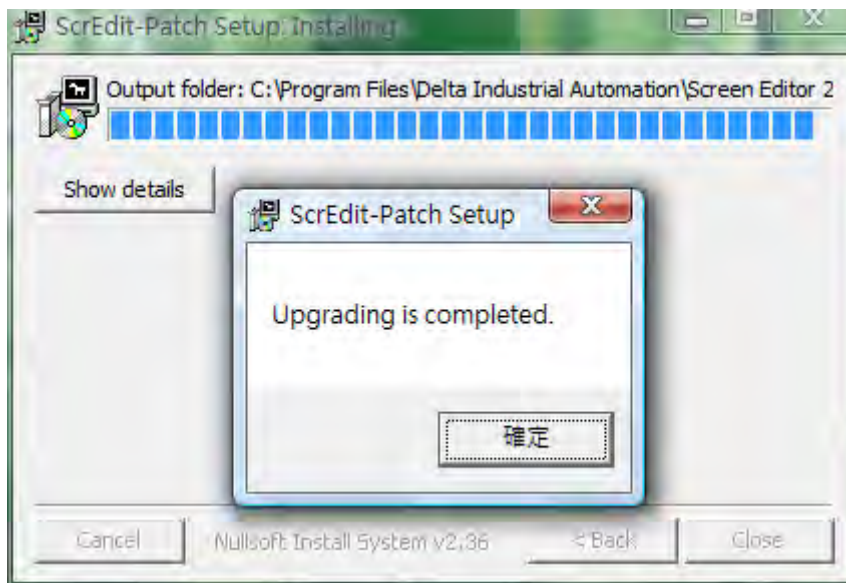
Fig. 3-1-11 Finish upgrading
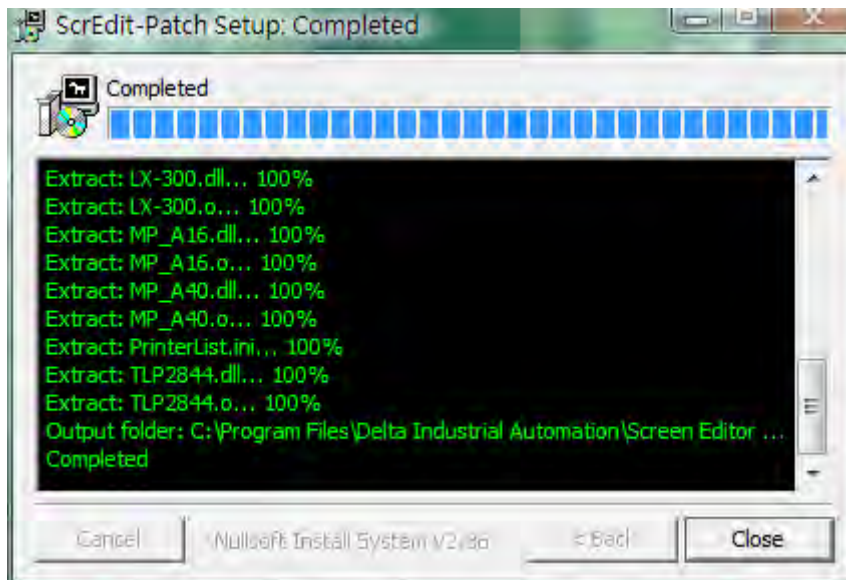
Fig. 3-1-12 Finish installation

Step 3: After upgrading is finished, click **Close** to complete the installation.

3.2   How to Start Screen Editor

1. After setup, you can start Screen Editor software program by clicking **Screen Editor 2.00.XX** shortcut on the desk (Fig. 3-2-1) or from Windows taskbar, click **Start > Programs > Delta Industrial Automation > HMI > Screen Editor 2.00.XX**.

Fig. 3-2-1

Fig. 3-2-2 Start-up display

When Screen Editor software program is activated for the first time, the first window to show up is as follows. There are only **File**, **View**, **Tools**, **Options** and **Help** on the toolbar.
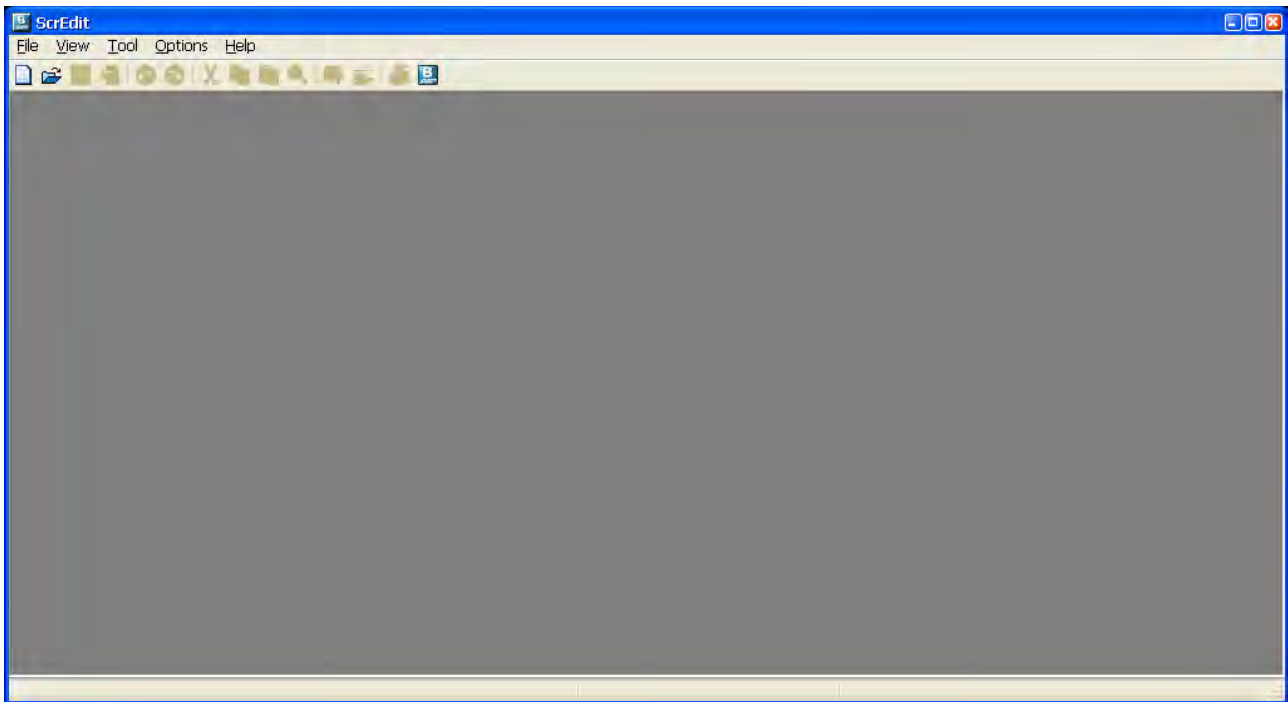
Fig. 3-2-3 Screen without editing file

2. After pressing or click **File** > **New**, it can create a new project and you will get a dialog box as shown in the following (Fig. 3-2-4).
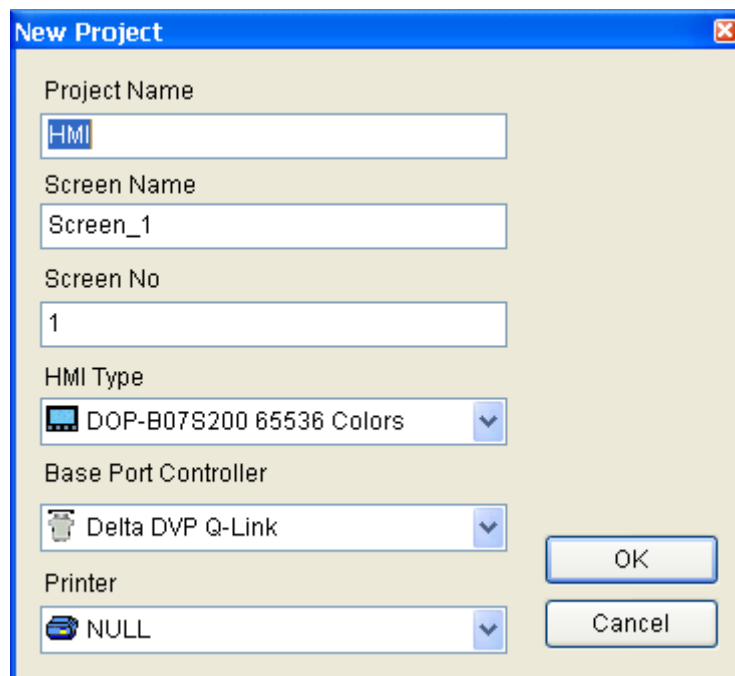
Fig. 3-2-4 Creating a New project

3. Enter the project name, screen name, screen No. and select connected HMI, controller or printer. Then, click **OK**. It can create a new project in Screen Editor software program as shown in the following (Fig. 3-2-5).
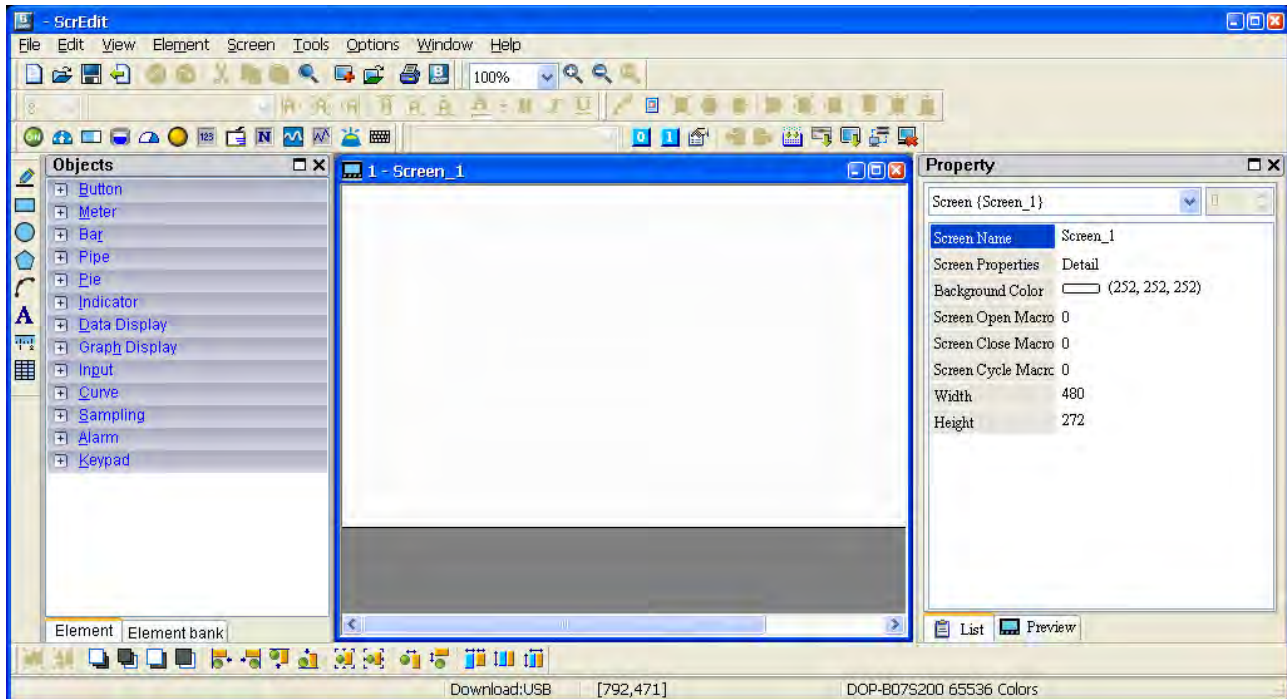
Fig. 3-2-5 New project screen of Screen Editor

There are five parts in the following for editing window of Screen Editor software program.

■ **Menu Bar**

There are nine functions for selection: File, Edit, View, Element, Screen, Tools, Options, Window, and Help.

■ **Toolbar**

Toolbar (Fig. 3-2-6) is like those toolbar in Windows® program. It is easy to use for editing and the user can arrange its position freely. For example, the user can move the Toolbar to the left side of the screen. Also, the user can arrange the toolbar position by their usage. The followings are the available toolbar on Screen Editor software program.

1. **Standard Toolbar**

2. **Zoom Toolbar**

3. **Text Toolbar**
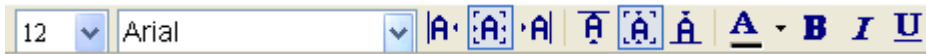
4. **Bitmap Toolbar**

5. **Element Toolbar**

6. **Layout Toolbar**

7. **Drawing Toolbar**
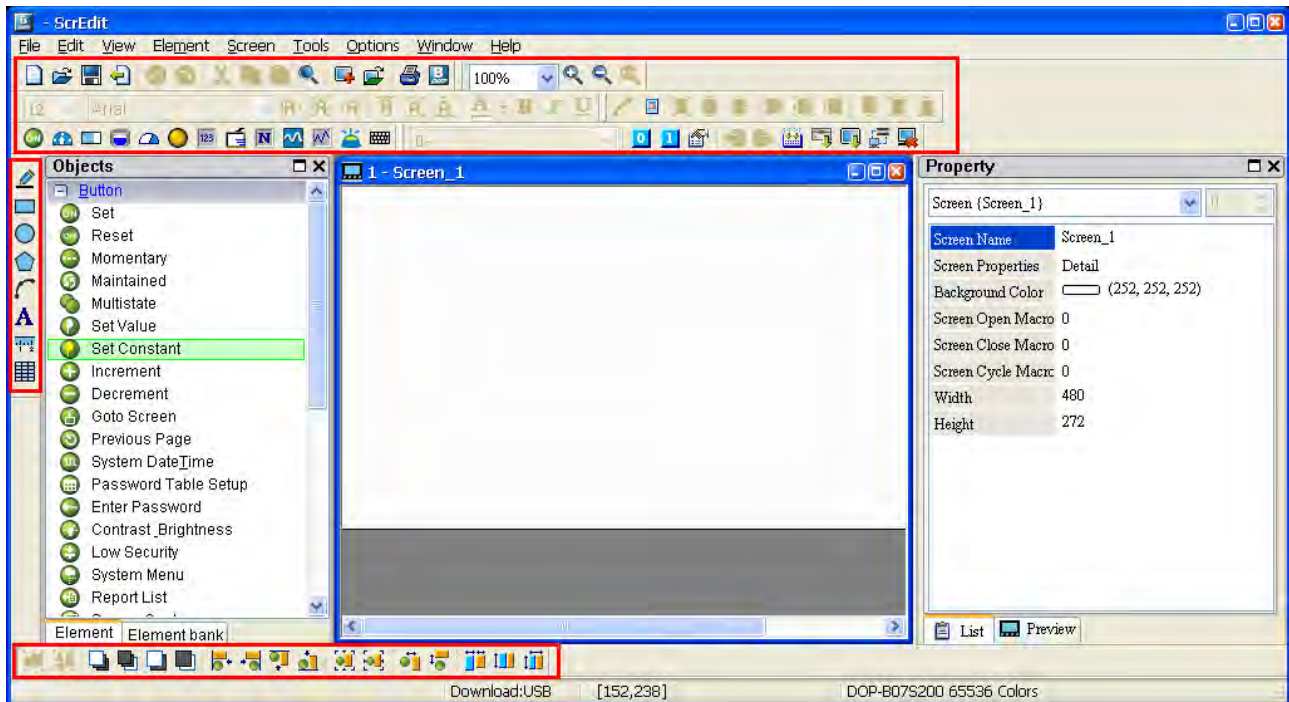
Fig. 3-2-6 Toolbar of Screen Editor
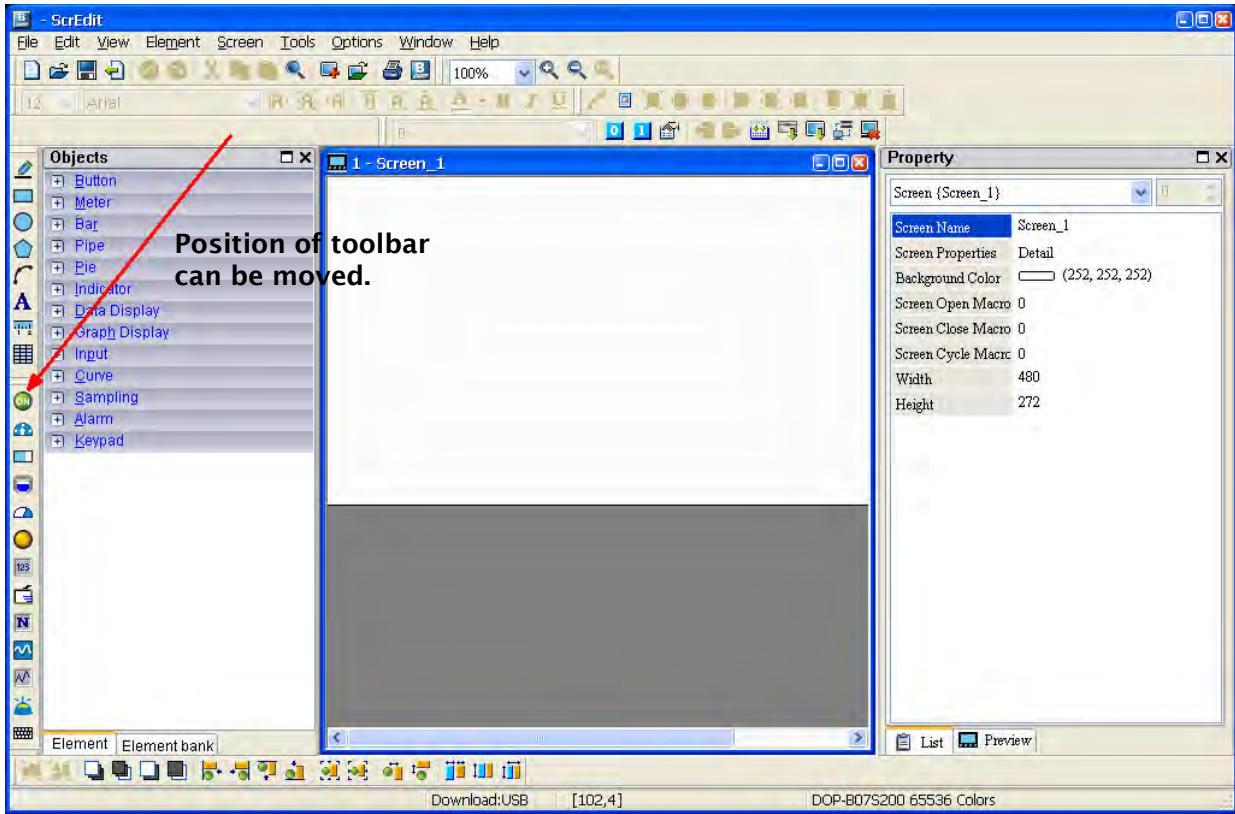
Fig. 3-2-7 Element Toolbar has been moved

■ **Element Tool Window**

The Element Tool window provides various kinds of element icons for selection (Fig. 3-2-8). The user can use the mouse to select the desired element icon and drag it onto the work place to create a new element. In addition, the user can save the element in the Element Bank for editing the element next time (Fig. 3-2-9).
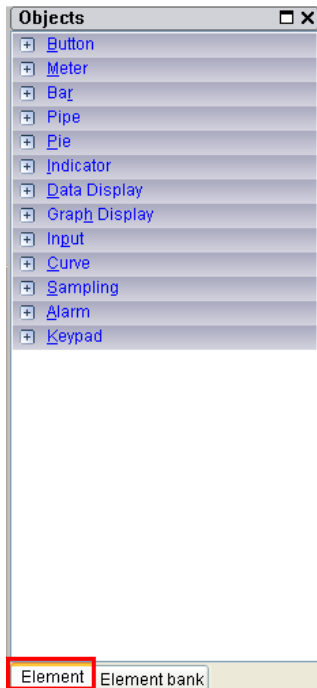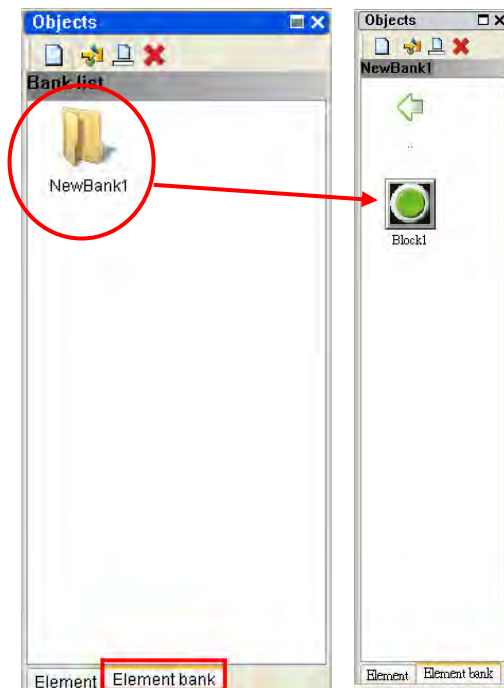
Fig. 3-2-8   Fig. 3-2-9

■   **Property Table**

The Property Table displays the element property settings for each element (Fig. 3-2-10 & Fig. 3-2-11).

All elements on the current editing screen
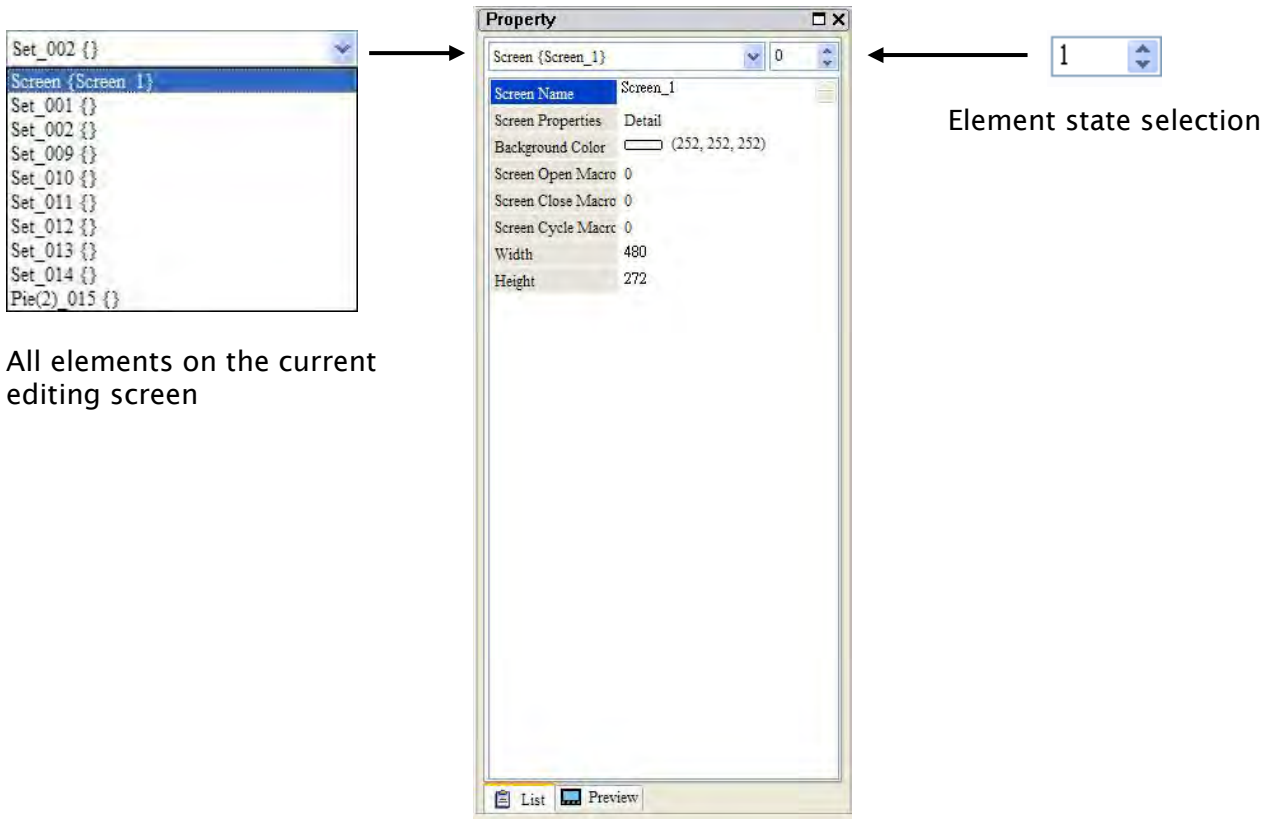
Element state selection
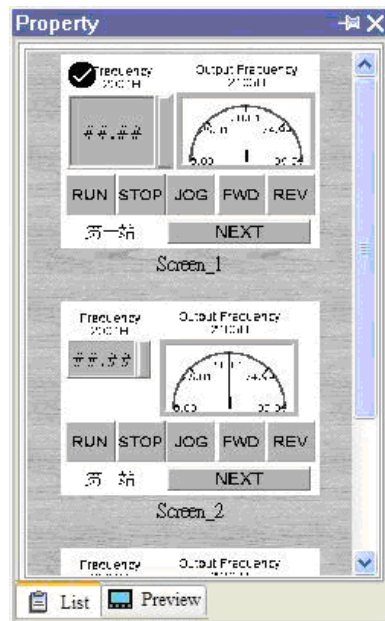
Fig. 3-2-10 Property Table and Editing Screen Preview

■   **Record and Output Window**

The Record and Output Window displays all the editing actions and output message when compile function is enabled (Fig. 3-2-11). When HMI program is compiled, the system will detect the program automatically. Once error occurs, the error messages will be displayed in Output Window. To get to the error element window, click on the error message.

Fig. 3-2-11 Record and Output window

■   **Work Place**

Following is an editing example display (Fig. 3-2-12).
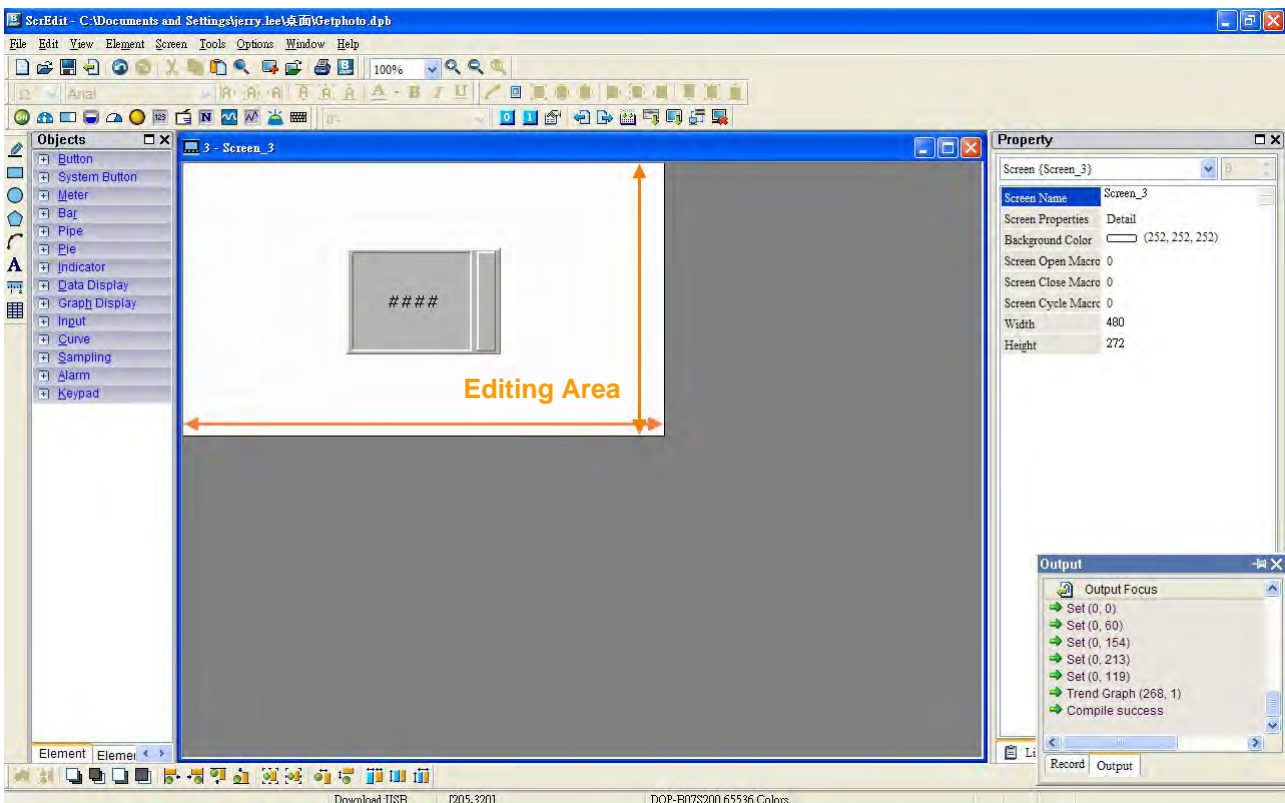
Fig. 3-2-12 Work Place of Screen Editor

■ **Status Bar**

Following is the status bar of Screen Editor (Fig. 3-2-13).
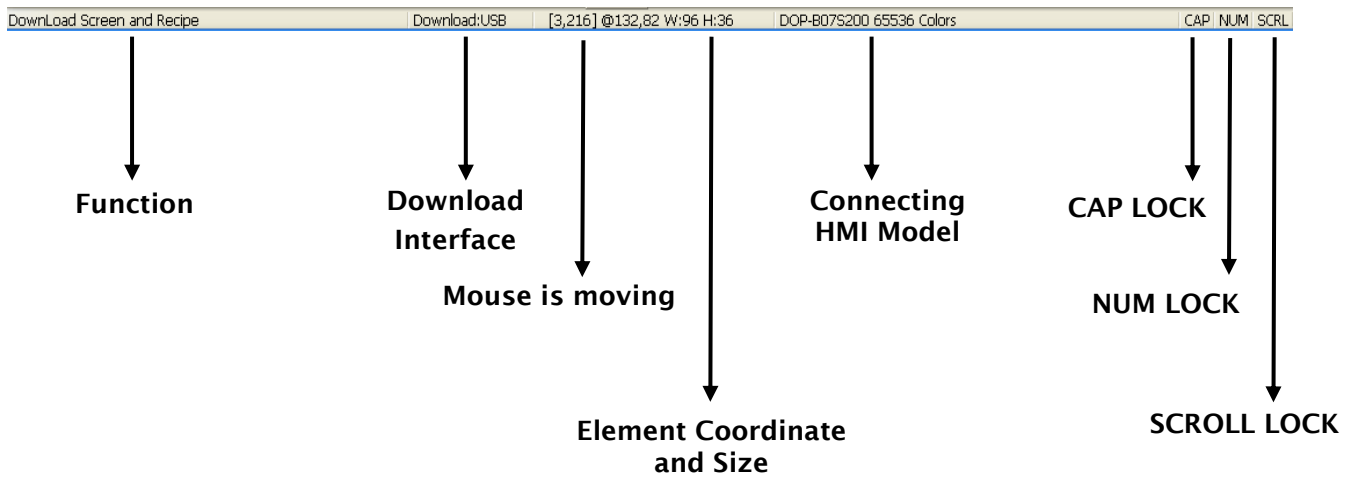
Fig. 3-2-13 Status Bar of Screen Editor

3.3   Internal Memory

There are six kinds of registers for selection. They are internal register $, Non-volatile Internal Register $M, Indirect Address Register *$, Recipe Number Register RCPNO, Recipe Group Register RCPG and Recipe Register RCP (Fig. 3-3-1). For more details on settings, please refer to the following descriptions.
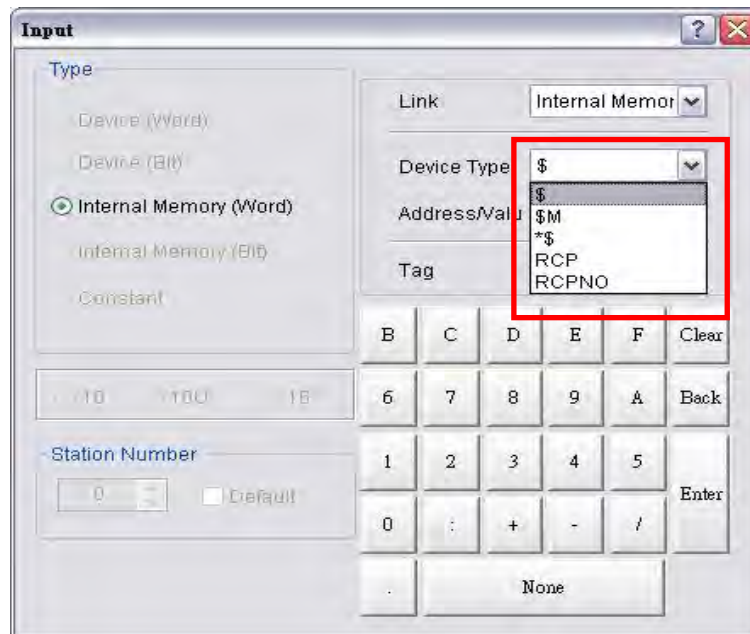
Fig. 3-3-1 HMI Internal Memory

3.3.1   Internal Register (Read / Write) : $

Word Access : $n   (n : 0-65535)

Bit Access   : $n.b(n : 0-65535, b : 0-15)

Delta DOP-B series HMI provides 65536 16-bit internal registers ($0.0 - $65535.15).

Note: The setting values of this register are not retained when power is off.

■   **Non-volatile Internal Register (R/W): $M**

   Word access: $Mn (n: 0~1023)

   Bit access: $Mn.b (n: 0~1023, b: 0~15)

   Delta DOP series HMI provides 1024 16-bit non-volatile internal registers ($M0 ~ $M1023).

3.3.2   Non-volatile Internal Register (Read / Write) : $M

Word Access : $Mn   (n : 0-1023)

Bit Access   : $Mn.b(n : 0-1023, b : 0-15)

Delta DOP-B series HMI provides 1024 16-bit non-volatile internal registers($M0.0 - $M1023.15). As the setting values of this register are retained when power is off, the user can use this register to store the important data or records.

3.3.3   Indirect Address Register (Read / Write) : *$

Word Access：*$n(n : 0-65535)

Indirect address register is an area where an address is stored. The user must get the address from *$n and then get the values stored in this address.

For example: if $7 = 20; $20 = 39; then *$7 = 39.

The general formula：if $n = m; $m = x, then *$n = x (m : 0-65535)。

The value of m must not be more than 65535.

Note: The setting values of this register are not retained when power is off.

3.3.4   Recipe Number Register (Read / Write) : RCPNO

This register is used to specify the recipe data number (Fig. 3-3-2). When upload/download the data to HMI or the external controller, HMI or the external controller uses the settings of recipe number register to read/write the data of recipe. If RCPNO is set to 1, it indicates it is defined as 1st number of recipe data. If RCPNO is set to 4, it indicates it is defined as 4th number of recipe data. In addition, when editing the recipe data, the user can set the size of each number of recipe data. For more details, please refer to the descriptions of Recipe Register RCP.

Note: The setting values of this register are not retained when power is off.
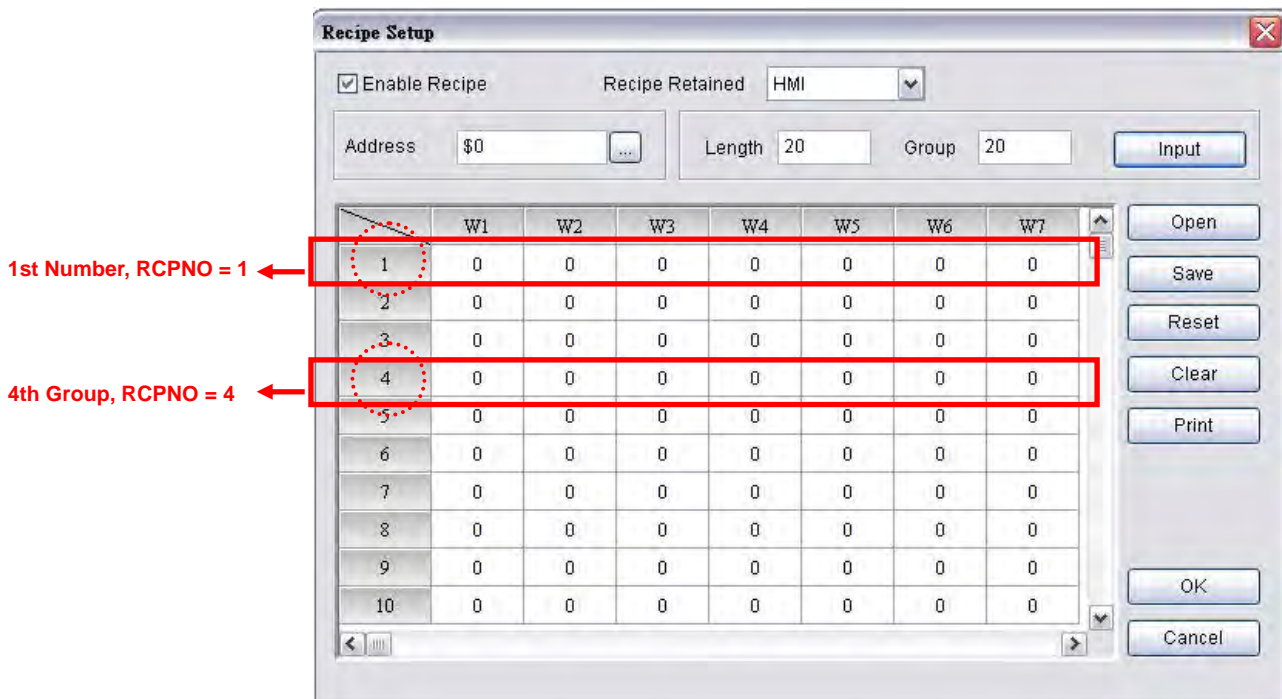
Fig. 3-3-2 Recipe Editing Screen

3.3.5 Recipe Group Register (Read / Write) : RCPG

This register is used to specify the 32-bit recipe group (Fig. 3-3-3). It is different than RCPNO. The difference is that when using RCPG, not only the recipe number, the recipe group also must be set. When the user wants to upload/download the recipe data of 1st number of 1st group, RCPG must be set to 1 and RCPNO must be set to 1. If HMI or the external controller needs to read/write the recipe data of 4th number of 3rd group, RCPG must be set to 3 and RCPNO must be set to 4. The recipe group number is determined when editing the recipe table. For more details, please refer to the descriptions of Recipe Register RCP.

Note: The setting values of this register are not retained when power is off.
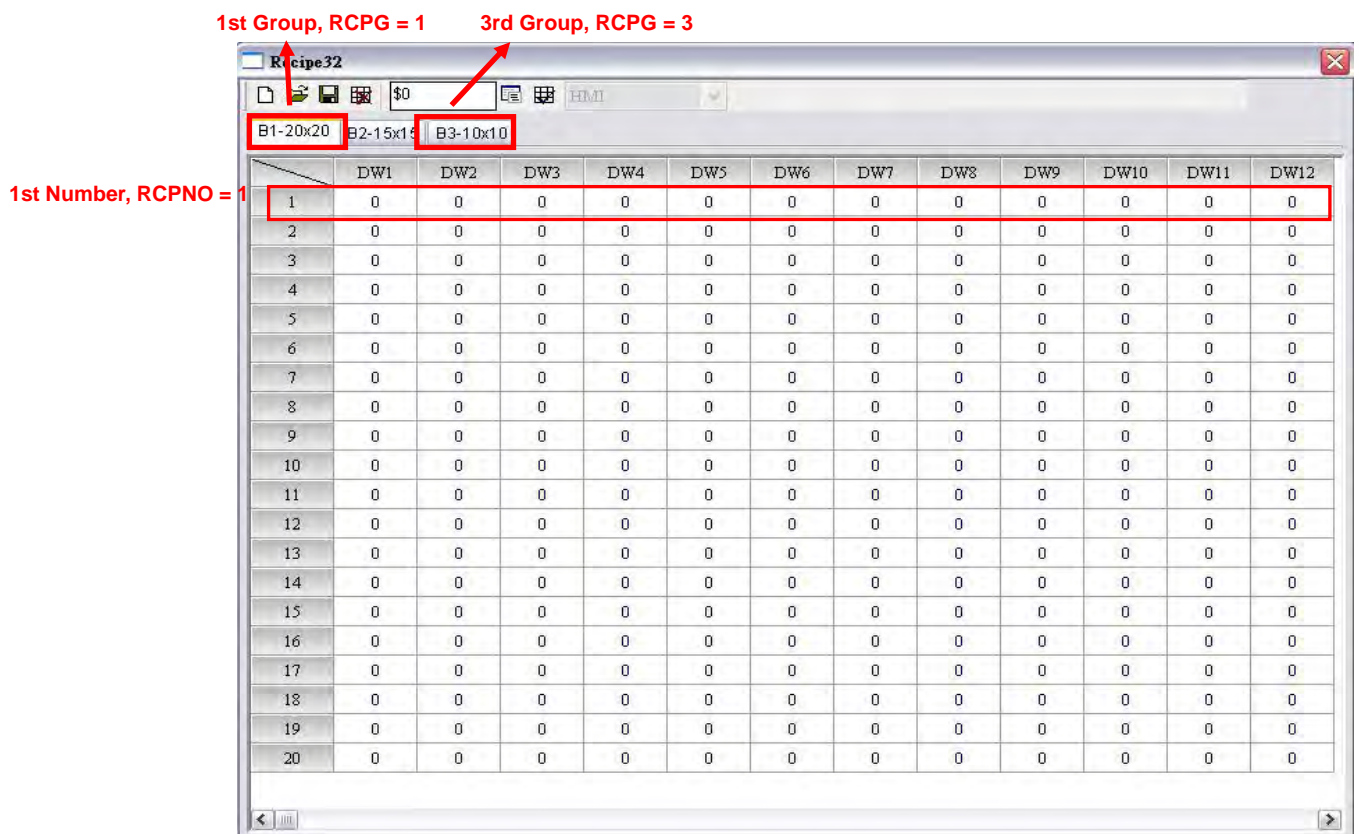
Fig. 3-3-3 Recipe Group Editing Screen

3.3.6 Recipe Register (Read / Write) : RCP

This register is used to save the recipe data that the user downloaded from HMI after exiting Screen Editor software program. There are two kinds of recipe register, 16-bit recipe register and 32-bit recipe register.

16-bit Recipe Register

The size of this register is 16bit (1 Word). If the data storage area is an external memory, i.e. a USB disk or SM card is connected, the data space of 16-bit recipe register is 4MB words. If the data storage area is an internal memory, the data space of 16-bit recipe register is 64K words.

Assume that the data size is L and the recipe number is N, and the actual recipe data space is equal to L x N words, i.e. L x N recipe registers are occupied. Delta DOP-B series has a recipe buffer area (Table 3-3-2) which stores the selected recipe data by the user. The size of this buffer area is the same as the data size of the selected recipe. It also means that L recipe registers are occupied in recipe buffer area. Therefore, there will be L x (N+1) registers occupied in one recipe table. Use the following method to access data that set with recipe.

Word Access： RCPn (n : 0-L*(N+1)-1)

Note: -1 indicates that the number of RCP starts from 0.
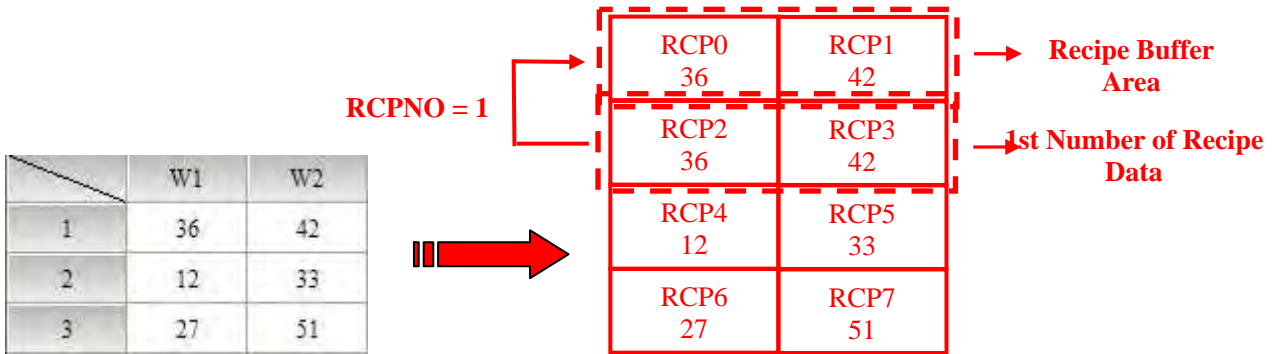
Table 3-3-1 Recipe Table Table 3-3-2 Layout of Recipe Registers

Example 1:

Table 3-3-1 is an example of how to access data. The size L is set to 2 and the number N is set to 3 with the recipe data. Thus the layout of the recipe data will be shown as Table 3-3-2, i.e. RCP0~RCP7 are occupied. When RCPNO is set to 1 and the recipe buffer area will show the 1st number of recipe data. If RCPNO is change to 3, the recipe buffer area will show 3rd number of recipe data shown as in Table 3-3-4.
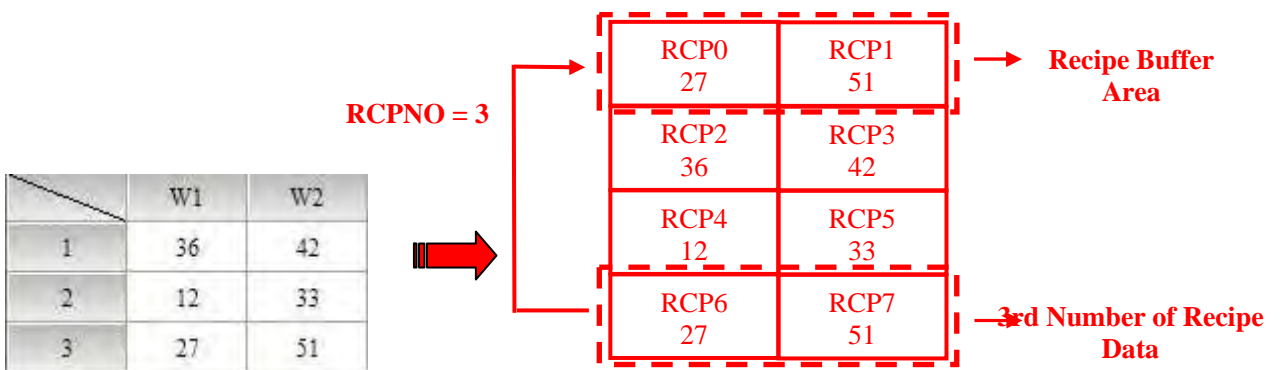
Table 3-3-3 Recipe Table Table 3-3-4 Layout of Recipe Registers

Example 2:

In Table 3-3-5, the size L is set to 3 and the number N is set to 2 with the recipe data. Thus the layout of the recipe data will be shown as Table 3-3-6, i.e. RCP0~RCP8 are occupied. When RCPNO is set to 2 and the recipe buffer area will show the 2nd number of recipe data.

	W1	W2	W3
1	36	42	1
2	12	33	76
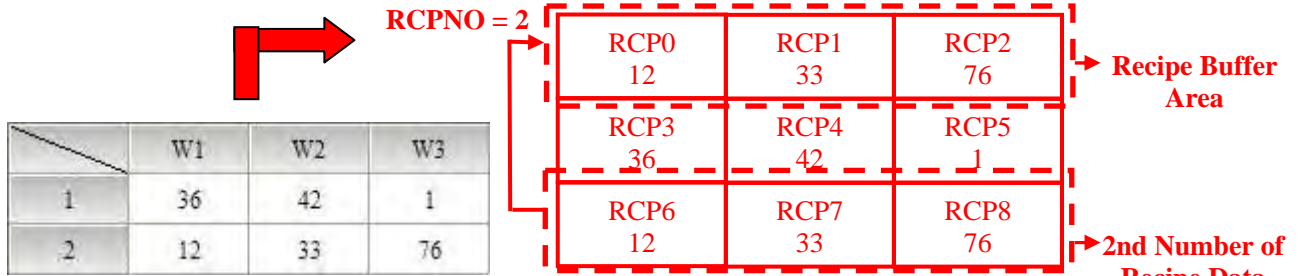
Table 3-3-5 Recipe Table   Table 3-3-6 Layout of Recipe Registers

32-bit Recipe Register

The size of this register is 32bit (2 Words or Double Word, DW). If the data storage area is an external memory, i.e. a USB disk or SM card is connected, the data space of 32-bit recipe register is 50MB words. If the data storage area is an internal memory, the data space of 32-bit recipe register depends on the specification of HMI flash memory. The user can refer to the specifications shown on DOP-B series catalogue. Please note that not only recipe data, there are also other screen data stored in flash memory. It indicates the total memory size of the recipe data space must be less than the space of the flash memory. For more details, please refer to HMI Memory dialog by clicking **View** > **Memory List** (Fig. 3-3-4).
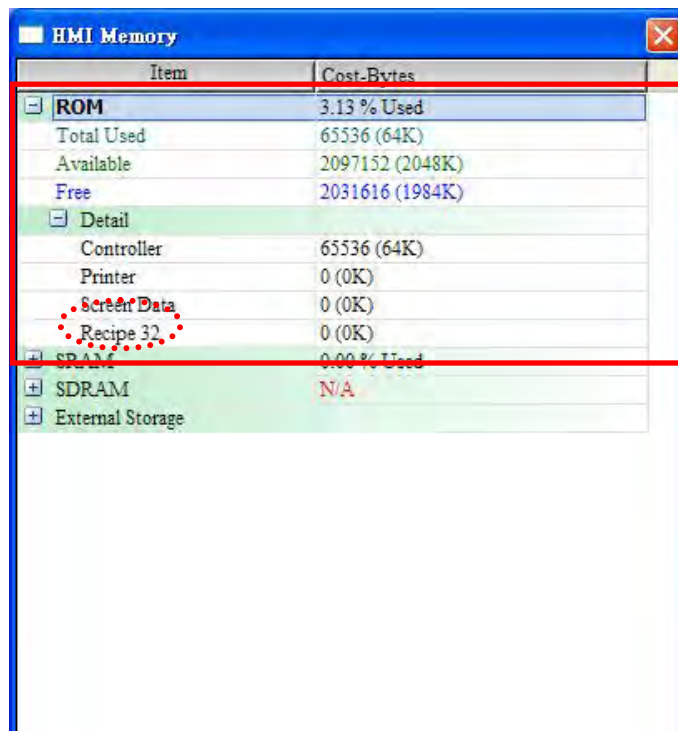
Fig. 3-3-4 HMI Memory

Assume that the data size is L and the recipe number is N, and the actual recipe data space is equal to L x N DW words, i.e. L x N recipe registers are occupied. Delta DOP-B series has a recipe buffer area (Table 3-3-8) which stores the selected recipe data by the user. The size of this buffer area is the same as the data size of the selected recipe. It also means that L recipe registers are occupied in recipe buffer area. Therefore, there will be L x (N+1) registers occupied in one recipe table. Use the following method to access data that set with recipe.

Double Word Access: RCPn (n : 0-L*(N+1)-1)

Note: -1 indicates that the number of RCP starts from 0.

	DW1	DW2	DW3
1	1	2	3
2	4	5	6
3	7	8	9
4	10	11	12

Table 3-3-7 Recipe Table

RCP0 1	RCP1 2	RCP2 3
RCP3 1	RCP4 2	RCP5 3
RCP6 4	RCP7 5	RCP8 6
RCP9 7	RCP10 8	RCP11 9
RCP12 10	RCP13 11	RCP14 12

Table 3-3-8 Layout of Recipe Registers
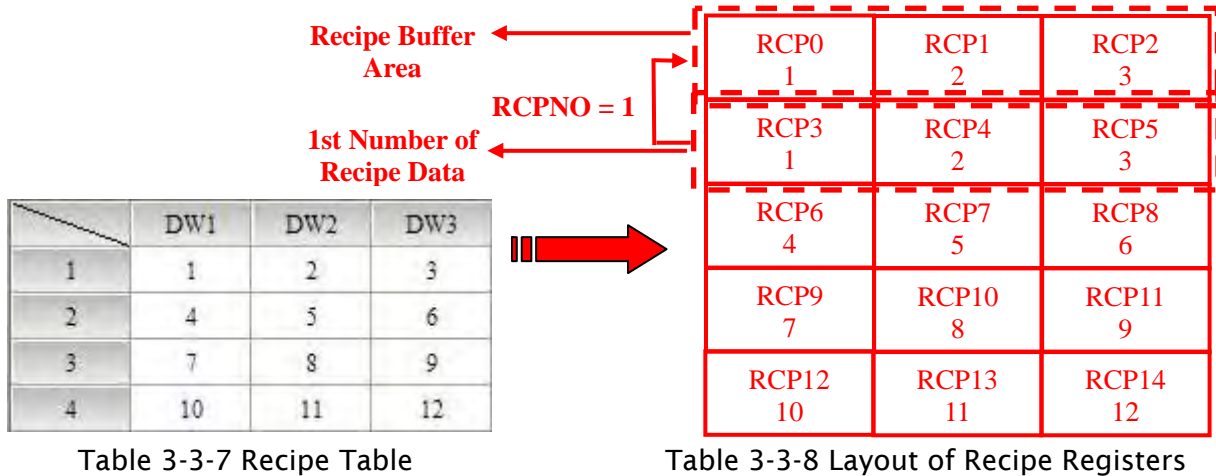
Example 1:

Table 3-3-7 is an example of how to access data which is built in the first group (RCPG=1). The size L is set to 3 and the number N is set to 4 with the recipe data. Thus the layout of the recipe data will be shown as Table 3-3-8, i.e. RCP0~RCP14 are occupied. When RCPNO is set to 1 and the recipe buffer area will show the 1st number of recipe data. If RCPNO is change to 3, the recipe buffer area will show 3rd number of recipe data shown as in Table 3-3-10.

	DW1	DW2	DW3
1	1	2	3
2	4	5	6
3	7	8	9
4	10	11	12

Table 3-3-9 Recipe Table

RCP0 7	RCP1 8	RCP2 9
RCP3 1	RCP4 2	RCP5 3
RCP6 4	RCP7 5	RCP8 6
RCP9 7	RCP10 8	RCP11 9
RCP12 10	RCP13 11	RCP14 12

Table 3-3-10 Layout of Recipe Registers
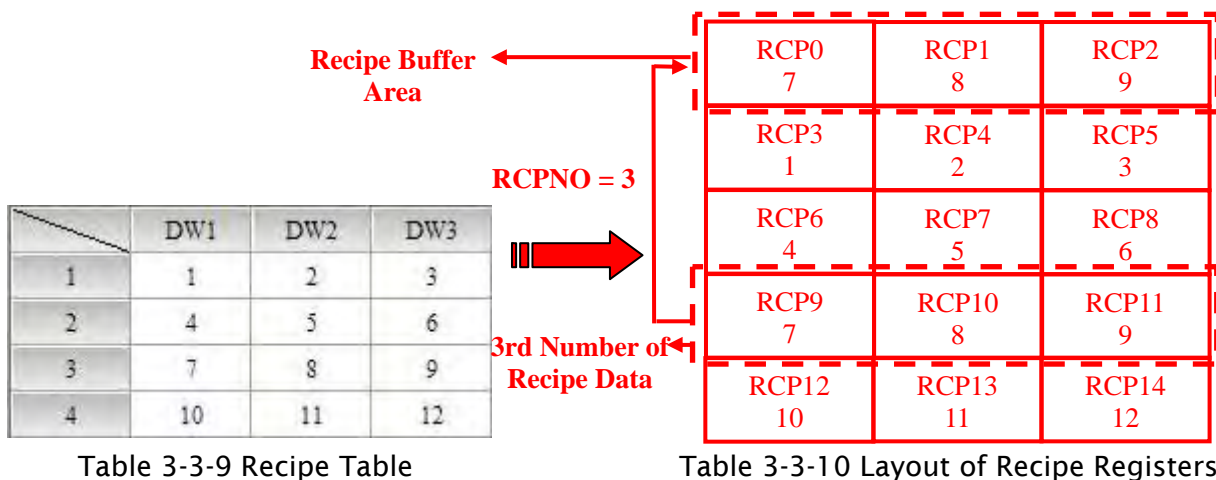
Example 2:

In Table 3-3-11, suppose that it is built in the first group (RCPG=1). The size L is set to 2 and the number N is set to 3 with the recipe data. Thus the layout of the recipe data will be shown as Table 3-3-12, i.e. RCP0~RCP7 are occupied. When RCPNO is set to 3 and the recipe buffer area will show the 3rd number of recipe data.
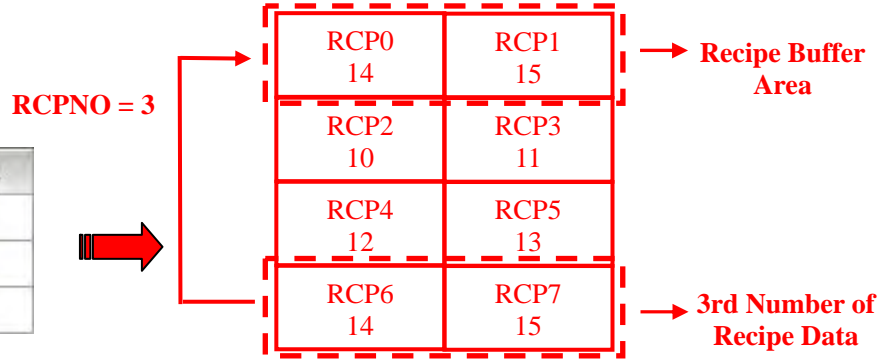
Table 3-3-11 Recipe Table   Table 3-3-12 Layout of Recipe Registers

3.4   Control Block and Status Block

For two-way communication between Delta DOP series HMI and all other brands of PLCs, the address of the control block and status block must be defined. These settings are located in the **Configuration** dialog box (Fig. 3-4-2) by clicking **Options** > **Configuration** (Fig. 3-4-1). For more details on settings, please refer to the following descriptions.
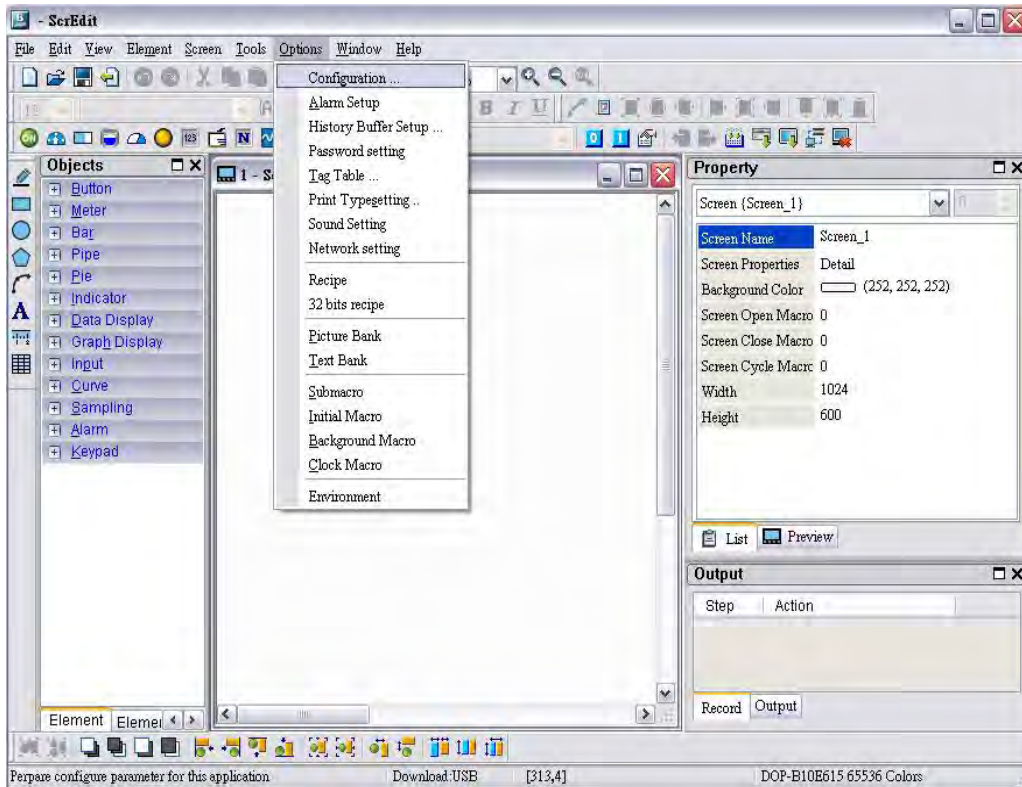
Fig. 3-4-1 Clicking Configuration Command
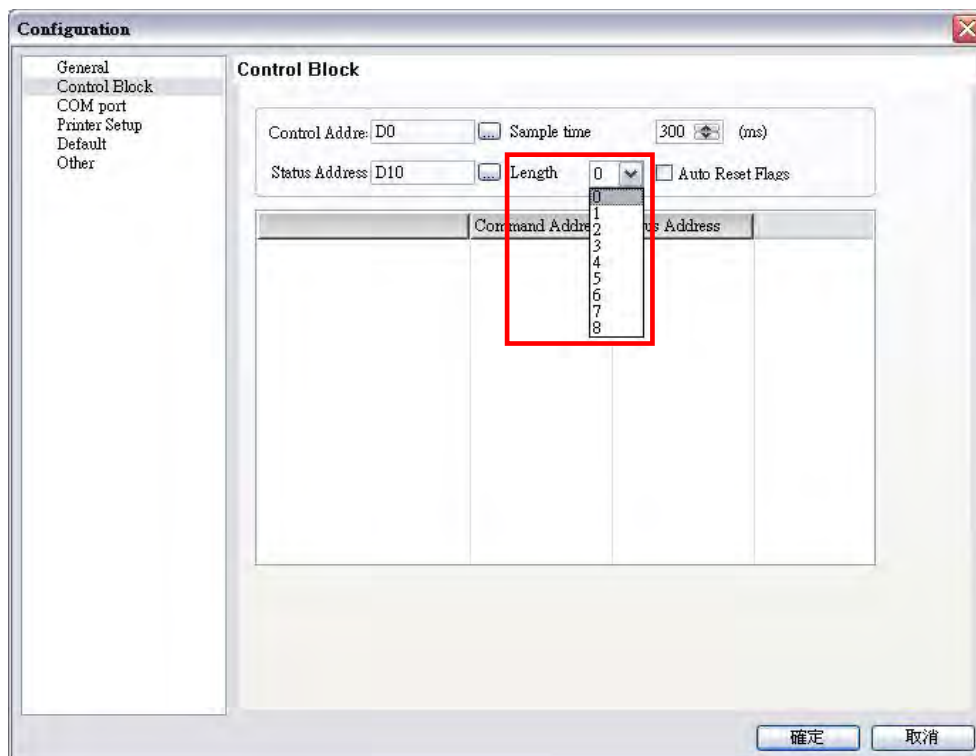
Fig. 3-4-2 Configuration Dialog Box

Note: Checking of **Auto reset flags** will reset the control block flags (Bits) automatically after the desired procedure has been executed. If this box is not checked, the system will ask the user to reset the flags.

3.4.1 Control Block

The control block is the way a PLC is used to control the HMI. Through the settings set in the registers, the controller which is connected to HMI can know HMI internal operation, i.e. screen switch, backlight on and off, current priority, curve sampling data and clear flag, etc. information and the user can also get the current system status of HMI. The register is a continuous data block and its length is from 0 to 8 words (Fig. 3-4-2). When using control block features, the actual length of control block is determined by the used control block features. For example, when Screen Switch feature (Screen Number Designation Register) is used, the control block must be set to a length of 1 or more. At this time, only Screen Number Designation Register can be used. One more example, when using History Buffer features (Sampling History Buffer Register), the control block must be set to a length of 4 or more. At this time, only Sampling History Buffer Register can be used. In addition, when using the function of Multi-language Setting Value Bit (System Control Flag Register), it is best that the length of the control block be set to 8 words. At this time, all the register in control block can be used. When the control block is set to a length of zero, the control block is disabled.

The function and explanation of each WORD is listed as Table 3-4-1 below. In the following table, in the following example 1 we assume that the user uses a Delta PLC, so the available starting addresses in control block are Dn ~ Dn+7 (D0 ~ D7). In the following example 2, we assume that the user uses HMI internal register $, so the available starting address in control block is$n ~ $n+7 ($15 ~ $22). The user can choose if the control block designations are stored in PLC or HMI.

Word Number	Register Number	Example 1 (PLC register)		Example 2 (HMI register)	
		Address	Example	Address	Example
1	Screen Number Designation Register (SNIR)	Dn	D0	$n	$15
2	Control Flag Register (CFR)	Dn+1	D1	$n+1	$16
3	Curve Control Register (CUCR)	Dn+2	D2	$n+2	$17
4	Sampling History Buffer Register (HBSR)	Dn+3	D3	$n+3	$18
5	Clearing History Buffer Register (HBCR)	Dn+4	D4	$n+4	$19
6	Recipe Control Register (RECR)	Dn+5	D5	$n+5	$20
7	Recipe Number Designation Register (RBIR)	Dn+6	D6	$n+6	$21
8	System Control Flag Register	Dn+7	D7	$n+7	$22

Table 3-4-1 Control Block Designations

Screen Number Designation Register (SNIR)

To use this register, write a value of the screen number that the user desires to have displayed into this register; then HMI will change to that screen. For example (refer to Table 3-4-1), if set D0 or $15.0 to 1, HMI will change to the 1st screen. If set D0 or $15.0 to 7, HMI will change to 7th screen.

Control Flag Register (CFR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Enable / Disable Communication
1	0000 0000 0000 00x0	Enable / Disable Backlight
2	0000 0000 0000 0x00	Enable / Disable Buzzer
3	0000 0000 0000 x000	Clear Alarm Buffer
4	0000 0000 000x 0000	Clear Alarm Counter
5	0000 0000 00x0 0000	Update USB Data
6-7	0000 0000 xx00 0000	Reserved
8	0000 000x 0000 0000	Set User Security Level (Level 1)
9	0000 00x0 0000 0000	Set User Security Level (Level 2)
10	0000 0x00 0000 0000	Set User Security Level (Level 4)
11-15	xxxx x000 0000 0000	Reserved

- **Enable / Disable Communication**

  Bit 0 controls the HMI communication. When bit 0 is turned ON, HMI communication is disabled. When bit 0 is turned OFF, HMI communication is enabled. By checking **Communication Interrupt** check box (Fig. 3-4-3) under the **Communication** tab of the **Configuration** dialog box when communication between one certain PLC is lost this bit will be turned ON and disable the communication automatically and the communication fault message will not display (this will not affect the communications between other PLCs). Then, the user can clear it to enable the communication again. If this check box is not checked, this flag is disabled (To disable and enable the communication manually, the user can use OPENCOM/CLOSECOM macro commands. For more details on macro commands, please refer to section 3.14)

  For example (refer to Table 3-4-1 and Fig. 3-4-4), if the PLC which is connected via COM2 port has communication error and communication retry time has reached three times, HMI will disable the communication between that PCL automatically (but will not disable the communication between other PLCs) and will not show communication errors. At this time, if D1 or $16.0 is set to 0, i.e. the communication flag is turned OFF, the communication will be enabled again and HMI will communicate with that PLC again. If the communication is lost for three times, this flag will be ON again. When D1=0, it indicates that Bit 0 of D1 is 0 (0000 0000 0000 0000).
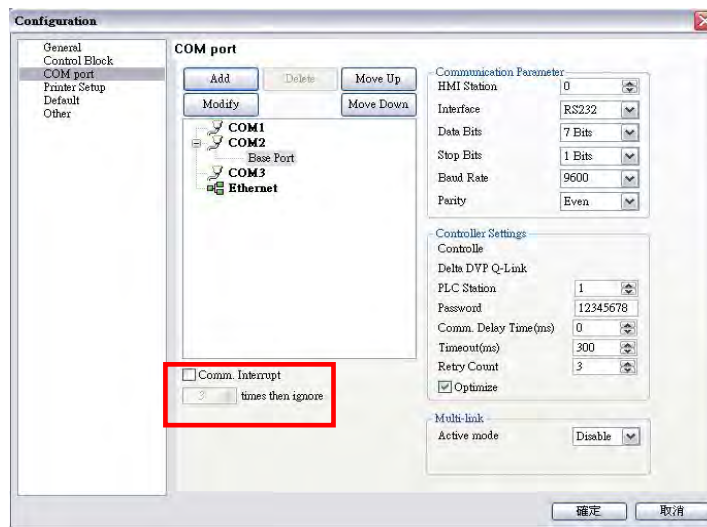
Fig. 3-4-3 Communication tab   Fig. 3-4-4 PLC Connections
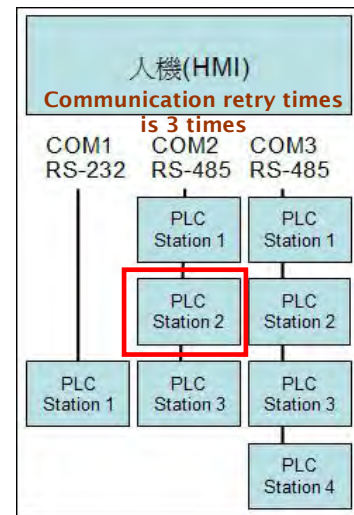
■ **Enable / Disable Backlight**

Bit 1 controls the backlight of HMI. When bit 1 is turned ON, the HMI backlight turns OFF. When bit 1 is turned OFF, the HMI backlight turns ON. For example (refer to Table 3-4-1), if D1 is set to 2 or $16.1 is set to 1, this flag is enabled and the HMI backlight turns OFF. When D1 = 2, it indicates that Bit 1 of D1 is 1(0000 0000 0000 0010).

■ **Enable / Disable Buzzer**

Bit 2 controls the buzzer of HMI. When bit 2 is turned ON, the HMI buzzer turns OFF. When bit 2 is turned OFF, the HMI buzzer turns ON. For example (refer to Table 3-4-1), if D1 is set to 4 or $16.2 is set to 1, the HMI buzzer turns ON. At this time, if an alarm occurs, it will sound. When D1 = 4, it indicates that Bit 2 of D1 is 1 (0000 0000 0000 0100).

■ **Clear Alarm Buffer**

Bit 3 clears the alarm buffer. When an alarm history table is used, setting this bit is able to clear all data inside of that table. When bit 3 is turned ON, the alarm buffer is cleared. To clear the alarm buffer again, this flag must be turned OFF and then ON again. For example (refer to Table 3-4-1), if D1 is set to 8 or $16.3 is set to 1, this flag is turned ON and the alarm buffer will be cleared. When D1 = 8, it indicates that Bit 3 of D1 is 1 (0000 0000 0000 1000).

■ **Clear Alarm Counter**

Bit 4 clears the alarm counter. When an alarm frequency table is used, setting this bit is able to clear the values for the alarms. When bit 4 is turned ON, the alarm counter is cleared. To clear the alarm counter again, this flag must be turned OFF and then ON again. For example (refer to Table 3-4-1), if D1 is set to 16 or $16.4 is set to 1, this flag is turned ON and the alarm counter will be cleared. When D1 = 16, it indicates that Bit 4 of D1 is 1 (0000 0000 0001 0000).

■   **Update USB Data**

Bit 5 updates the USB data. When this flag is used, the user can update the stored data in alarm buffer area into the USB disk. If one of alarm buffer, history buffer or recipe function is activated and the non-volatile memory area is set to USB disk, when this flag is enable, HMI will backup and update the data that is stored in buffer area into USB disk in real-time. Please note that all the data will be stored in the buffer area first. Before reaching the limit of the buffer memory (the memory capacity of buffer area is **64KB** and it can be user-defined as well in **Configuration** dialog box), the system will not backup and update the data into USB disk. The purpose is not to frequently overwrite the USB disk and avoid the damage to USB disk. Therefore, if the amount of data is less than the memory capacity, to avoid the data may be lost, the user can enable this flag and update the data into USB disk.

For example (refer to Table 3-4-1), if D1 is set to 32 or $16.5 is set to 1, this flag is turned ON and the function of update USB data will be enabled. When D1 = 32, it indicates that Bit 5 of D1 is 1 (0000 0000 0010 0000).

■   **Set User Security Level**

Bits 8 to 10 set the user security level. The HMI security level settings are divided into two parts: one is level 0 (lowest) to level 7 and the other is highest level. Bits 8 to 10 controls the level 0 (lowest) to level 7 but cannot control the highest level. When Bit 8 is turned ON, the user security level is 1. When Bit 9 is turned ON, the user security level is 2. When Bit 10 is turned ON, the user security level is 4. For more details on settings, please refer to the following descriptions.

Level	Flag Control		Binary Display
	ON	OFF	
Level 0		Bit 8, Bit 9, Bit 10	0000 0000 0000 0000
Level 1	Bit 8	Bit 9, Bit 10	0000 0001 0000 0000
Level 2	Bit 9	Bit 8, Bit 10	0000 0010 0000 0000
Level 3	Bit 8, Bit 9	Bit 10	0000 0011 0000 0000
Level 4	Bit 10	Bit 8, Bit 9	0000 0100 0000 0000
Level 5	Bit 8, Bit 10	Bit 9	0000 0101 0000 0000
Level 6	Bit 9, Bit 10	Bit 8	0000 0110 0000 0000
Level 7	Bit 8, Bit 9, Bit 10		0000 0111 0000 0000

For example (refer to Table 3-4-1), if D1 is set to 1280 or $16.8 and $16.10 is set to 1, this flag is enabled and the user security level is 5. When D1 = 1280, it indicates that Bit 8 and Bit 10 of D1 are both 11(0000 0101 0000 0000).

Curve Control Register (CUCR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Curve Sampling Flag 1
1	0000 0000 0000 00x0	Curve Sampling Flag 2
2	0000 0000 0000 0x00	Curve Sampling Flag 3
3	0000 0000 0000 x000	Curve Sampling Flag 4
4-7	0000 0000 xxxx 0000	Reserved
8	0000 000x 0000 0000	Curve Clear Flag 1
9	0000 00x0 0000 0000	Curve Clear Flag 2
10	0000 0x00 0000 0000	Curve Clear Flag 3
11	0000 x000 0000 0000	Curve Clear Flag 4
12-15	xxxx 0000 0000 0000	Reserved

■ **Curve Sampling Flag**

Bits 0 to 3 (flags 1 to 4) control the curve (Trend Graph, X-Y Chart, X-Y distribution or Curve Input) sampling. When this flag is turned ON, HMI will read continuous data from the set PLC address to sample once, changes the data to the graph and shows it on HMI screen (For more details on the settings of curve element, please refer to section 3.8.10). To control the curve sampling flag again, this flag must be turned OFF and then ON again.

Each curve element has to be assigned to a sampling flag where the sample flag is setup in the detail property of the element. To enable the curve element, set the corresponding bit in this register. For example (refer to Table 3-4-1 and Fig. 3-4-5), if D2 or $17.0 is set to 1, the curves of figure 1 and 2 will be activated and show on the screen and the curves of figure 3 and 4 will not. When D2=1, it indicates that Bit 0 of D2 is 0 (0000 0000 0000 0001).
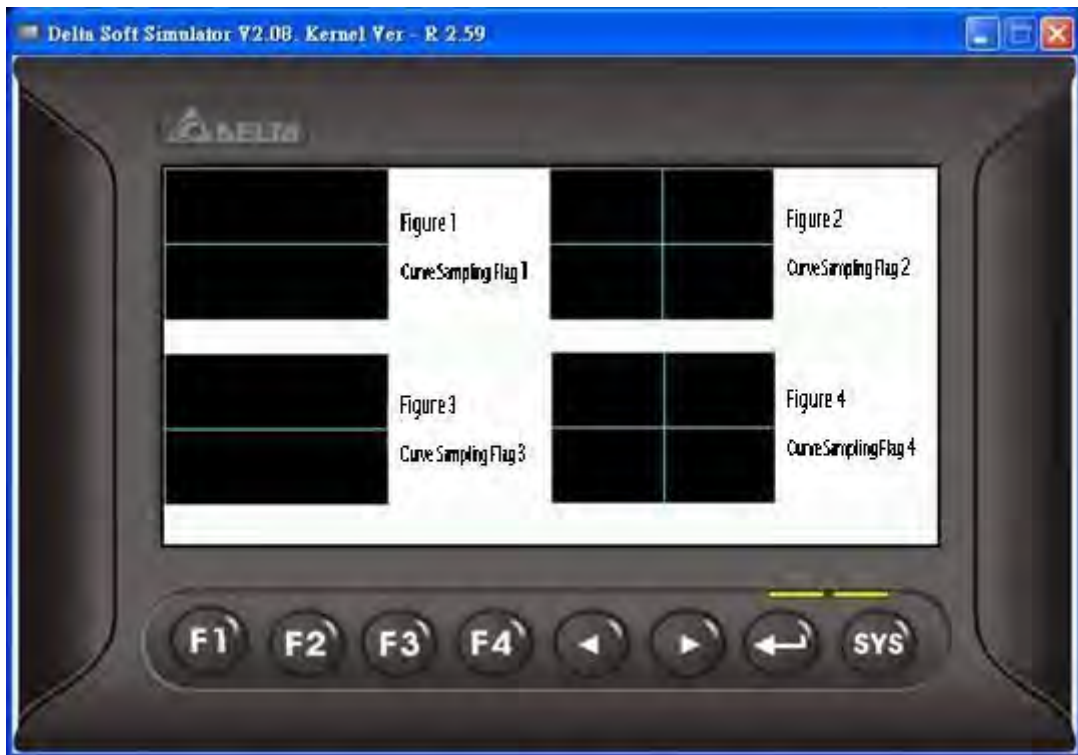
Fig. 3-4-5 Curve Elements on HMI Screen

■ **Curve Clear Flag**

Bits 8 to 11 (flags 1 to 4) clear the curve (Trend Graph, X-Y Chart, X-Y distribution or Curve Input) when this flag is turned ON (For more details on the settings of curve element, please refer to section 3.8.10). To control the curve clear flag again, this flag must be turned OFF and then ON again.

For example (refer to Table 3-4-1 and Fig. 3-4-5), if D2 is set to 512 or $17.9 is set to 1, the curves of figure 3 will be cleared and the curves of figure 1, 2 and 4 will not. When D2=512, it indicates that Bit 9 of D2 is 1(0000 0010 0000 0000).

Sampling History Buffer Register (HBSR)

Delta DOP-B series has 12 Bits that control the sampling address of history buffer (refer to Fig. 3-4-6 and the following table). Not only Timer, the history buffer can be controlled by a PLC if the Trigger Source in the History Buffer setup is set to a PLC from Timer. For more details on History Buffer setup, please refer to section 3.11.3.

Corresponding Buffer Area	Corresponding Flag		
	Bit	Binary Display of Relative Position (x)	Function
Buffer Area 1	0	0000 0000 0000 000x	Sampling History Buffer 1
Buffer Area 2	1	0000 0000 0000 00x0	Sampling History Buffer 2
Buffer Area 3	2	0000 0000 0000 0x00	Sampling History Buffer 3

Corresponding Buffer Area	Corresponding Flag		
	Bit	Binary Display of Relative Position (x)	Function
Buffer Area 4	3	0000 0000 0000 x000	Sampling History Buffer 4
Buffer Area 5	4	0000 0000 000x 0000	Sampling History Buffer 5
Buffer Area 6	5	0000 0000 00x0 0000	Sampling History Buffer 6
Buffer Area 7	6	0000 0000 0x00 0000	Sampling History Buffer 7
Buffer Area 8	7	0000 0000 x000 0000	Sampling History Buffer 8
Buffer Area 9	8	0000 000x 0000 0000	Sampling History Buffer 9
Buffer Area 10	9	0000 00x0 0000 0000	Sampling History Buffer 10
Buffer Area 11	10	0000 0x00 0000 0000	Sampling History Buffer 11
Buffer Area 12	11	0000 x000 0000 0000	Sampling History Buffer 12
	12-15	xxxx 0000 0000 0000	Reserved

■ **Sampling History Buffer Flag**

Bits 0 to 11 control the sampling history buffer operation of HMI by the PLC. When this flag is turned ON, HMI performs sampling one time. To control the sampling history buffer flag again, this flag must be turned OFF and then ON again.
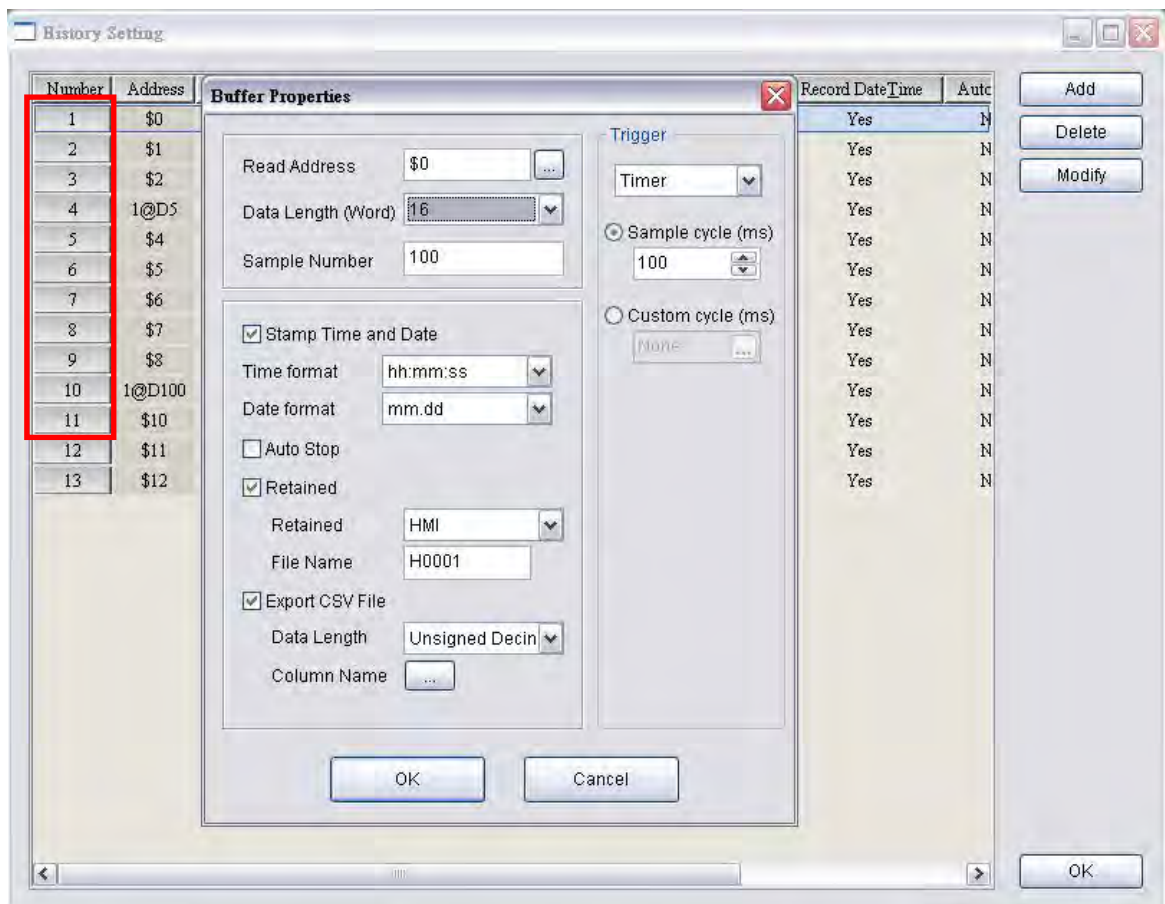

Fig. 3-4-6 History Setup

Clearing History Buffer Register (HBCR)

The history buffer when controlled by a PLC can also be cleared by the PLC.

Corresponding Buffer Area	Corresponding Flag		
	Bit	Binary Display of Relative Position (x)	Function
Buffer Area 1	0	0000 0000 0000 000x	Clearing History Buffer Flag 1
Buffer Area 2	1	0000 0000 0000 00x0	Clearing History Buffer Flag 2
Buffer Area 3	2	0000 0000 0000 0x00	Clearing History Buffer Flag 3
Buffer Area 4	3	0000 0000 0000 x000	Clearing History Buffer Flag 4
Buffer Area 5	4	0000 0000 000x 0000	Clearing History Buffer Flag 5
Buffer Area 6	5	0000 0000 00x0 0000	Clearing History Buffer Flag 6
Buffer Area 7	6	0000 0000 0x00 0000	Clearing History Buffer Flag 7
Buffer Area 8	7	0000 0000 x000 0000	Clearing History Buffer Flag 8
Buffer Area 9	8	0000 000x 0000 0000	Clearing History Buffer Flag 9
Buffer Area 10	9	0000 00x0 0000 0000	Clearing History Buffer Flag 10
Buffer Area 11	10	0000 0x00 0000 0000	Clearing History Buffer Flag 11
Buffer Area 12	11	0000 x000 0000 0000	Clearing History Buffer Flag 12
	12-15	xxxx 0000 0000 0000	Reserved

■ **Clearing History Buffer Flag**

Bits 0 to 11 clear the history buffer. When this flag is turned ON, HMI clears the history buffer one time. To control the clearing history buffer flag again, this flag must be turned OFF and then ON again.

Recipe Control Register (RECR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Change Recipe Number Flag
1	0000 0000 0000 00x0	Read Recipe Flag (PLC → HMI): Read recipe data from PLC and store it in HMI
2	0000 0000 0000 0x00	Write Recipe Flag (PLC ← HMI) Write recipe data from HMI into PLC
3	0000 0000 0000 x000	Change Recipe Group Number Flag
4-7	0000 0000 xxxx 0000	Reserved
8-15	xxxx xxxx 0000 0000	Designate Recipe Group Number

■ **Change Recipe Number Flag**

To change recipe number, the user can use Recipe Number Register RCPNO directly or use this flag. To specify the recipe number, write the recipe number into the Recipe Number Designation Register (RBIR) and then turn ON this flag (Bit 0). After the above

settings, the RCPNP can change to the designated recipe number automatically. To control the change recipe number flag again, this flag must be turned OFF and then ON again.

For example (refer to Table 3-4-1), if set D6 to 3 and set D5 or $20.0 to 1 simultaneously, the recipe number will become 3 (RCPNO=3). When D6 = 3, it indicates that the designated recipe number is 3. When D5 = 1, it indicates that Bit 0 of D5 is 1(0000 0000 0000 0001).

■ **Read Recipe Flag**

Bit 1 reads the recipe data from PLC and stores the recipe data in the specified area of HMI. To read and store the recipe data, specify the recipe number and turn this flag to be ON. To control the read recipe flag again, this flag must be turned OFF and then ON again.

For example (refer to Table 3-4-1), if the designated recipe number is 4 (RCPNO=4), set D5 to 2 or $20.1 to 1 and the recipe data saved in PLC will be read and stored in the 4th recipe register. The original data saved in the 4th recipe register will be updated as well. When D5 = 2, it indicates that Bit 1 of D5 is 1(0000 0000 0000 0010).

■ **Write Recipe Flag**

Bit 2 write the recipe data from HMI into PLC. To write the recipe data, specify the recipe number and turn this flag to be ON. To control the write recipe flag again, this flag must be turned OFF and then ON again.

For example (refer to Table 3-4-1), if the designated recipe number is 2 (RCPNO=2), set D5 to 4 or $20.2 to 1 and the recipe data saved in HMI will be written into the PLC register immediately. The original data saved in the PLC register will be updated as well. When D5 = 4, Bit 2 of D5 is 1(0000 0000 0000 0100).

■ **Change Recipe Group Number**

To change the recipe group number, the user can use Recipe Group Register RCPG directly or use this flag. To specify the recipe group number, write the recipe group number into the Designate Recipe Group Number Register (Bits 8 to 15) and then turn ON this flag. After the above settings, when HMI detects the change recipe group number flag, it will change the value of RCPG and change recipe group number automatically. To control the change recipe group number flag again, this flag must be turned OFF and then ON again.

For example (refer to Table 3-4-1), if set D5 to 520 or set$20.3 and $20.9 to 1 simultaneously, the recipe group number will become 2 (RCPG=2). When D5 = 520, it indicates that Bit 3 and Bit 9 of D5 are both 1(0000 0010 0000 1000).

■　**Designate Recipe Group Number**

Bits 8 to Bit 15 designate the recipe group number. When the recipe group number is designated and turn ON this control flag, HMI will change the value of RCPG and change the recipe group number automatically.

For example (refer to Table 3-4-1), if set D5 to 520 or set$20.3 and $20.9 to 1 simultaneously, the recipe group number will become 2 (RCPG=2). When D5 = 520, it indicates that Bit 3 and Bit 9 of D5 are both 1(0000 0010 0000 1000).

For more detailed settings, please refer to the following descriptions.

How to designate recipe group number:

D5 = 520(0000 0010 0000 1000)	
High Byte (Recipe Group Designation Register) 0000 0010	Low Byte (Other control flags relevant to Recipe) 0000 1000

If dividing D5 into high byte and low byte, it is easily to see that high byte determines the recipe group number (regardless of low byte). When the high byte setting is set to 0000 0010, it indicates that the designated group number is the 2nd group. If the high byte setting is changed to 0000 0011, it indicates that the designated group number is changed to 3rd group and vise versa.

Recipe Number Designation Register (RBIR)

This register is used to specify the recipe. When this flag is turned ON, the system will write the designated recipe group number into Recipe Number Designation Register (RBIR). After Change Recipe Number Flag is turned ON, HMI will change the value of RCPNO and change the recipe number as well.

For example (refer to Table 3-4-1), if set D6 to 3 and set D5 or $20.0 to 1 at the same time, the recipe number will become 3 (RCPNO=3) When D6 is set to 3, it indicates that the designated recipe number is 3. When D5 = 1, it indicates that Bit 0 of D5 is 1(0000 0000 0000 0001).

System Control Flag Register

Bit	Binary Display of Relative Position (x)	Function
0-7	0000 0000 xxxx xxxx	Multi-language Setting Value
8	0000 000x 0000 0000	Printer Flag
9	0000 00x0 0000 0000	Printer Form Feed Flag
10-15	xxxx xx00 0000 0000	Reserved

■ **Multi-language Setting Value**

Bits 0 to 7 save the designated multi-language setting values (Fig. 3-4-7). These setting values control HMI to switch to the specified language (For more details on multi-language settings, please refer to section 3.10).

For example (refer to Table 3-4-1 and Fig. 3-4-7), if language setting value 1 is Chinese, and D7 or $22.0 is set to 1, all the text in HMI will change to the text in Chinese. When D7 =1, it indicates that Bit 0 of D7 is 1(0000 0000 0000 0001).

For more detailed settings, please refer to the following descriptions.

How to designate the multi-language:

D7 = 1(0000 0000 0000 0001)	
High Byte (Other control flags relevant to System Control) 0000 0000	Low Byte (Multi-language Setting Value Register) 0000 0001

If dividing D7 into high byte and low byte, it is easily to see that low byte determines the multi-language setting value (regardless of high byte). When the low byte setting is set to 0000 0001, it indicates that the multi-language setting value is 1, i.e. the language setting is Chinese. If the low byte setting is changed to 0000 0011, it indicates that the multi-language setting value is 2, i.e. the language setting is Japanese. Please note that the range of multi-language setting value is from 0 to 255.
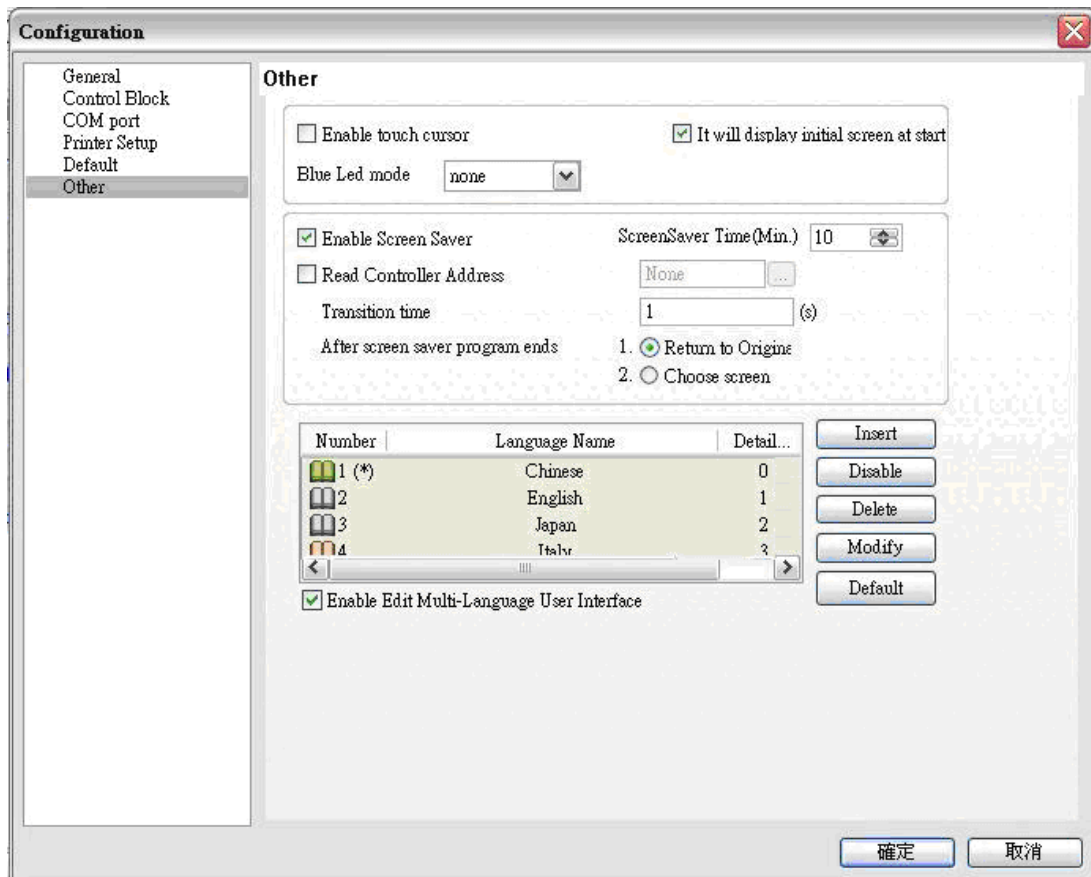
Fig. 3-4-7 Multi-language Settings

■ **Printer Flag**

When this flag is turned ON, the current display (Hard Copy) or the editing screen can be printed out. When this flag is turned OFF, the printer function is disabled.

For example (refer to Table 3-4-1), if D7 is set to 256 or set $22.8 to 1, HMI will perform printing function. When D7 = 256, it indicates that Bit 8 of D7 is 1(0000 0001 0000 0000).

■ **Printer Form Feed Flag**

When this flag is turned ON, the printer will retract the paper and align the paper for the next run automatically. When this flag is set to OFF, the printer form feed function is disabled.

For example (refer to Table 3-4-1), if D7 is set to 512 or set $22.9 to 1, HMI will retract the paper and align the paper for the next run automatically. When D7 = 512, it indicates that Bit 9 of D7 is 1(0000 0010 0000 0000).

3.4.2 Status Block

The status block is the way a PLC is used to get feedback from the HMI. Through the settings set in the registers, the controller which is connected to HMI can know HMI internal operation, i.e. screen switch, backlight on and off, current priority, curve sampling data and clear flag, etc. information. The status block consists of 8 continuous words and this cannot be changed (Fig. 3-4-2) When the user set the address in Status Block, PLC can read the status of DOP-B series HMI. Please note that when the function Control Block is disabled, the function of Status Block is disabled as well. In addition, ensure that the addresses of Control Block and Start Block must be different.

The function and explanation of each WORD is listed as Table 3-4-2 below. In the following table, in the following example 1 we assume that the user uses a Delta PLC, so the available starting addresses in status block are Dm ~ Dm+7 (D10 ~ D17). In the following example 2, we assume that the user uses HMI internal register $, so the available starting address in control block is$m ~ $m+7 ($25 ~ $32). The user can choose if the status block designations are stored in PLC or HMI.

Word	Control Register	Example 1 (PLC register)		Example 2 (HMI register)	
		Address	Example	Address	Example
0	General Control Status Register (GCSR)	Dm	D10	$m	$25
1	Screen Number Status Register (SNSR)	Dm+1	D11	$m+1	$26
2	Curve Control Status Register (CCSR)	Dm+2	D12	$m+2	$27
3	Sampling History Buffer Status Register (HSSR)	Dm+3	D13	$m+3	$28
4	Clearing History Buffer Status Register (HCSR)	Dm+4	D14	$m+4	$29
5	Recipe Status Register (RESR)	Dm+5	D15	$m+5	$30
6	Recipe Number Status Register (RBSR)	Dm+6	D16	$m+6	$31

Word	Control Register	Example 1 (PLC register)		Example 2 (HMI register)	
		Address	Example	Address	Example
7	General Control Status Register 2 (GCSR2)	**D**m+7	**D**17	$m+7	$32

Table 3-4-2 Status Block Designations

General Control Status Register (GCSR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Screen Switch Status Flag
1-2	0000 0000 0000 0xx0	Reserved
3	0000 0000 0000 x000	Clear Status of Alarm Buffer
4	0000 0000 000x 0000	Clear Status of Alarm Counter
5-7	0000 0000 xxx0 0000	Reserved
8	0000 000x 0000 0000	User Security Level Flag (Level 1)
9	0000 00x0 0000 0000	User Security Level Flag (Level 2)
10	0000 0x00 0000 0000	User Security Level Flag (Level 4)
11-15	xxxx x000 0000 0000	Reserved

- **Screen Switch Status Flag**

  When HMI switches the screen, this flag is turned ON. After the screen switch is completed, this flag is turned OFF.

- **Clear Status of Alarm Buffer**

  When HMI clears the alarm buffer, this flag is turned ON. After this function is completed, this flag is turned OFF.

- **Clear Status of Alarm Counter**

  When HMI clears the alarm counter, this flag is turned ON. After this function is completed, this flag is turned OFF.

- **User Security Level Flag**

  Bits 8 to 10 hold the current user security level.

Level	Flag Control		Binary Display
	ON		
Level 0		Bit 8, Bit 9, Bit 10	0000 0000 0000 0000
Level 1	Bit 8	Bit 9, Bit 10	0000 0001 0000 0000
Level 2	Bit 9	Bit 8, Bit 10	0000 0010 0000 0000
Level 3	Bit 8, Bit 9	Bit 10	0000 0011 0000 0000
Level 4	Bit 10	Bit 8, Bit 9	0000 0100 0000 0000
Level 5	Bit 8, Bit 10	Bit 9	0000 0101 0000 0000

Level	Flag Control		Binary Display
	ON		
Level 6	Bit 9, Bit 10	Bit 8	0000 0110 0000 0000
Level 7	Bit 8, Bit 9, Bit 10		0000 0111 0000 0000

Screen Number Status Register (SNSR)

This register stores the last screen number (includes sub screen) that the user opened (refer to D11 or $26 of Table 3-4-2).

Curve Control Status Register (CCSR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Curve Sampling Status Flag 1
1	0000 0000 0000 00x0	Curve Sampling Status Flag 2
2	0000 0000 0000 0x00	Curve Sampling Status Flag 3
3	0000 0000 0000 x000	Curve Sampling Status Flag 4
4-7	0000 0000 xxxx 0000	Reserved
8	0000 000x 0000 0000	Curve Clear Status Flag 1
9	0000 00x0 0000 0000	Curve Clear Status Flag 2
10	0000 0x00 0000 0000	Curve Clear Status Flag 3
11	0000 x000 0000 0000	Curve Clear Status Flag 4
12-15	xxxx 0000 0000 0000	Reserved

- ■ **Curve Sampling Status Flag**
  When the HMI samples a trend graph or X-Y chart, the curve sampling status flag (bits 0 to 3) is turned ON. After the sampling operation is completed, the curve sampling status flag is turned OFF. Curve Sampling Flag 1 of control block corresponds to Curve Sampling Status Flag 1 of status block, Curve Sampling Flag 2 of control block corresponds to Curve Sampling Status Flag 2 of status block and vise versa.

- ■ **Curve Clear Status Flag**
  When the HMI clears trend graph or X-Y chart, the curve clear status flag (bits 8 to 11) is turned ON. After the clear operation is completed, the curve clear status flag is turned OFF. Curve Clear Flag 1 of control block corresponds to Curve Clear Status Flag 1 of status block, Curve Clear Flag 2 of control block corresponds to Curve Clear Status Flag 2 of status block and vise versa.

Sampling History Buffer Status Register (HSSR)

Corresponding Buffer Area	Corresponding Flag		
	Bit	Binary Display of Relative Position (x)	Function
Buffer Area 1	0	0000 0000 0000 000x	Sampling History Buffer Status Flag 1
Buffer Area 2	1	0000 0000 0000 00x0	Sampling History Buffer Status Flag 2
Buffer Area 3	2	0000 0000 0000 0x00	Sampling History Buffer Status Flag 3
Buffer Area 4	3	0000 0000 0000 x000	Sampling History Buffer Status Flag 4
Buffer Area 5	4	0000 0000 000x 0000	Sampling History Buffer Status Flag 5
Buffer Area 6	5	0000 0000 00x0 0000	Sampling History Buffer Status Flag 6
Buffer Area 7	6	0000 0000 0x00 0000	Sampling History Buffer Status Flag 7
Buffer Area 8	7	0000 0000 x000 0000	Sampling History Buffer Status Flag 8
Buffer Area 9	8	0000 000x 0000 0000	Sampling History Buffer Status Flag 9
Buffer Area 10	9	0000 00x0 0000 0000	Sampling History Buffer Status Flag 10
Buffer Area 11	10	0000 0x00 0000 0000	Sampling History Buffer Status Flag 11
Buffer Area 12	11	0000 x000 0000 0000	Sampling History Buffer Status Flag 12
	12-15	xxxx 0000 0000 0000	Reserved

■ **Sampling History Buffer Status Flag**

When sampling the history buffer, the sampling history buffer status flag will be set to be ON (Bits 0 to 11 is set to ON). After the sampling operation is completed, the sampling history buffer status flag will be OFF.

Clearing History Buffer Status Register (HCSR)

Corresponding Buffer Area	Corresponding Flag		
	Bit	Binary Display of Relative Position (x)	Function
Buffer Area 1	0	0000 0000 0000 000x	Clearing History Buffer Status Flag 1
Buffer Area 2	1	0000 0000 0000 00x0	Clearing History Buffer Status Flag 2
Buffer Area 3	2	0000 0000 0000 0x00	Clearing History Buffer Status Flag 3
Buffer Area 4	3	0000 0000 0000 x000	Clearing History Buffer Status Flag 4
Buffer Area 5	4	0000 0000 000x 0000	Clearing History Buffer Status Flag 5
Buffer Area 6	5	0000 0000 00x0 0000	Clearing History Buffer Status Flag 6
Buffer Area 7	6	0000 0000 0x00 0000	Clearing History Buffer Status Flag 7
Buffer Area 8	7	0000 0000 x000 0000	Clearing History Buffer Status Flag 8
Buffer Area 9	8	0000 000x 0000 0000	Clearing History Buffer Status Flag 9
Buffer Area 10	9	0000 00x0 0000 0000	Clearing History Buffer Status Flag 10
Buffer Area 11	10	0000 0x00 0000 0000	Clearing History Buffer Status Flag 11
Buffer Area 12	11	0000 x000 0000 0000	Clearing History Buffer Status Flag 12
	12-15	xxxx 0000 0000 0000	Reserved

■ **Clearing History Buffer Status Flag**

When clearing the history buffer, the clearing history buffer status flag will be set to be ON (Bits 0 to 11 is set to ON). After the clearing operation is completed, the clearing history buffer status flag will be OFF.

Recipe Status Register (RESR)

Bit	Binary Display of Relative Position (x)	Function
0	0000 0000 0000 000x	Change Status of Recipe Number
1	0000 0000 0000 00x0	Recipe Read Status (PLC → HMI)
2	0000 0000 0000 0x00	Recipe Write Status (PLC ← HMI)
3	0000 0000 0000 x000	Change Status of Recipe Group Number
4~7	0000 0000 xxxx 0000	Reserved
8~15	xxxx xxxx 0000 0000	Designate Status of Recipe Group Number

■ **Change Status of Recipe Number**

When the recipe number is changed, this flag is turned ON. After the recipe number is changed and the value of RCPNO is updated, this flag is turned OFF.

■ **Recipe Read Status**

When HMI reads one number of recipe data from PLC, this flag is turned ON. After read operation is completed and the recipe data is stored in HMI, this flag is turned OFF.

■ **Recipe Write Status**

When HMI sends one number of recipe data to PLC, this flag is turned ON. After write operation is completed and the recipe data is written into PLC, this flag is turned OFF.

■ **Change Status of Recipe Group Number**

When the recipe group number is changed, this flag is turned ON. After the recipe group number is changed and the value of RCPG is updated, this flag is turned OFF.

■ **Designate Status of Recipe Group Number**

No matter the value of RCPG is designated by PLC or HMI, when the designated recipe group number is changed, this flag is turned ON so that the system can echo back the updated recipe group number to the Designate Recipe Group Number Register.

Recipe Number Status Register (RBSR)

No matter the value of RCPNO is designated by PLC or HMI, when the designated recipe number is changed, this flag is turned ON so that the system can feedback the updated recipe group number to the Designate Recipe Number Register.

General Control Status Register 2 (GCSR2)

Bit	Binary Display of Relative Position (x)	Function
0-7	0000 0000 xxxx xxxx	Multi-language Status Value
8	0000 000x 0000 0000	Printer Status Flag
9	0000 00x0 0000 0000	Printer Form Feed Status Flag
10-15	xxxx xx00 0000 0000	Reserved

■ **Multi-language Status Value**

Bits 0 to 7 read the current language that HMI shows from the multi-language status value.

■ **Printer Status Flag**

When this flag is turned ON, it indicates that the printer is printing the current display or editing screen. When this flag is turned OFF, the printer function is disabled.

■ **Printer Form Feed Status Flag**

When this flag is turned ON, it indicates that the printer is retracting the paper and aligning the paper for the next run automatically. When this flag is turned OFF, the printer form feed function is disabled.

3.5   Menu Bar and Toolbar (File)
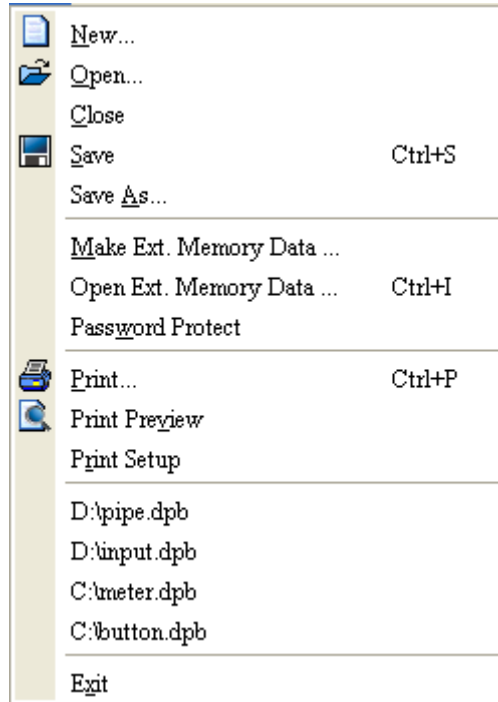
3.5.1   New

Create a New Project. Creates a new project by choosing **File > New** (Fig. 2.3.2) or clicking the New icon from toolbar (Fig. 2.3.3), or pressing **Ctrl + N**.

If this is the first time use and there is no old project, the following dialog box (Fig. 3-5-1) will show up for the user to input project name, screen name, screen number, HMI type and connecting base port controller after creating a new project.
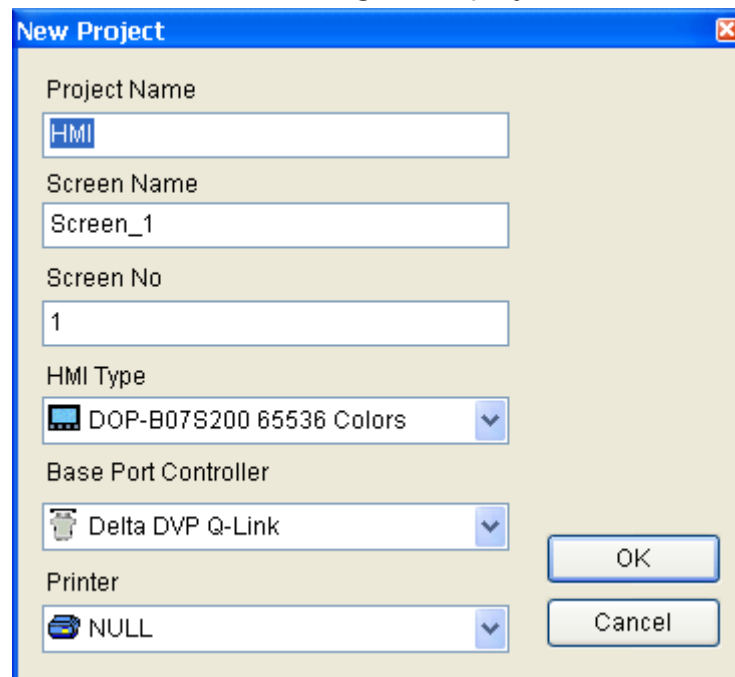
Fig. 3-5-1 New project dialog box

If other project files already exist and are open, the user will get the following dialog box to remind the user of saving project (Fig. 3-5-2) before creating new project. Press **Yes** button to save the existed file, press **No** button not to save the file and press **Cancel** button to cancel the save operation. After the user press the Yes or No button, the new project dialog box will appear again (Fig. 3-5-1).
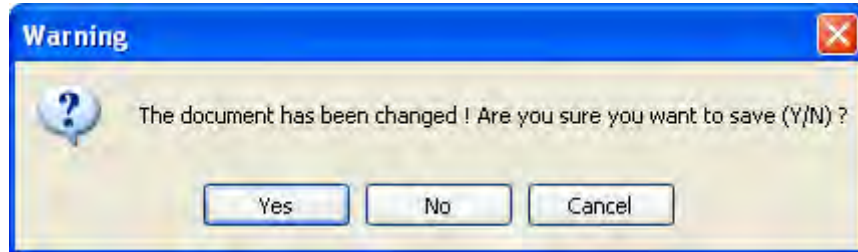
圖 3-5-2 Saving dialog box

Input project name, screen name, select HMI model and connecting base port controller (Fig. 3-5-3), and then press OK button.
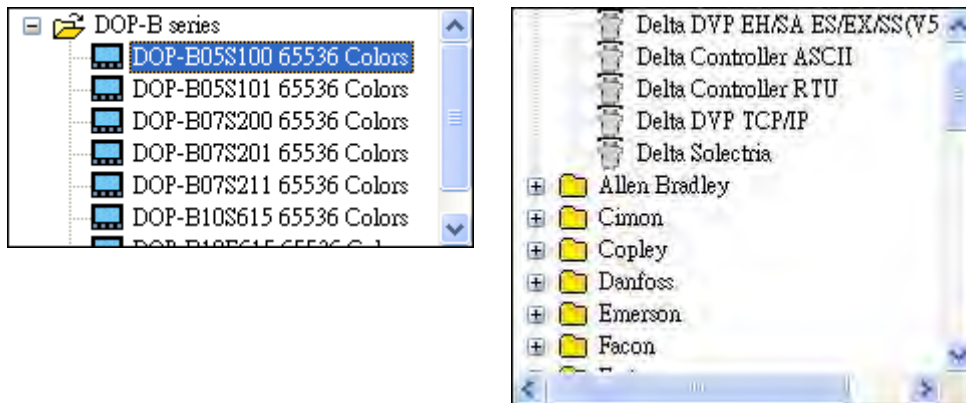
圖 3-5-3 HMI model and base port controller options

3.5.2   Open

Open Old Project. Open current project by choosing **File > Open** (Fig. 3-5-4) or clicking the Open icon ![icon] from toolbar, or pressing **Ctrl + O**.
If other project files exist before opening an old project, the user will get the Saving dialog box (Fig. 3-5-2) to remind the user of saving file and then get the following dialog box for opening existing dop file (Fig. 3-5-4).
If save operation is complete or there is no old project files, the following dialog box for opening existing dop file (Fig. 3-5-4) will show up directly.
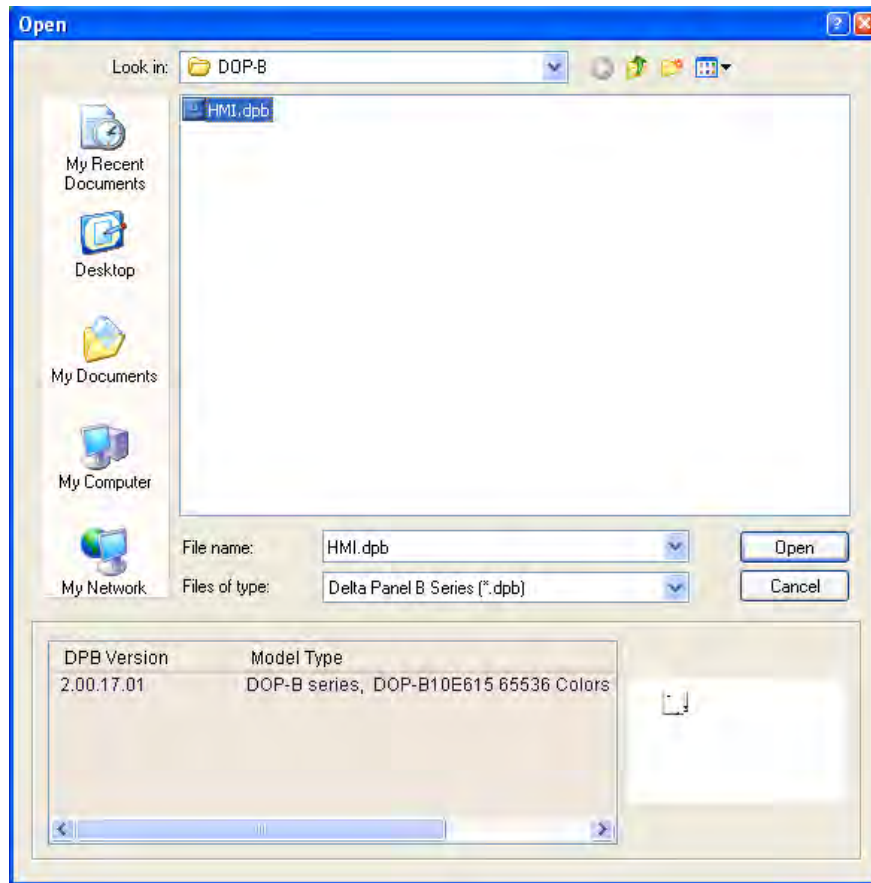
Fig. 3-5-4 Open an old project in ScrEdit

3.5.3 Close

Close Project. Closes project by clicking **File > Close**.

If project didn't get saved before issuing the command of closing project, the user will get saving dialog box (Fig. 3-5-5) to remind the user of saving project. The user can press Yes button to close the project.
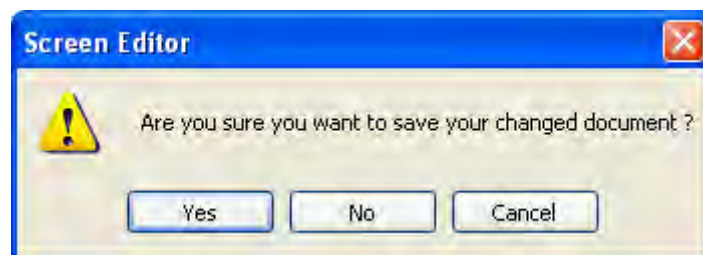
Fig. 3-5-5 Saving dialog box

3.5.4 Save

Save the File. Save current project into hard disk with extension file "dop" by choosing **File > Save** or clicking the Save icon , or pressing **Ctrl + S**. If the project is a new file, the Save as dialog box will show up (Fig. 3-5-6). If the project is an old file, the Save function will perform immediately and the Save as dialog box will not show up.

3.5.5   Save as

Save current project to another file name by clicking **File > Save As**. The user will get Save as dialog box (Fig. 3-5-6) to input project name with extension file **dpb**. This dialog also appears automatically when the first time any project file is saved no matter whether Save As or Save command is used.
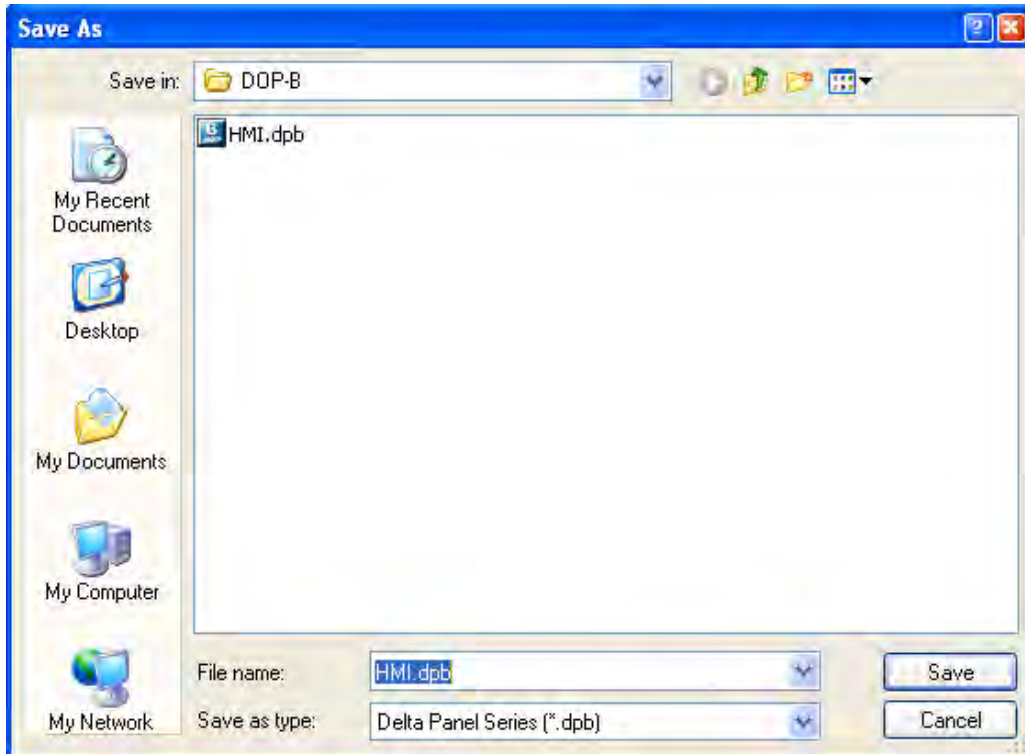
Fig. 3-5-6 Save as dialog box

3.5.6   Make Ext. Memory Data

Before using this command, ensure to compile the editing screen data. If not execute the compilation first, the ScrEdit cannot make screen data and an error message dialog box will show up (Fig. 3-5-7). Please execute the compilation first and then clicking F**ile > Make Ext. Memory Data** to copy the compiled HMI program into SD card or a USB disk (Fig. 3-5-8). If the SD card or USB disk with compiled HMI program stored inside is inserted into HMI, HMI will startup by reading the data of SD card or USB disk directly.
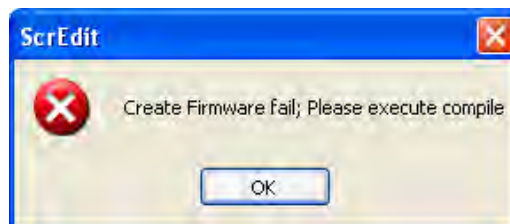
Fig. 3-5-7 Error message dialog box when making ext. memory data

---
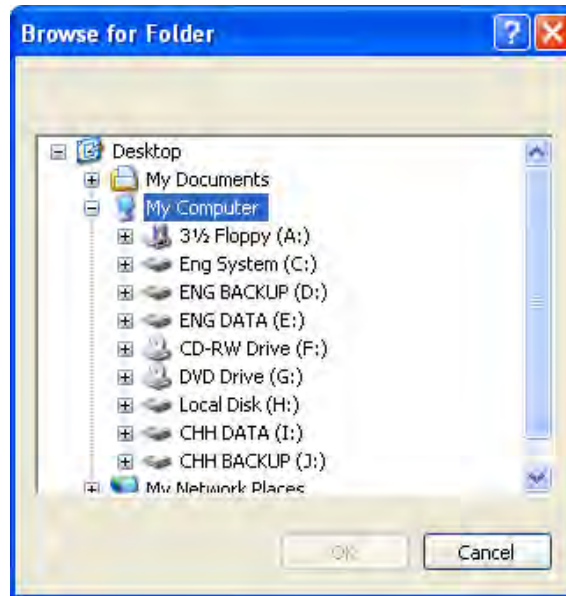
Fig. 3-5-8 Make Ext. Memory Data dialog box

3.5.7 Open Ext. Memory Data

To open the screen data, select **File > Open Ext. Memory Data** or press **Ctrl+I**. A dialog box is displayed and the user selects the file that the user wants to open.

3.5.8 Password Protect

The user can enable and disable password protect function (Fig. 3-5-9 & Fig. 3-5-10) by clicking **File > Password protect**. Once password protect function is enabled, the user will get Fig. 3-5-9 dialog box and [✓] symbol before "Password Protect" command. If the [✓] symbol shows before "Password Protect" command from **File** menu, it indicates that this dpb file is password protected and the user will need to input password before opening dpb file. The password is set by clicking **Options > Configuration > General > Security**) (Fig. 3-5-11). If the password protect function is disabled, the Fig. 3-5-10 dialog box will show up.

Fig. 3-5-9 Password protect function is enabled

Fig. 3-5-10 Password protect function is disabled
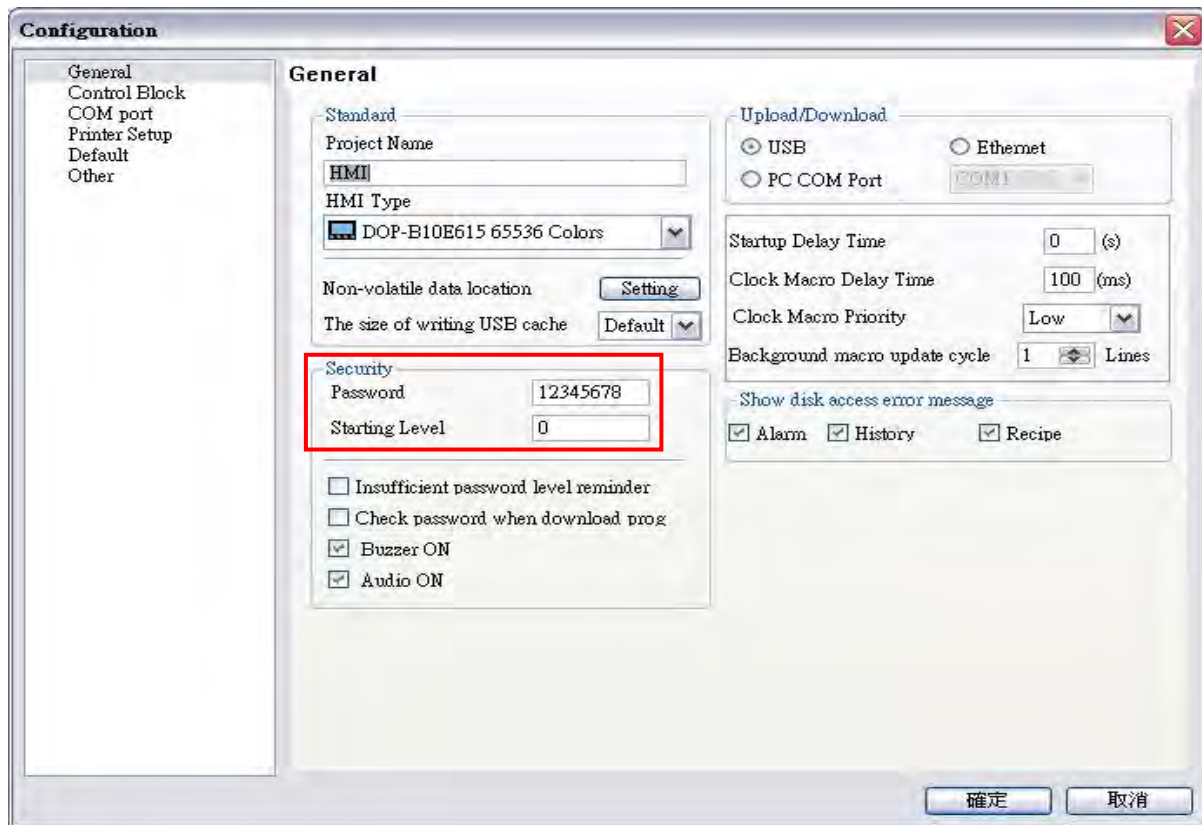
Fig. 3-5-11 Password settings – Security

3.5.9   Print

Print current screen by choosing **File > Print**, or clicking the Print icon 🖨 from toolbar, or pressing **Ctrl + P**.

3.5.10   Print Preview

To preview the screen print before sending the image to the printer, select **File > Print Preview** (Fig. 3-5-12).
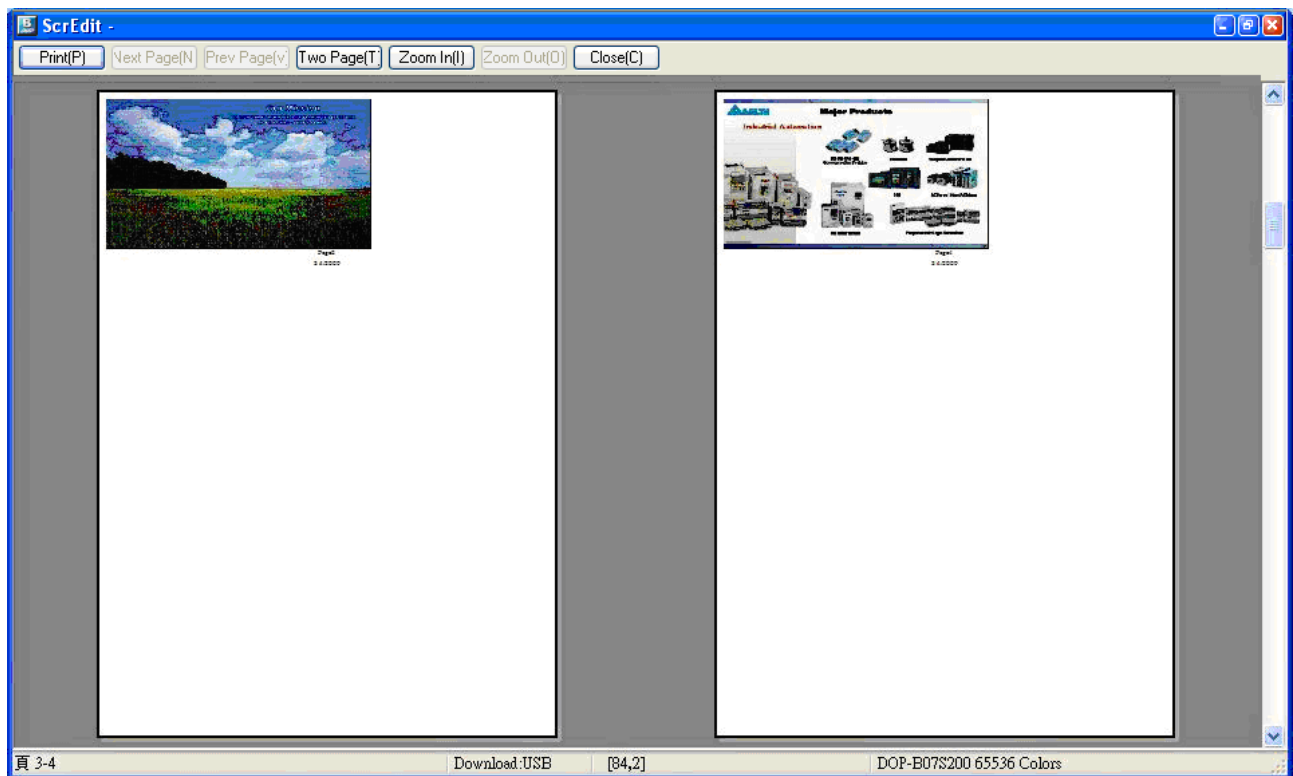
Fig. 3-5-12 Print Preview dialog box

3.5.11   Print Setup

To choose the printer and paper options, select **File > Print Setup** (Fig. 3-5-13).
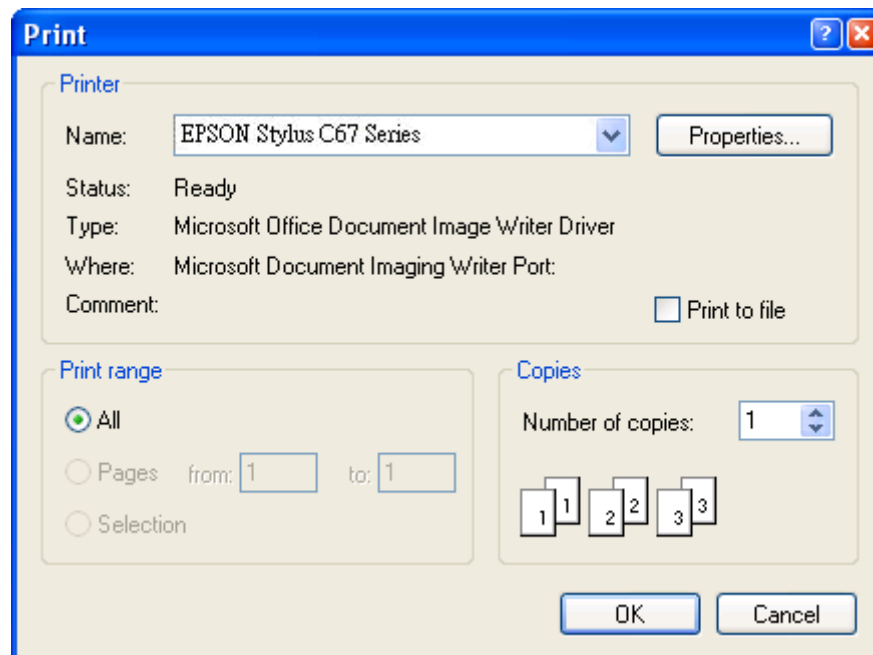
Fig. 3-5-13 Print Setup dialog box

3.5.12   File Quick Access

By default, ScrEdit presents a list of the four most recent used files on the File menu for quick access (Fig. 3-5-14). Just click the file name to open the file. This function is similar to the Open command and the user can refer to the description of Open command on the page 3-43. If the saving path is too long, the too long path will display as "….". The user still can see the complete dpb file name.

```
  📄  New...
  📂  Open...
      Close
  💾  Save                              Ctrl+S
      Save As...
      ─────────────────────────────────────────
      Make Ext. Memory Data ...
      Open Ext. Memory Data ...         Ctrl+I
      Password Protect
      ─────────────────────────────────────────
  🖨  Print...                          Ctrl+P
  🔍  Print Preview
      Print Setup
      ─────────────────────────────────────────
      C:\Documents and Settings\...\Alarm Report.dpb
      C:\Documents and Settings\...\32bit recipe.dpb
      C:\Documents and Settings\...\0519.dpb
      C:\Documents and Settings\...\HMI.dpb
      ─────────────────────────────────────────
      Exit
```
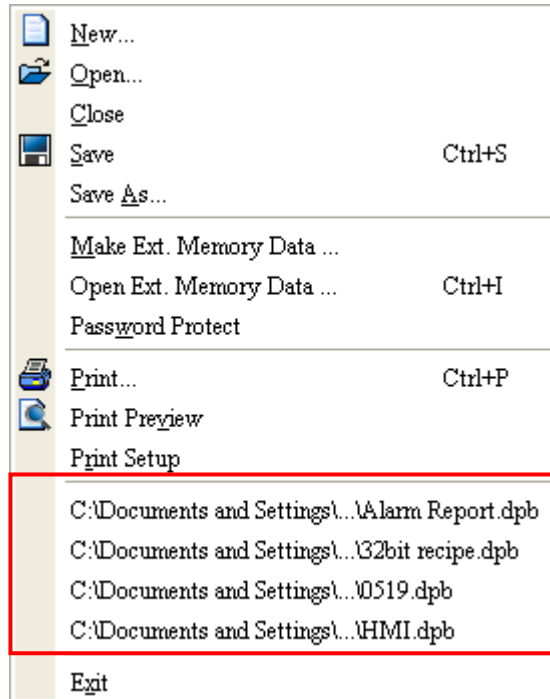
Fig. 3-5-14 Most recent used files

3.5.13   Exit

Exit function is to close all open editing files and save those that have not been save yet and finally exit the ScrEdit. Select this function by clicking **File > Exit**. If the file has been changed or not saved yet, the saving dialog box (Fig. 3-5-2) will show up to remind the user of saving project. If the user press **Cancel** button at this time, the exit command is cancelled. Either pressing **Yes** button to save the file, or pressing **No** button not to save the file can exit the ScrEdit. After the user press the **Yes** button, the Save As dialog box will appear (Fig. 3-5-4) for saving the file.

3.6   Menu Bar and Toolbar (Edit)

Adopt pull-down menu similar to Microsoft Office style and provide user-friendly Edit pull-down menu.
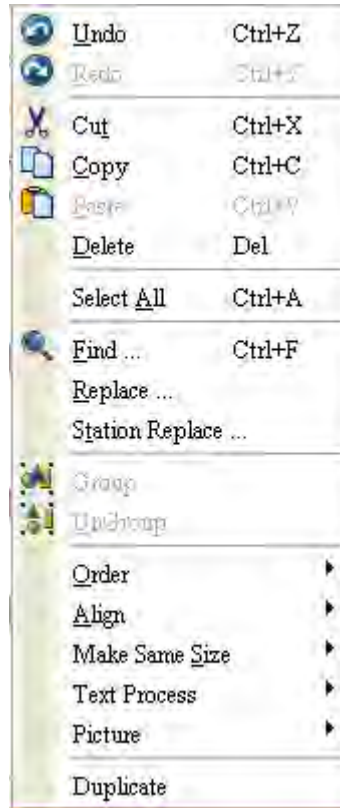
3.6.1   Undo

Undo the last action. Select this function by choosing **Edit > Undo** or clicking the Undo icon

from toolbar, or pressing **Ctrl + Z**. All actions are recorded in output window.

3.6.2   Redo

Redo the undo action. Select this function by choosing **Edit > Redo** or clicking the Redo icon from toolbar, or pressing **Ctrl + Y**. All actions are recorded in output window.

3.6.3   Cut

Deletes the selected element and save it in clipboard to paste to other place. Select this

function by choosing **Edit > Cut** from menu bar or clicking the Cut icon from toolbar, or

pressing **Ctrl + X**.

3.6.4   Copy

Copy the selected element to the clipboard. Select this function by choosing **Edit > Copy** from menu bar or clicking the Copy icon from toolbar, or pressing **Ctrl + C**.

3.6.5   Paste

Paste element from clipboard. Select this function by choosing **Edit > Paste** from menu bar or clicking the Paste icon from toolbar, or pressing **Ctrl + V**.

3.6.6   Delete

Delete selected element. Select this function by choosing **Edit > Delete** from menu bar or pressing **Del** key.

3.6.7   Select All

This command selects all elements. To select all elements to remove everything, select **Edit > Select All** from menu bar or press **Ctrl + A**. When the user uses Select All, the element in the upper left corner will be filled with a blue and white border as a base element. Additional elements will be filled with a white and black border. The base element is used to align or resize.

3.6.8   Find

To find content that matches the find criteria, select **Edit > Find**, or click the , or press **Ctrl + F**. The user can find element text, read address, write address or memory address on the current screen or all screens (Fig. 3-6-1). Once the content is located, the found content is displayed in the output window. To go to actual location of the found content, click in the output window and HMI will move to the location of the found content. (Fig. 3-6-2).

Find

Find What: This field is where the user enters the word or phase that the user is looking for.
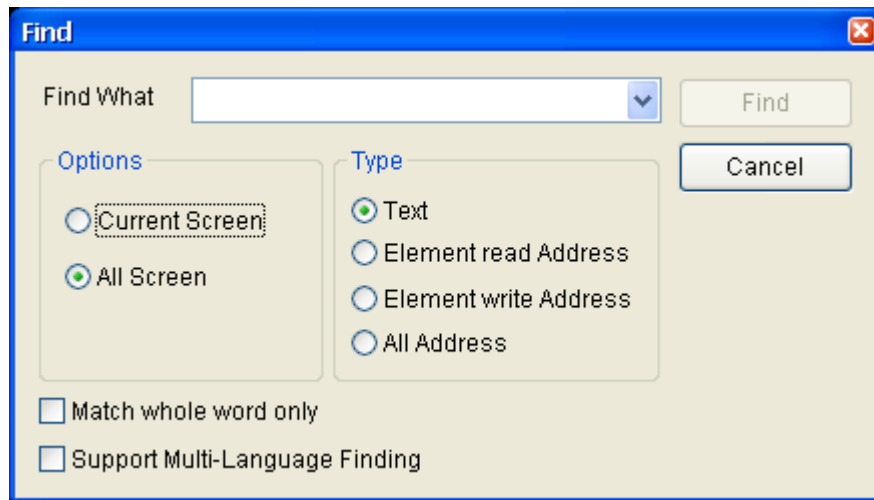
Fig. 3-6-1 Find dialog box

Options:

Current Screen

This causes ScrEdit to navigate the current screen only and find the matching word or phase that the user is looking for. The output window will display all matching words or phases. When the user double clicks the word or phase, ScrEdit will jump to that location of the matching word or phase. Please refer to the example screen below.
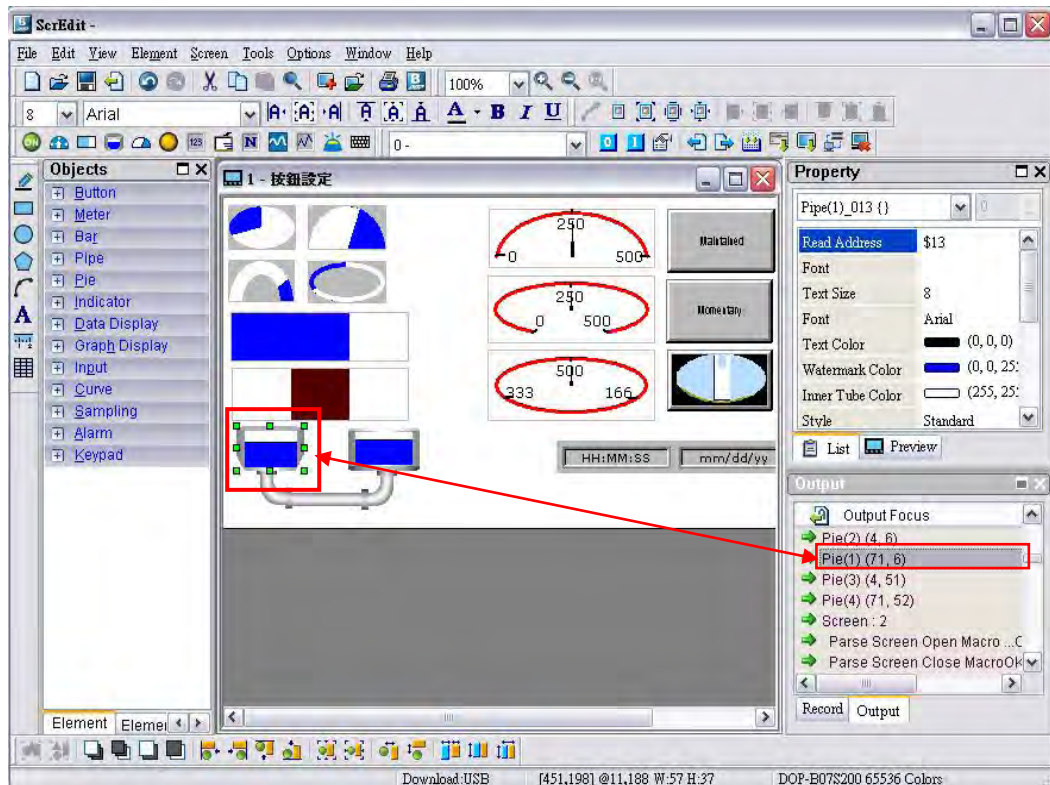
Fig. 3-6-2

All Screen

This causes ScrEdit to navigate all screens and find the word or phase that the user is looking for. The output window will display all matching words or phases. When the user double clicks the word or phase, ScrEdit will also jump to that location of the matching word or phase.

Type:

Text

To specify the data type as Text, click the Text button

Read Address

To specify the data type as Read Address, click the Read Address button.

Write Address

To specify the data type as Write Address, click the Write Address button.

All Address

To specify the search to look for all data types, click the All Address button.

Check Box:

By checking **Match whole word only** check box, the system finds only the words or phrases that the user entered. If the user does not select this option, the system finds all contents that include the words or phrases that the user entered.

By checking **Support Multi-Language Finding** check box, the system finds all multi-language contents that include the words or phrases that the user entered. The user can use the **Support Multi-Language Finding** option when finding texts.

3.6.9 Replace

To replace the content that matches the replace criteria, select **Edit > Replace** or press **Ctrl + R**. The user can replace element text, read address, or write address on the current screen or all screens. The replacement data type can be Bit, Word or Double Word. The user can change the data type only for read addresses and write addresses. The replacement data may exists in Element, Macro, Control Block, Status Block, History Buffer, Alarm and Recipe. When read addresses and write addresses are selected, the user can choose where to find and replace the content that matches the replace criteria (the items for replacement).

Replace

Find What: This field is where the user enters the word or phase that the user is looking for.

Replace With: This field is where the user enters the word or phase that the user wants to replace with.
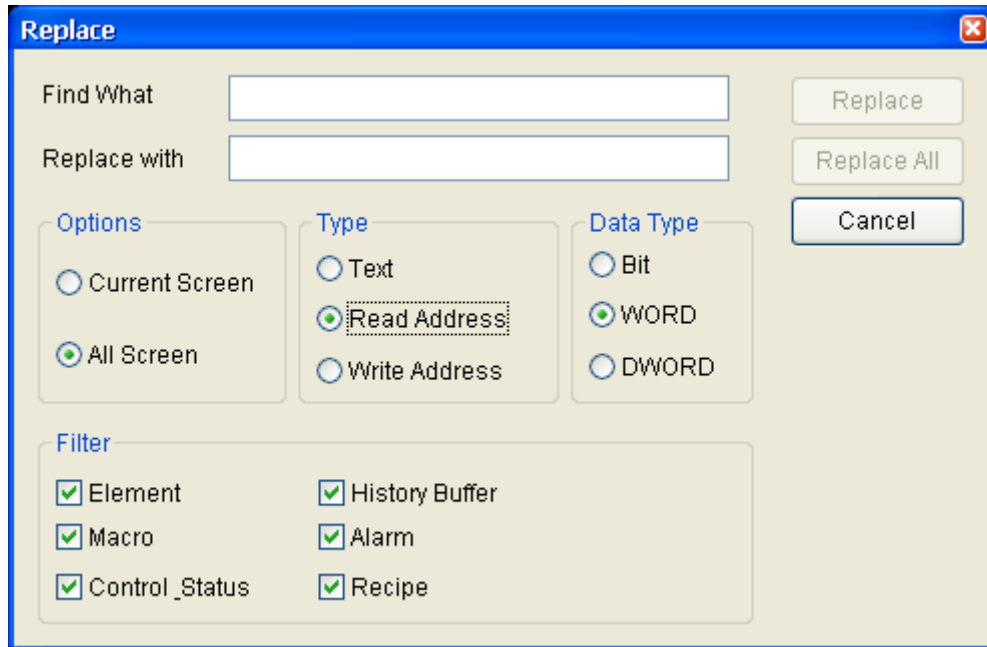
Fig. 3-6-3 Replace dialog box

Options:

    Current Screen

    This causes ScrEdit to navigate the current screen only, find the matching word or phase that the user is looking for and replace it.

    All Screen

    This causes ScrEdit to navigate all screens and find the matching word or phase that the user is looking for and replace it.

Type:

    Text

    To specify the data type as Text, click the Text button

    Read Address

    To specify the data type as Read Address, click the Read Address button.

    Write Address

    To specify the data type as Write Address, click the Write Address button.

Data Type:

> Bit, WORD, DWORD
>
> If the Read Address or Write Address button is selected, it is needed to select if the replacing data type is Bit, Word, or Double Word.

Filter (Replace Criteria)

> Element, Macro, Control Block, Status Block, History Buffer, Alarm and Recipe
>
> If the Read Address or Write Address button is selected, it is needed to select if the replace criteria are Element, Macro, Control Block, Status Block, History Buffer, Alarm and Recipe.

Replace / Replace All

> If the user only wants to replace a single instance of the data, click the Replace button.
>
> If the user wants to replace all instances of the specified data automatically, click the Replace All button.
>
> For example, the user wants to replace the read address from $0 to $1234, enter $0 in Find What field, enter $1234 in Replace With field and press Replace button (Fig. 3-6-4). ScrEdit will find the matching criteria (Fig. 3-6-5) and perform the replacement.
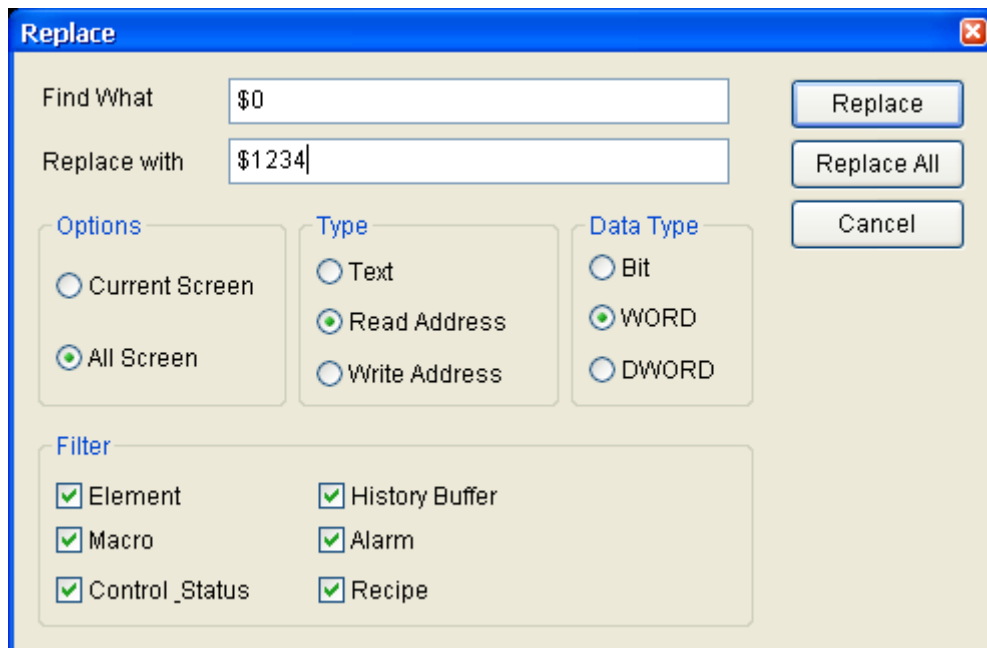
Fig. 3-6-4 Replace dialog box
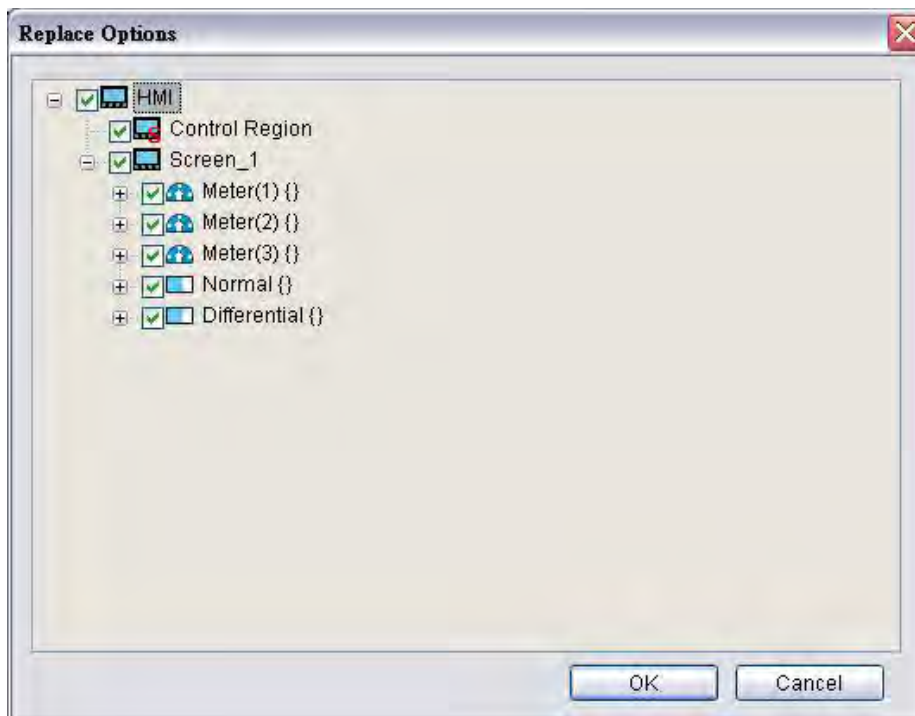
Fig. 3-6-5

3.6.10   Station Replace

This function is used to replace the designated station number (PLC unit number).
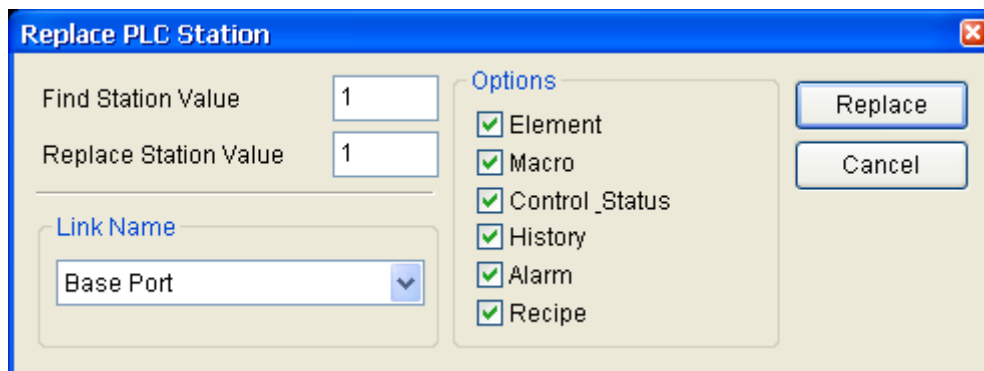
Fig. 3-6-6

3.6.11   Group

This command groups the selected elements. When the user groups two or more elements, they will become one unit. Thus, when the user moves or changes the elements, the user will move or change them together. To group the elements, select **Edit > Group** from menu bar or clicking the Group icon from toolbar.

3.6.12   Ungroup

This command ungroups selected elements. To ungroup the elements, select **Edit > Ungroup** from menu bar or clicking the Ungroup icon [icon] from toolbar.

3.6.13   Order

This command changes the stacking order of the selected elements. To change the order, select **Edit > Order**, or select one of the specific order icons [icons] from the toolbar.

The Order icons include:

[icon] Bring to Top: Moves the selected element to the front.

[icon] Send to Bottom: Moves the selected element to the behind.

[icon] Bring Forward: Moves the selected element to the behind.

[icon] Send Backward: Moves the selected element one step to the behind.

3.6.14   Align

This command aligns the elements. The user can use this command only when more than one element are selected. The Screen Editor refers to the base element to align the elements. To align the elements, select **Edit > Align**, or click one of the Align icons on the toolbar

[icon]: Align Left. Move an element to the left.

[icon]: Align Right. Move an element to the right.

[icon]: Align Top. Move an element to the top.

[icon]: Align Bottom. Move an element to the bottom.

[icon]: Align Center Vertically. Center an element vertically.

[icon]: Align Center Horizontally. Center an element horizontally.

[icon]: Across Space Evenly. Space selected elements evenly across the window.

[icon]: Down Space Evenly. Space selected elements evenly from top to bottom.

Align Left, Align Right, Align Top and Align Bottom commands are available when two or more elements are selected. That is because the element only can be left, right, top and bottom aligned relative to another element. Align Center Vertically and Align Center Horizontally commands are available when one or more elements are selected. Across Space Evenly and Down Space Evenly are available when three or more elements are selected. After Align commands are used, the coordinates of the elements will changed to the coordinates of the new position.

3.6.15   Make Same Size

This command makes the element to be the same size. The users must select one element first as reference object, and then select other elements. To use this function, select **Edit > Make Same Size** or click the make same size icons in the toolbar.

3.6.16   Text Process

This command aligns the text. To use this function, select **Edit > Text Process** or click the text process icons in the toolbar. In the Import Text dialog box, the user can decide if use Text Bank Edit Font or not. If the user checks the box next to Text Bank Edit Font, the imported text will be display by adopting the fonts of Text Bank. For the settings of Text Bank, please refer to **Options** > **Text Bank**.

3.6.17   Picture

☑ next to the Picture command represents that this function is enabled. To use this function, select **Edit > Picture** or click the picture icons in the toolbar. The users can also use the functions of Bitmap Toolbar to perform Picture commands.

3.6.18   Duplicate

To copy one or more elements at the same time, select **Edit > Duplicate**. After the user has selected this command, the Duplicate dialog box is displayed (Fig. 3-6-7). The user can enter the number of columns and rows to get the total copy numbers. The minimum entry number must be more than 2 as the original element is included in the total copy number.
If the user wants to copy only the rows, uncheck the box next to columns. If the user wants to copy only the columns, uncheck the box to rows.

To set the spacing between every element, set the pixel count in the Spacing field.
To place the copied element by ascending or descending address, click the Increase Address or Decrease Address button. The unit of the address can be Word or Bit. To place the copied element by the horizontal (X-direction) or vertical (Y-direction) direction, click the X-Direction or Y-Direction button (Please refer to the example 1 and 2 in Fig. 3-6-8 and Fig. 3-6-9).
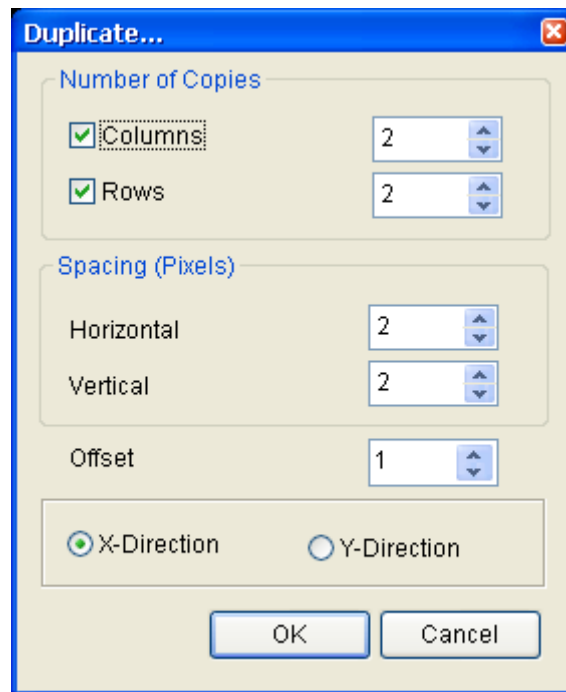
Fig. 3-6-7 Duplicate dialog box
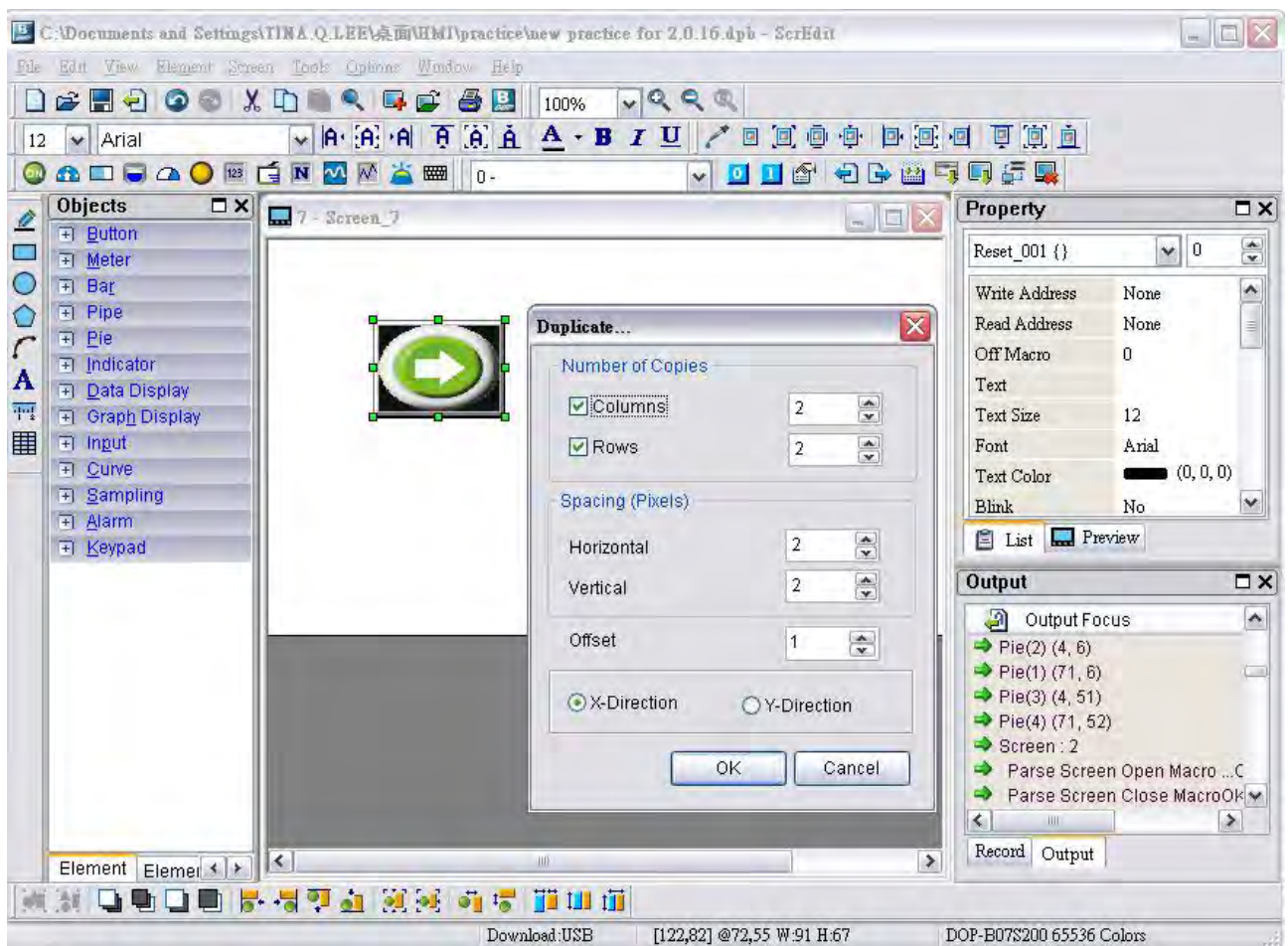
Fig. 3-6-8 Duplicate Example 1
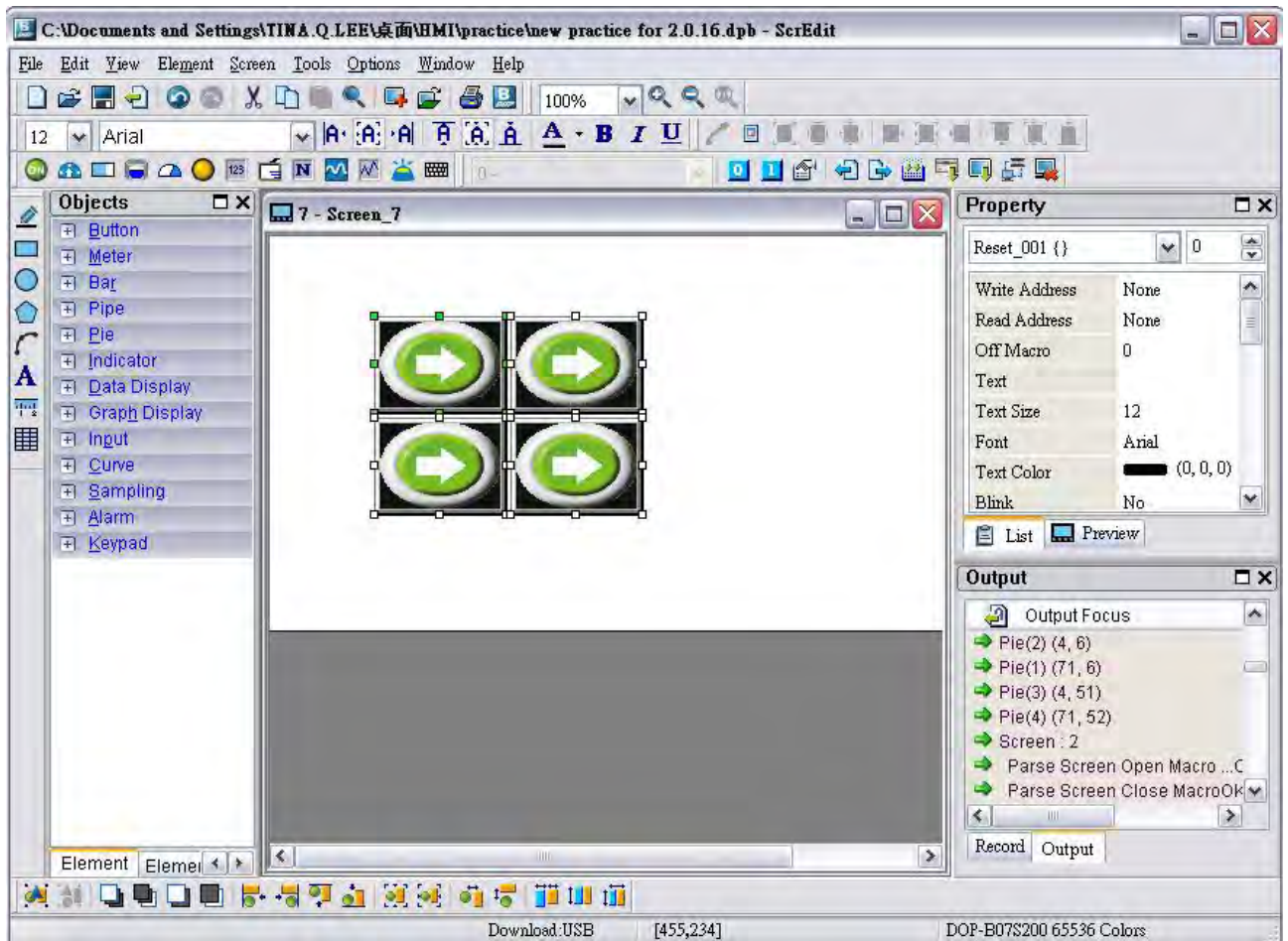
Fig. 3-6-9 Duplicate Example 2

3.7   Menu Bar and Toolbar (View)

```
Tools                     ▶
✓ Property
✓ Output
✓ Element Tool
  Zoom In
  Zoom Out
  Actual Size
  Full Screen
  I/O Screen
  Grid Setup...
  Cross Reference Table ...
  Element Part List ...
  Memory List
```
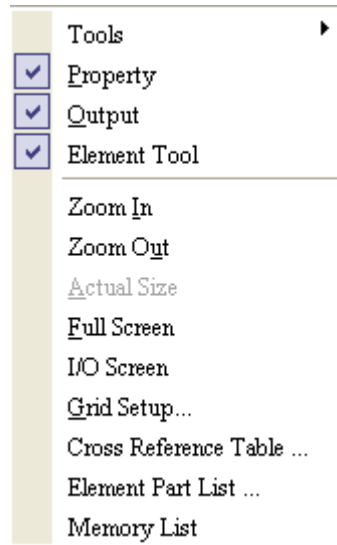
In View option, the user can decide how toolbars and docking windows display. Once the user clicks on it, it will have icon ☑ in front of it and display on screen. The user can also arrange these toolbars and docking windows by themselves. If ☑ not show in front of the toolbar, it indicates that the toolbar is hided and not display on the screen. The description of each toolbar is introduced in the following sections.

3.7.1   Tools

Standard Toolbar

Icon	Function	Description
🗋	New	Create a new project
📂	Open	Open an old project
💾	Save	Save current edited project
⏎	Export	Export an project to BMP format
↺	Undo	Undo an action (some actions cannot be undone)
↻	Redo	Redo an action
✂	Cut	Cut selected elements
🗐	Copy	Copy selected elements
📋	Paste	Paste the element the user copy or cut
🔍	Find	Find specific text, write address or read address

Icon	Function	Description
	New Screen	Create a new screen
	Open Screen	Open an old screen
	Print	Print current project
	About	Screen editor version

Table 3-7-1 Standard Toolbar

Status Bar

Following is the status bar of Screen Editor (Fig. 3-7-1).
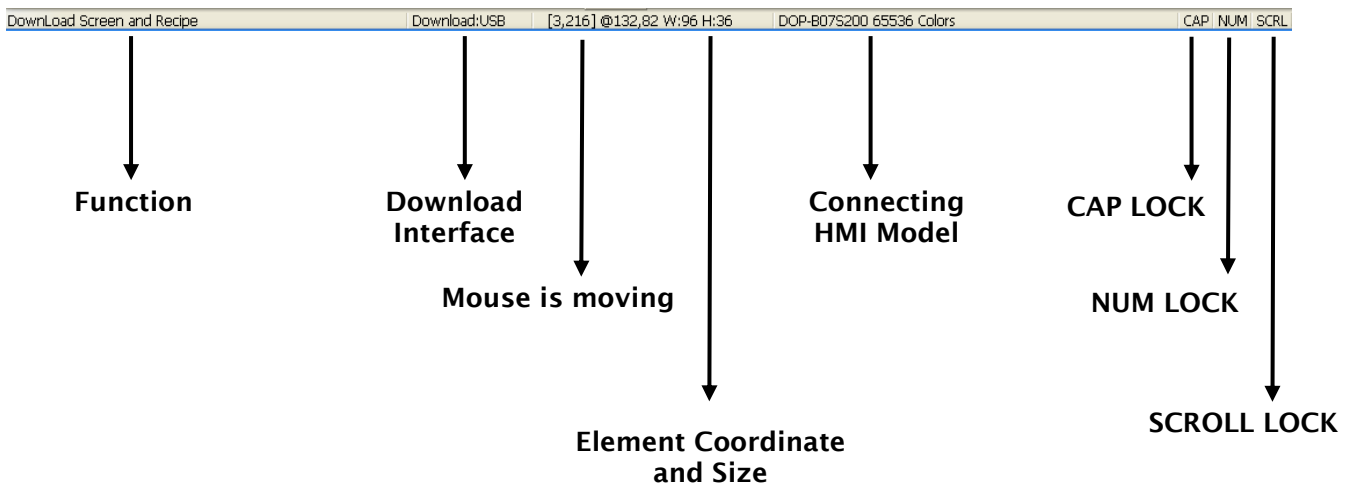
Fig. 3-7-1 Status Bar

Text Toolbar
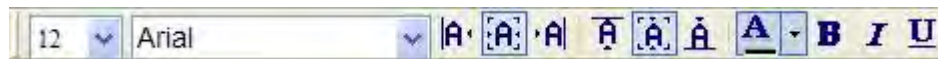
Icon	Function	Description
12 ▼	Font Size	Display and change text size
Arial ▼	Font Name	Display and change text font
A	Align Txt to Left	Align text to left
A	Text Center Horizontally	The space at the right/left sides of text will be the same.
A	Align Text to Right	Align text to right

Icon	Function	Description
Ā	Align Text to Top	Align text to top
[Ā]	Text Center Vertically	The space at the top/bottom sides of text will be the same.
Å	Align Text to Bottom	Align text to bottom
A ˅	Text Color	Change text color
B	Bold	Text bold
I	Italic	Text Italic
U	Underline	Add line under text

Table 3-7-2 Text Toolbar

Bitmap Toolbar

Icon	Function	Description
	Select Transparent Color	Use the suction tool to remove the color of the picture and determine the transparent color of the picture
	Chang Mode for process all state pictures	If this function is enabled (this icon is pressed), not only the current picture with current state but also all pictures with all states are stretched, resized or aligned
	Picture Stretch All	Stretch the selected picture to the whole range of the element.
	Picture Stretch 1：1	Scale the picture relative to original picture size
	Original Picture	Resize the selected picture to the actual picture size
	Picture Align Left	Align the selected picture to left
	Picture Center Horizontally	The space at the right/left sides of the selected picture are the same
	Picture Align Right	Align the selected element to right
	Picture Align Top	Align the selected element to top
	Picture Center Vertically	The space at the top/bottom sides of the selected element are the same
	Picture Align Bottom	Align the selected element to bottom

Table 3-7-3 Bitmap Toolbar

Element Toolbar

Icon	Function	Description
	Button	Set Reset Momentary Maintained Multistate Set Value Set Constant Increment Decrement Goto Screen Previous Page System DateTime Password Table Setup Enter Password Contrast_Brightness Low Security System Menu Report List Screen Capture Remove storage Import/Export recipe Calibration Language Changer
	Meter	Meter(1) Meter(2) Meter(3)
	Bar	Normal Differential
	Pipe	Pipe(1) Pipe(2) Pipe(3) Pipe(4) Pipe(5) Pipe(6) Pipe(7)
	Pie	Pie(1) Pie(2) Pie(3) Pie(4)

Icon	Function	Description
🟡	Indicator	🟡 Multistate Indicator 🔵 Range Indicator 🔵 Simple Indicator
123	Display	123 Numeric Display ABC Character Display 1 Date Display ⏰ Time Display Sun Day-of-week Display ☐ Prestored Message Moving Sign
🗂	Graphic	State Graphic Animated Graphic Dynamic Line Dynamic Rectangle Dynamic Ellipse Real Image
N	Input	N Numeric Entry A Character Entry A Barcode Input
∿	Curve	∿ Trend Graph X-Y Chart X-Y Distribution Curve input
∿	Sampling	Historical Trend Graph Historical Data Table Historical Event Table
🔔	Alarm	Alarm History Table Active Alarm List Alarm Frequency Table Alarm Moving Sign
⌨	Keypad	⌨ KeyPad(1) ⌨ KeyPad(2) ⌨ KeyPad(3)

Table 3-7-4 Element Toolbar

Drawing Toolbar

Icon	Function	Description
✎	Line	Draw a line
▭	Rectangle	Draw a rectangle
◯	Circle	Draw a circle
⬠	Polygon	Draw a polygon
⌒	Arc	Draw an arc
A	Text	Add paragraph text
⊞	Scale	Draw a scale drawing
▦	Table	Create a table

Table 3-7-5 Drawing Toolbar

Layout Toolbar 1

Icon	Function	Description
0 -	Current Element State	Text on selected element
0	View State OFF/0	Switch and view current state OFF/0
1	View State ON/1	Switch and view current state ON/1
⚙	Display All Read/Write Address	Display all read/write addresses of all elements
⬅	Previous windows	Select previous windows
➡	Next windows	Select the next windows
🗓	Compile	Compile current element

Icon	Function	Description
	Download Screen and Recipe	Download screen data and recipe
	Download Screen	Download screen data
	On-line Simulation	Test editing file at PC side and connected to the controller
	Off-line Simulation	Test editing file at PC side and not connected to the controller

Table 3-7-6 Layout Toolbar 1

Layout Toolbar 2

Icon	Function	Description
	Group	Group the selected elements
	Ungroup	Ungroup the selected elements
	Bring to Front	Move the selected element to the front of all other elements
	Send to Bottom	Move the selected element behind all other elements
	Bring Forward	Move the selected element forward one position
	Send Backward	Move the selected element behind one position
	Align Left	Align the selected elements to left
	Align Right	Align the selected elements to right
	Align Top	Align the selected elements to top
	Align Bottom	Align the selected elements to bottom
	Align Center Vertically	Set the element to be the vertical position of the work place
	Align Center Horizontally	Set the element to be the horizontal position of the work place
	Across Space Evenly	Make all the elements align in a consistent width

Icon	Function	Description
	Down Space Evenly	Make all the elements align in a consistent height
	Make Same Width	Make the selected elements to be the same width
	Make Same Height	Make the selected elements to be the same height
	Make Same Size	Make the selected elements to be the same size

Table 3-7-7 Layout Toolbar 2

Zoom Toolbar
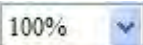
Icon	Function	Description
100%	Display Level	Lets the user set a zoom level, including 25%, 50%, 75%, 100%, 150%, 200% and 300%
	Zoom In	Lets the user change the magnification level, including 150%, 200% and 300%.
	Zoom Out	Lets the user reduce the magnification level, including 25%, 50% and 75%.
	1:1	Lets the user change element size to actual size (100%).

Table 3-7-8 Zoom Toolbar

3.7.2   Property Table

The Property Table displays the element property settings for each element (Fig. 3-7-2).

All elements on the current
editing screen
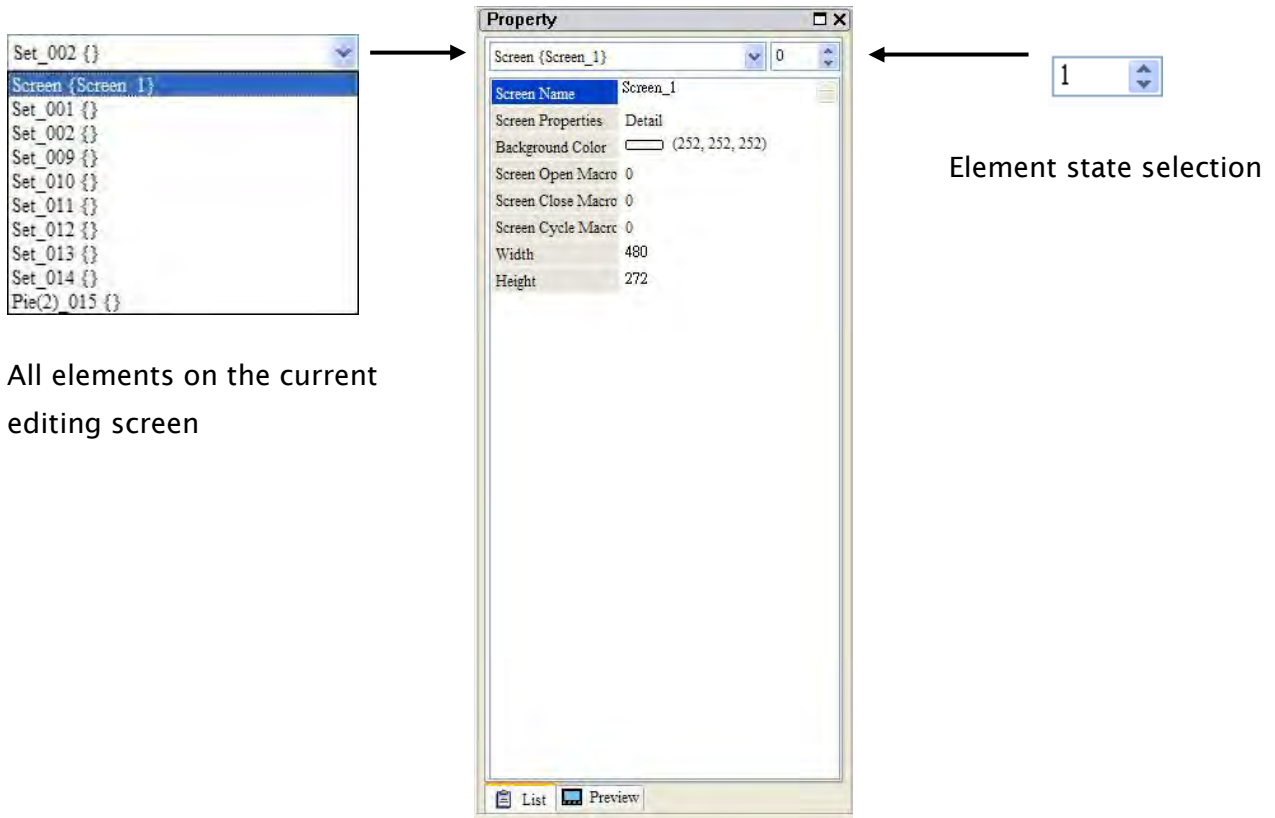
Element state selection
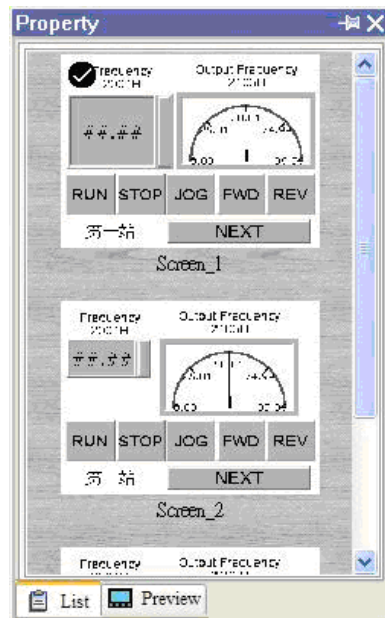
Fig. 3-7-2 Property Table and Editing Screen Preview

3.7.3　Record and Output Window

The Record and Output Window displays all the editing actions and output message when compile function is enabled. When HMI program is compiled, the system will detect the program automatically. Once error occurs, the error messages will be displayed in Output Window. To get to the error element window, click on the error message (Fig. 3-7-3, Fig. 3-7-4, Fig. 3-7-5, Fig. 3-7-6).
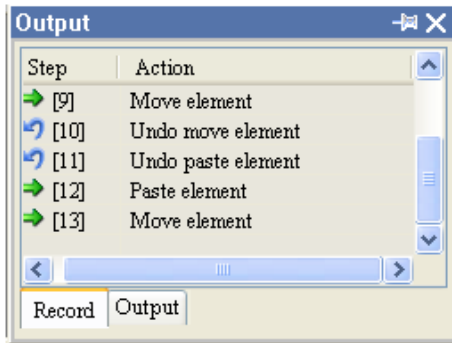
Fig. 3-7-3 Record Window
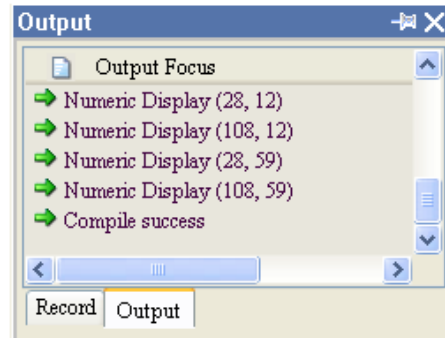
Fig. 3-7-4 Output Window
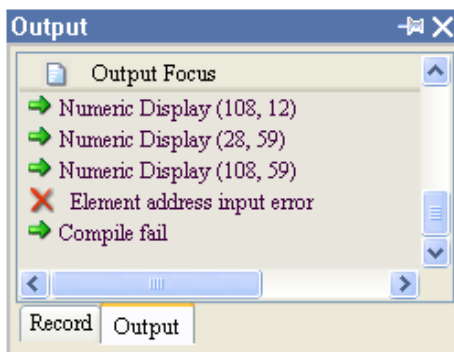
Fig. 3-7-5 Compile Result
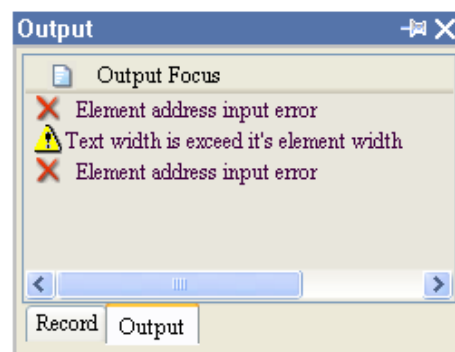
Fig. 3-7-6 Error Message

3.7.4   Zoom In

Zoom in to get a close look at the elements on ScrEdit work place (Fig. 3-7-7, Fig. 3-7-8).
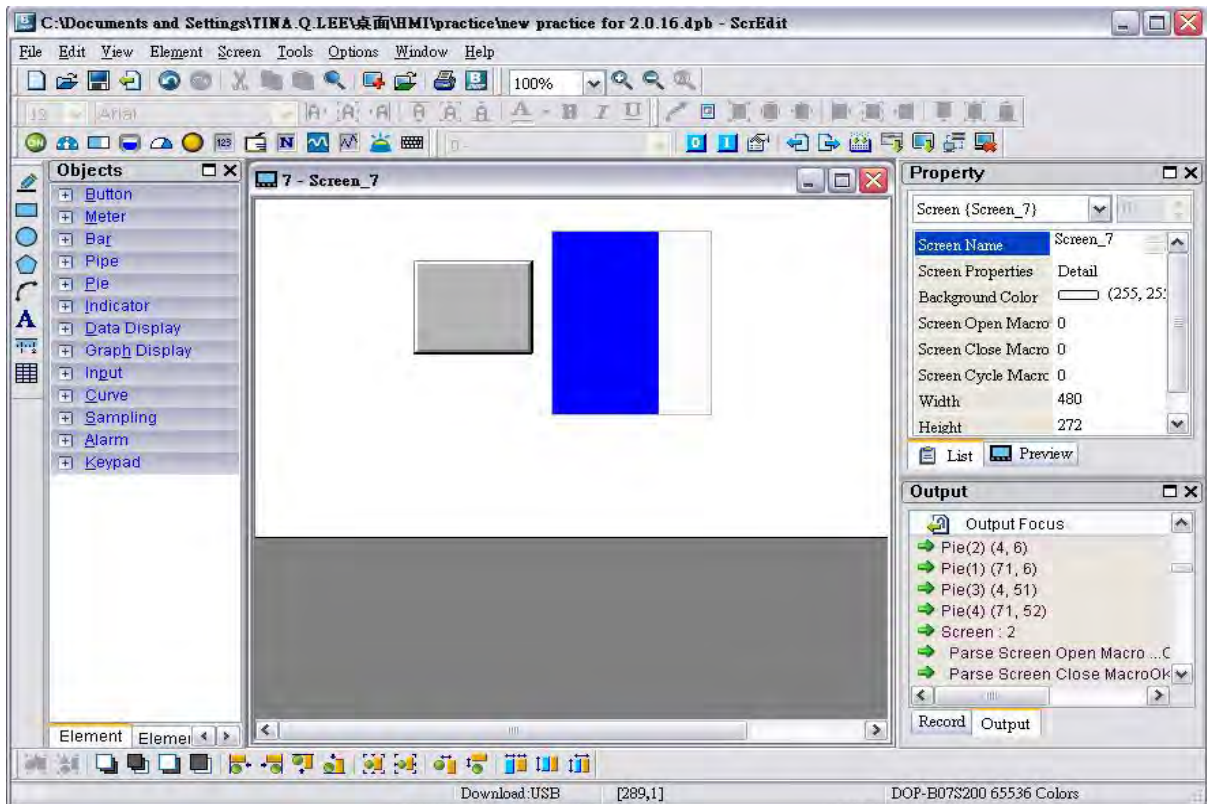
Fig. 3-7-7 Zoom level = 100% (Before Choosing Zoom In command)
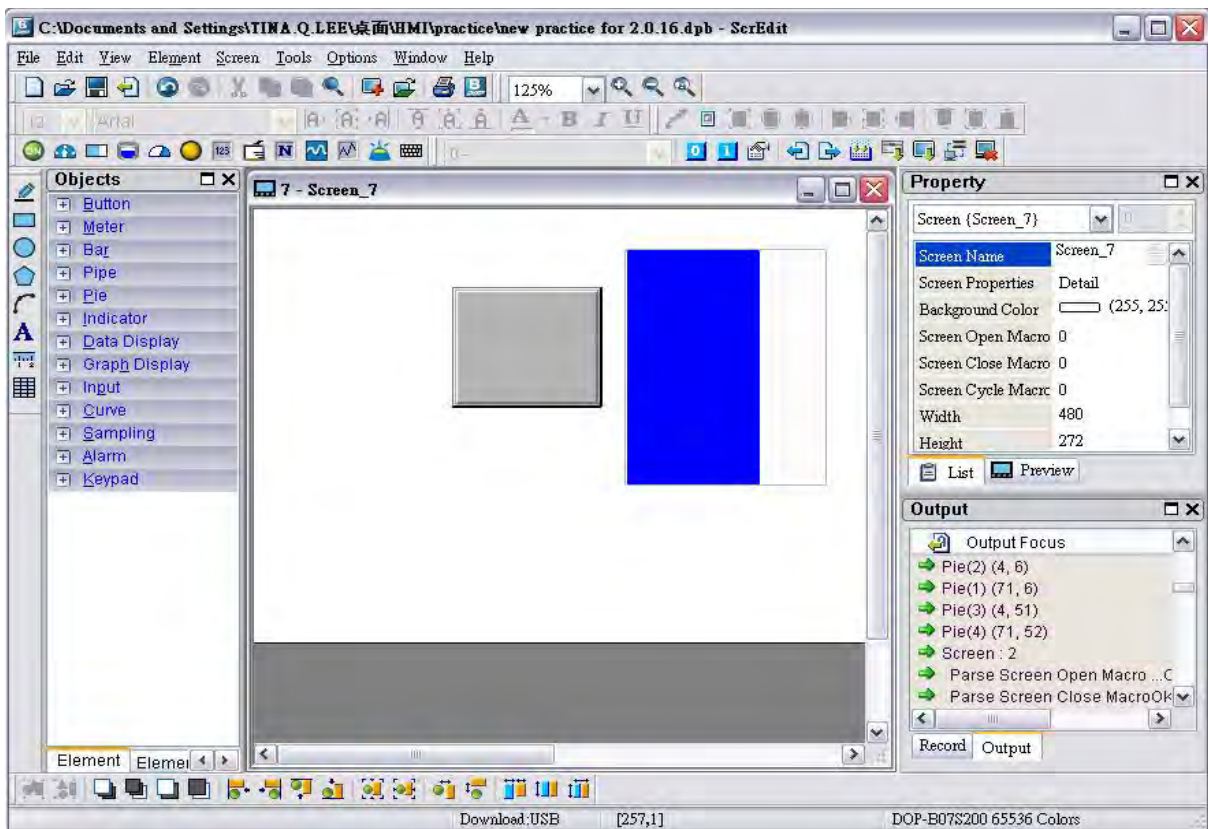
Fig. 3-7-8 Zoom level = 125% (After Choosing Zoom In command)

3.7.5   Zoom Out

Zoom out to see more look of the elements on ScrEdit work place (Fig. 3-7-9).
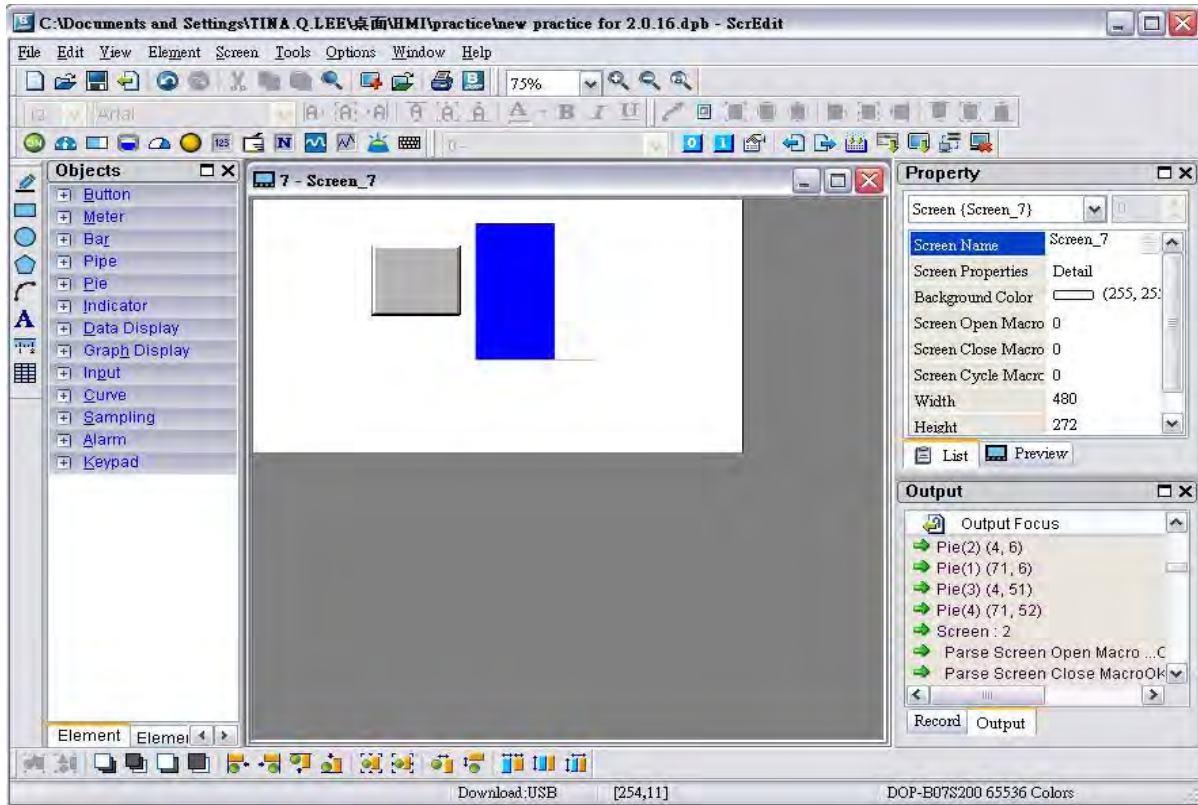
Fig. 3-7-9 Zoom level = 75% (After Choosing Zoom Out command)

3.7.6   Actual Size

Return to actual size (100%). This size is relative to the screen size of HMI.

No matter zoom in or zoom out command, the zoom level could be 20%, 50%, 75%, 100%,

150%, 200% or 300%. The user can also zoom in or out by clicking   or   or selecting

the Zoom level (Fig. 3-7-10).
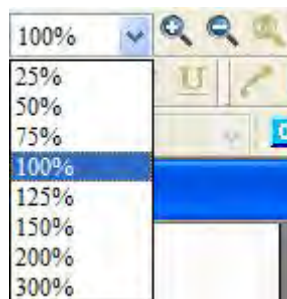
Fig. 3-7-10 Zoom Level

3.7.7   Full Screen

Refer to Fig. 3-7-11. Full screen provides maximum view to edit in ScrEdit. Full screen view will hide all toolbars and docking windows other than the ScrEdit work place itself. Fig. 3-7-11 full screen also shows the reference macro command.
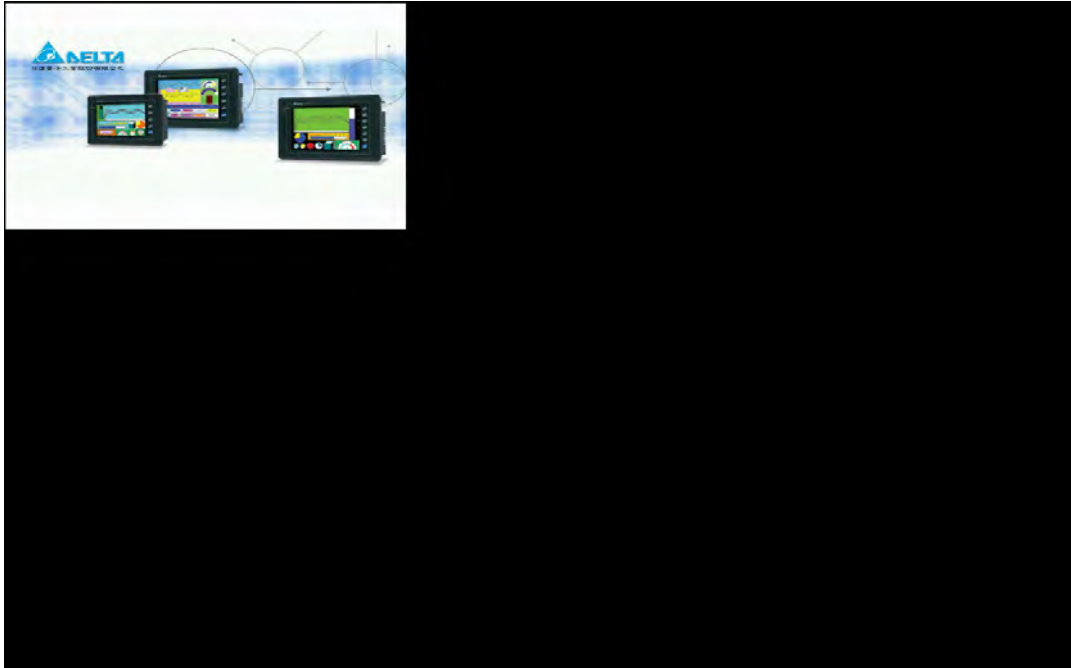
Fig. 3-7-11 Full Screen (Pressing Esc key or left-click the mouse can exit Full screen)

3.7.8   I/O Screen

Refer to Fig. 3-7-12. I/O screen also provides maximum view to edit in ScrEdit just like Full screen. But the difference is that I/O Screen will show the read and write addresses of the element and also shows the set macro commands.
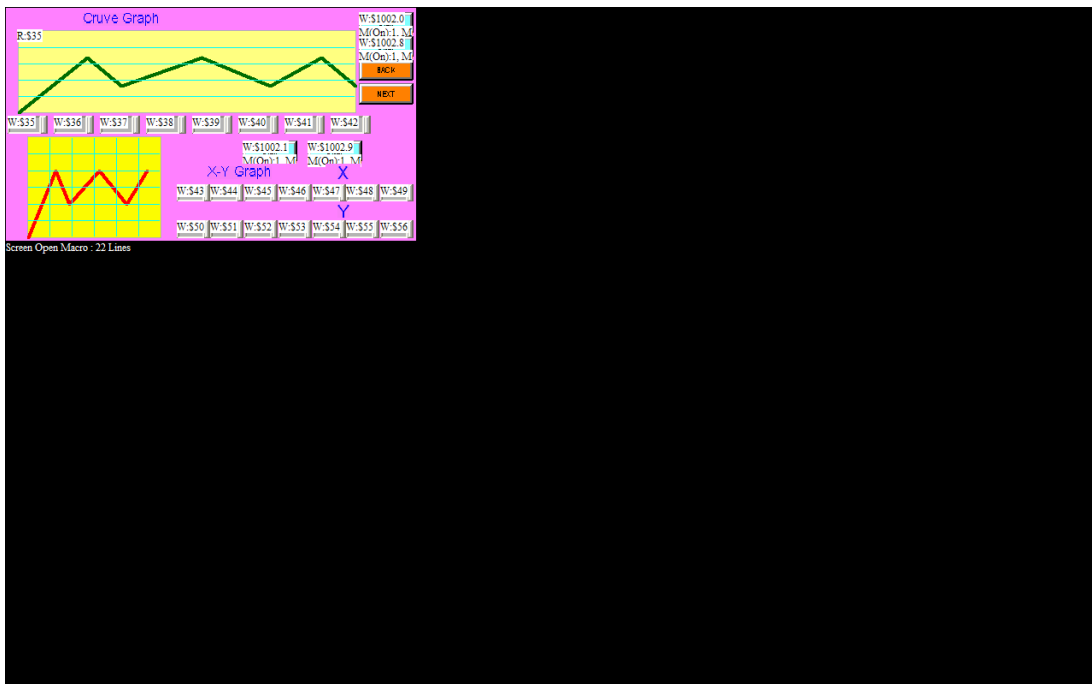
Fig. 3-7-12 I/O Screen (Pressing Esc key or left-click the mouse can exit Full screen)

3.7.9　Grid Setup

Grid Setup is a function that can help the user to align and position the element more easily and precisely. The distance (spacing) between the grid dots can be set by the user freely (Fig. 3-7-13 and Fig. 3-7-14).

Show Grid: Show the grid dots on the screen.

Snap to Grid: Make the elements snap to grid so that the elements can jump between grid lines when the user moves them.
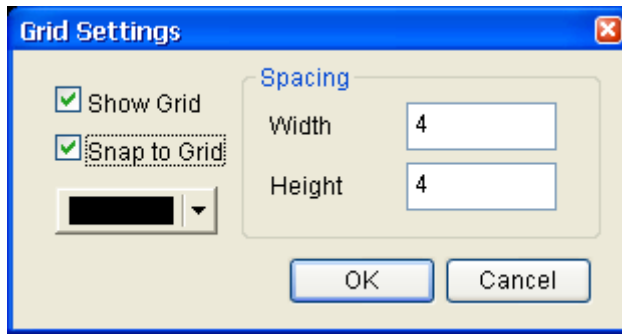
Fig. 3-7-13 Grid Setup dialog box
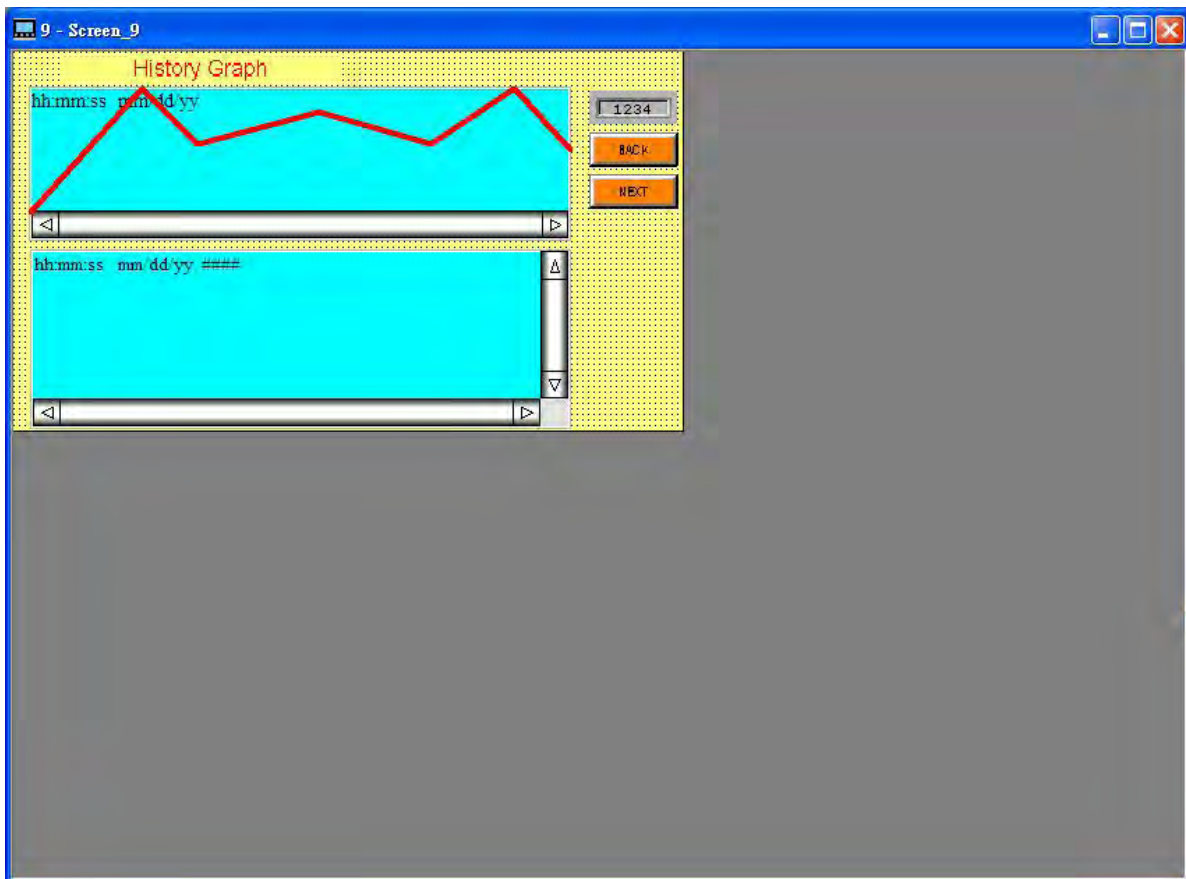
Fig. 3-7-14 Show Grid screen

3.7.10   Cross Reference Table

When creating and editing various kinds of elements, often the same address is reused. To avoid this situation, HMi provides the cross reference table function for user's convenience and quick reference. The user can view the read/write addresses of the selected element and see its relationship or connection with the addresses of other elements, macro commands or the system control area. The first row of the cross reference table displays the referred element that the user selected. The following rows display the elements which have the same write address. The user can double-click a specific row and HMi will switch to the corresponding screen of the referred address. In Fig. 3-7-15, we can see that alarm address and macro command use the same internal memory $50.

Fig. 3-7-15 Cross Reference Table

3.7.11   Element Part List

When the Element Part List function is enabled, HMi sorts out and classifies all the elements on the current screen. The user can click the tab to switch to the classification that the user wants to view. The related addresses and corresponding properties are listed in each classification (Name, Describe, Write / Read address, Trigger address, Trigger type, Interlock and Level) in each tab. The user can double-click the column to let HMi select the element automatically and allow the user to edit the detailed property of the selected element in the property table.
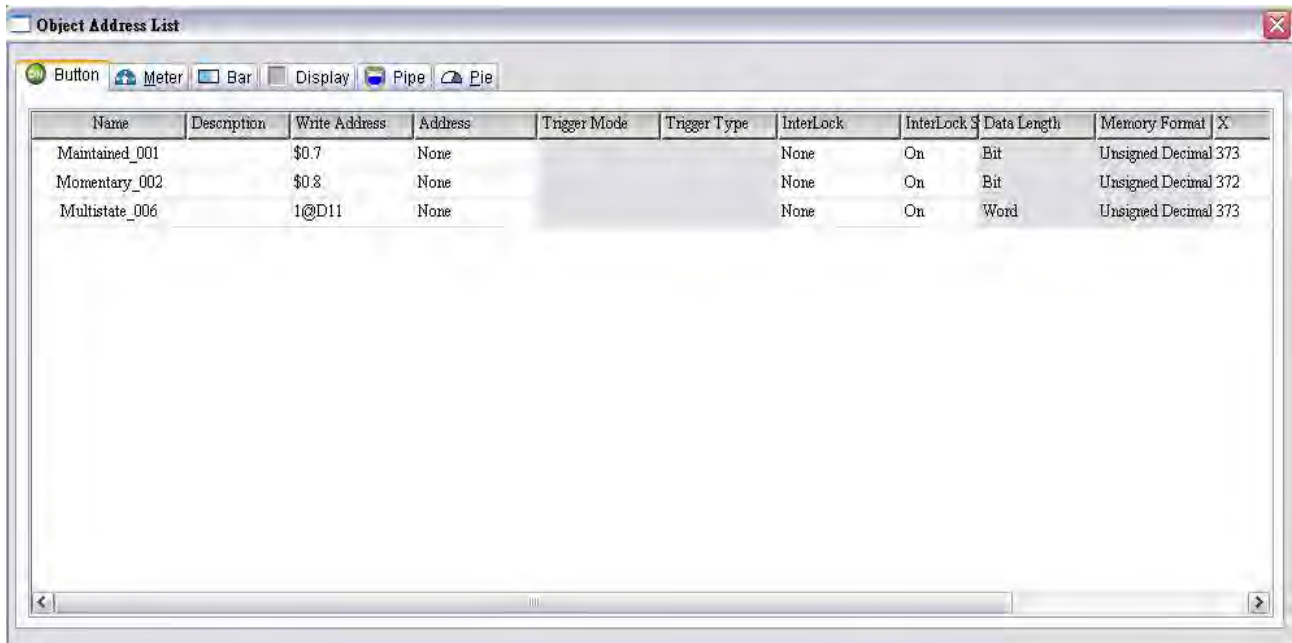
Fig. 3-7-16 Element Part List dialog box

3.7.12   Memory List

There are four items in memory list:

1.   ROM: It is the location where recipe data and screen data are stored.

2.   SRAM: It is the location where non-volatile data is stored.
      When there are history and alarm, etc. data in the project, the user can check the
      memory space in this area.

3.   SDARM: It is the location where HMI executes the project. To get this information, the
      user must create a project and compile it first.

4.   External Storage: It indicates the external memory is used. When the non-volatile data is
      stored in external memory, i.e. USB disk, the data stored in SRAM will be moved to
      external memory area.

See below example.

(1). See the memory space after a picture is imported.

(2). See the memory space after a history data is created.

 (1). Import a picture

When importing a picture on HMI screen, the memory space of ROM and SDRAM changes. When the user create a new project, the calculated memory space by the system is shown as:

ROM=3.13%

SDAM=0.71%

After importing a picture on the screen, the memory space changes as shown as the figure below.
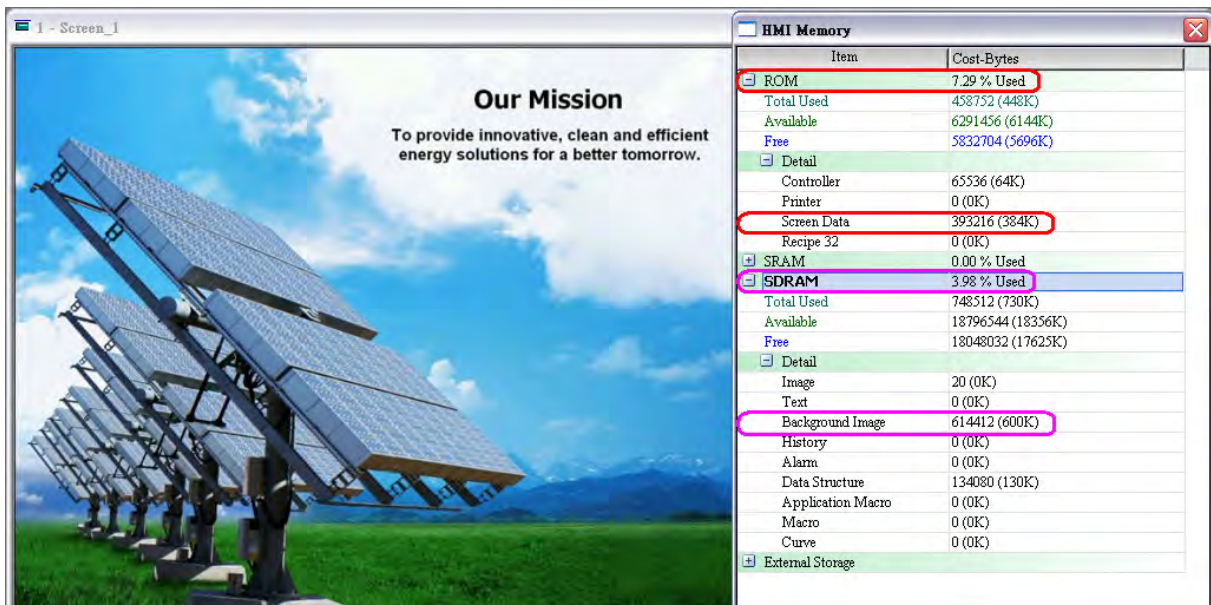
At this time, the memory space is changed as:

ROM=7.29%

SDAM=3.98%

The occupied ROM space increases 256K (384K-128K) and the occupied SDRAM space increases 600K (600K-0K).

(2). Create a history data

In this case, the original occupied memory space is:

ROM=7.29%

SDAM=3.98%

SRAM=0%

External Storage=0%

Create a two word history data as shown as the figure below. Ensure that this history data is stored in HMI (non-volatile area), i.e. **Retained** check box must be checked.
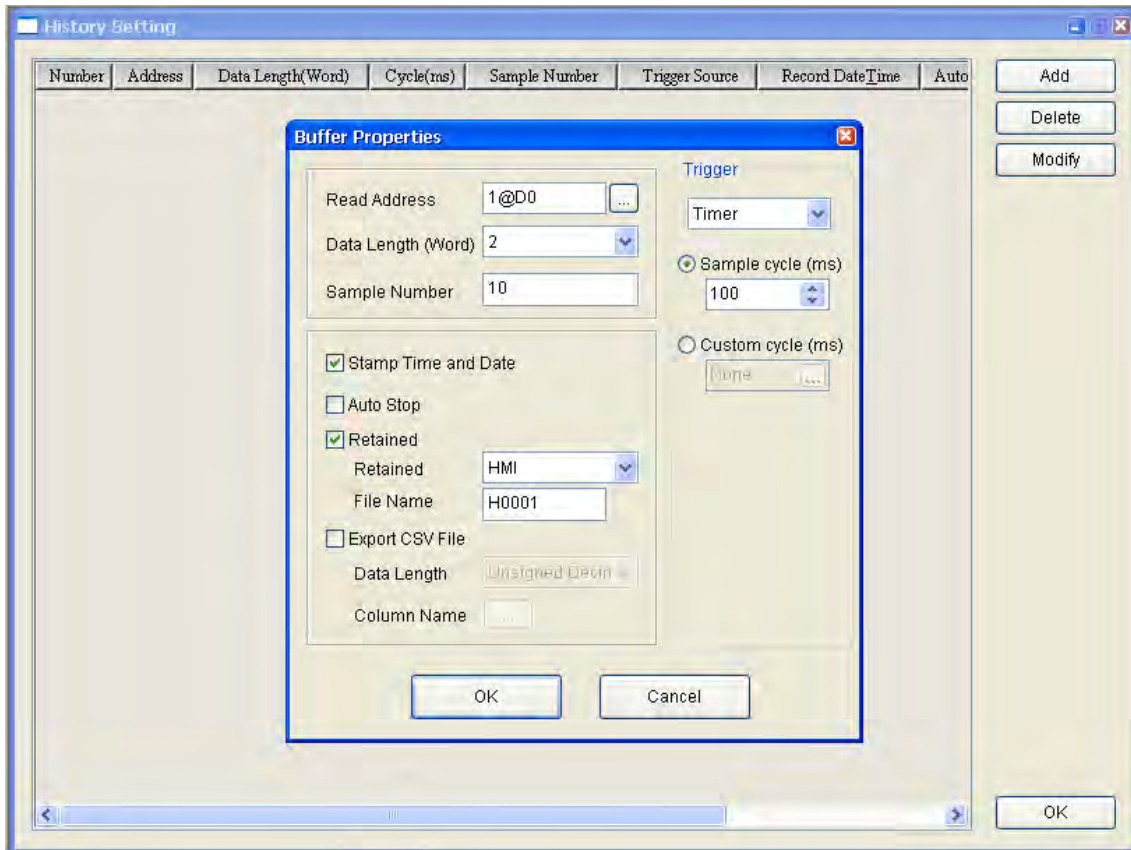
After the history setting is completed, the memory space changes.

Each saved date and time record occupied 6Byres

Each saved history data occupied 2word (4Byres)

SRAM=（6+4）x 10 +10 Byres (for system use) =110 Byres

At this time, the memory space will become:

ROM=7.29%

SDAM=3.98%

SRAM=0.03%

External Storage=0%
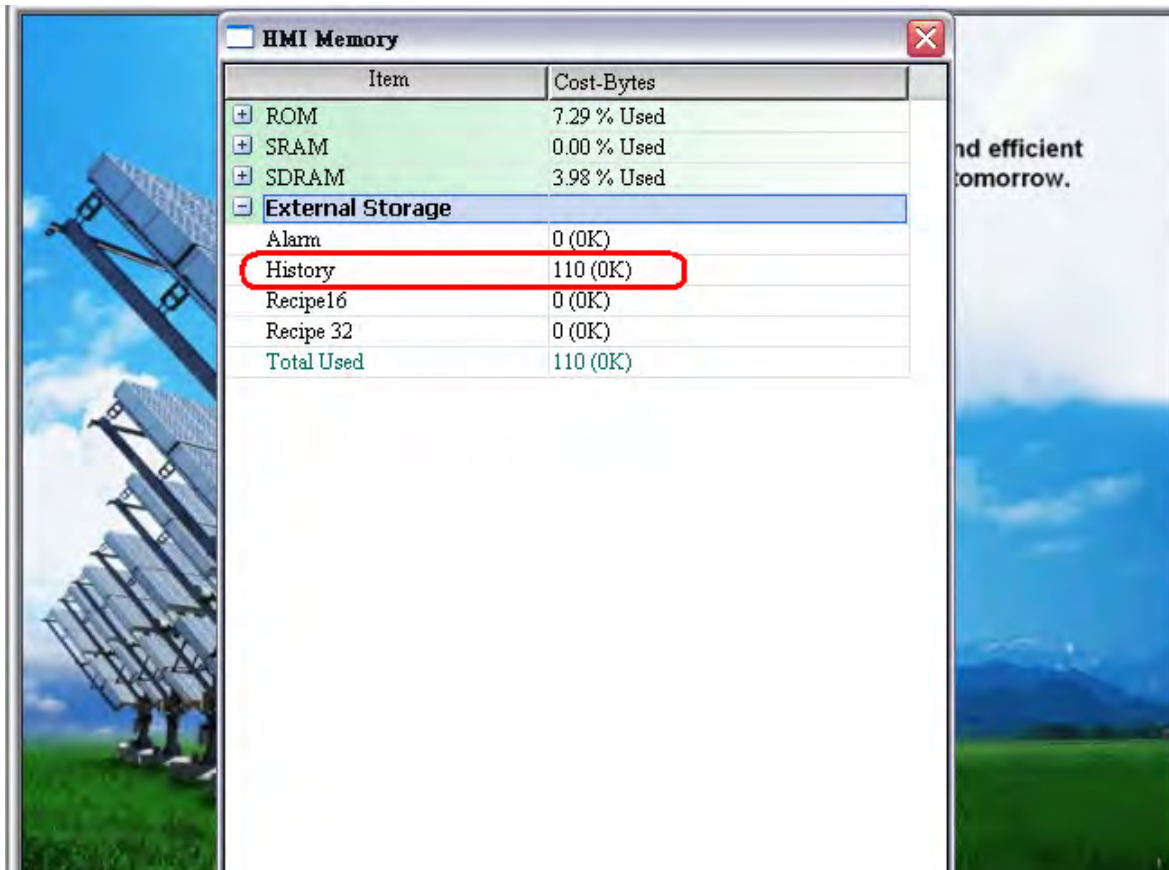
If the history data is saved in USB Disk (External Storage), the occupied memory space is changed as follows:

ROM=7.29%

SDAM=3.98%

SRAM=0%

External Storage=110Bytes

For more details setting on alarm and history data, please refer to the section 3.11.3 in Chapter 3.

3.8 Menu Bar and Toolbar (Element)

3.8.1 Create an Element

There are four methods for choosing elements when editing the screens:

1. Right-click the mouse in the work place and a shortcut menu will display as Fig. 3-8-1. The user can choose the desired elements by the mouse.

2. Choose Element command from menu bar as Fig. 3-8-2.

3. Choose Element icon from toolbar as Fig. 3-8-3.

4. Choose Element icon from Object dialog box as Fig. 3-8-4
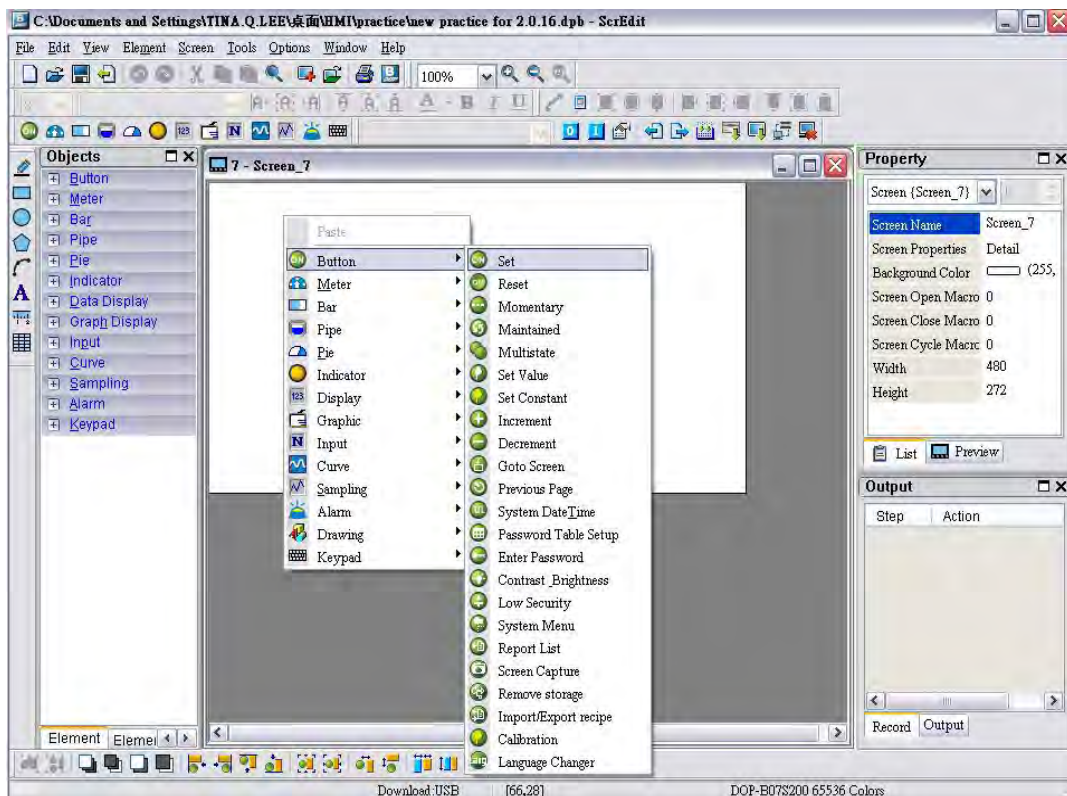
Fig. 3-8-1 Shortcut menu display
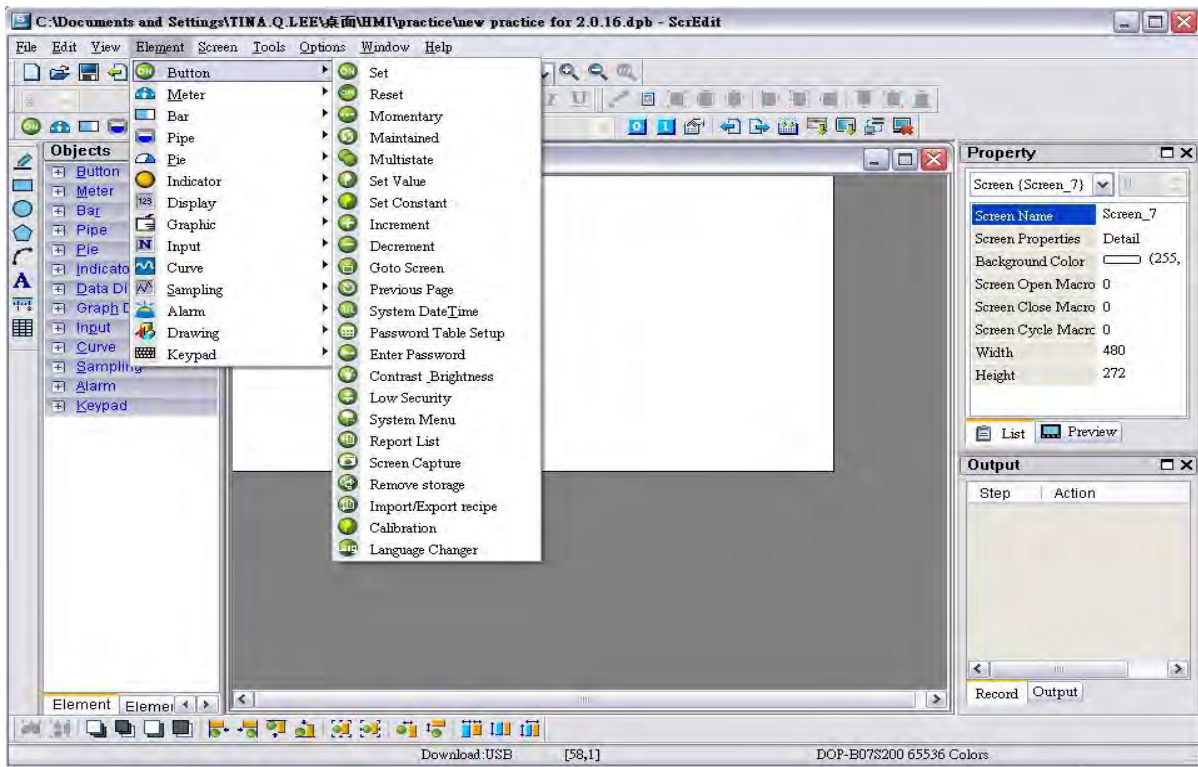
Fig. 3-8-2 Choose Element command from menu bar
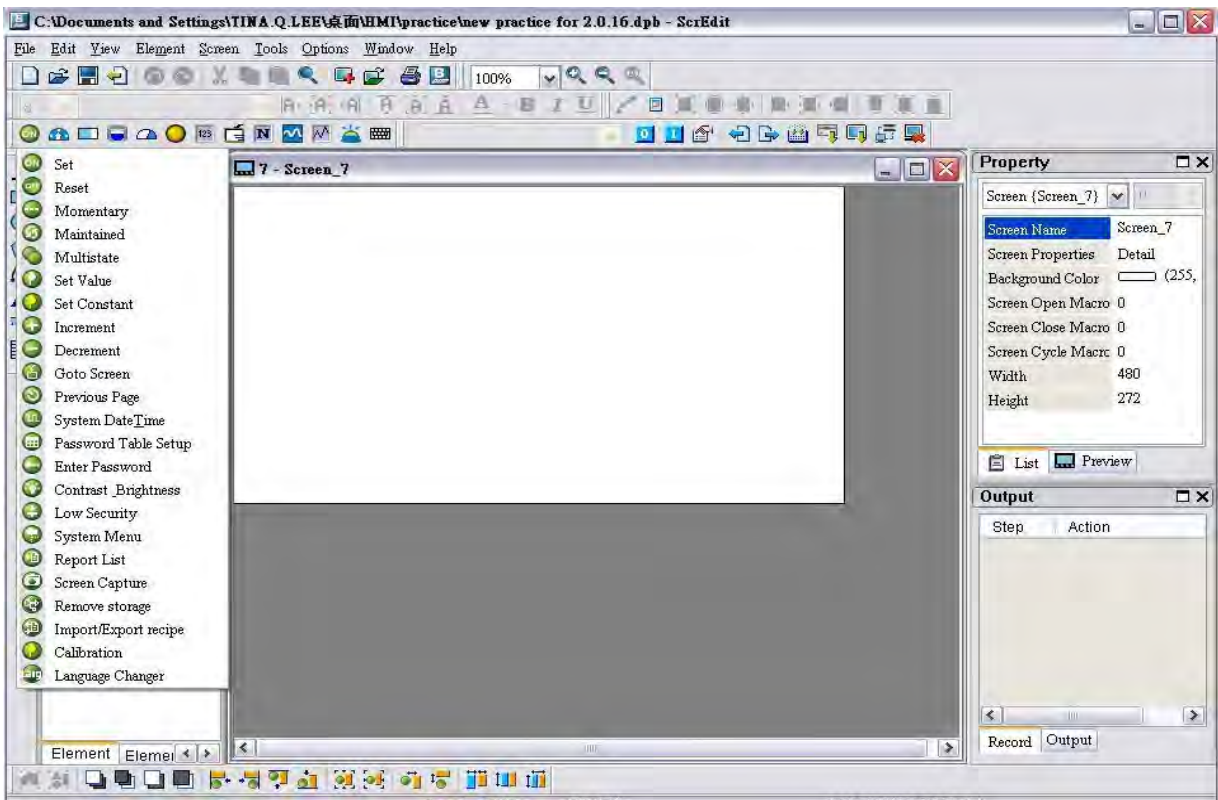
Fig. 3-8-3 Choose Element icon from toolbar
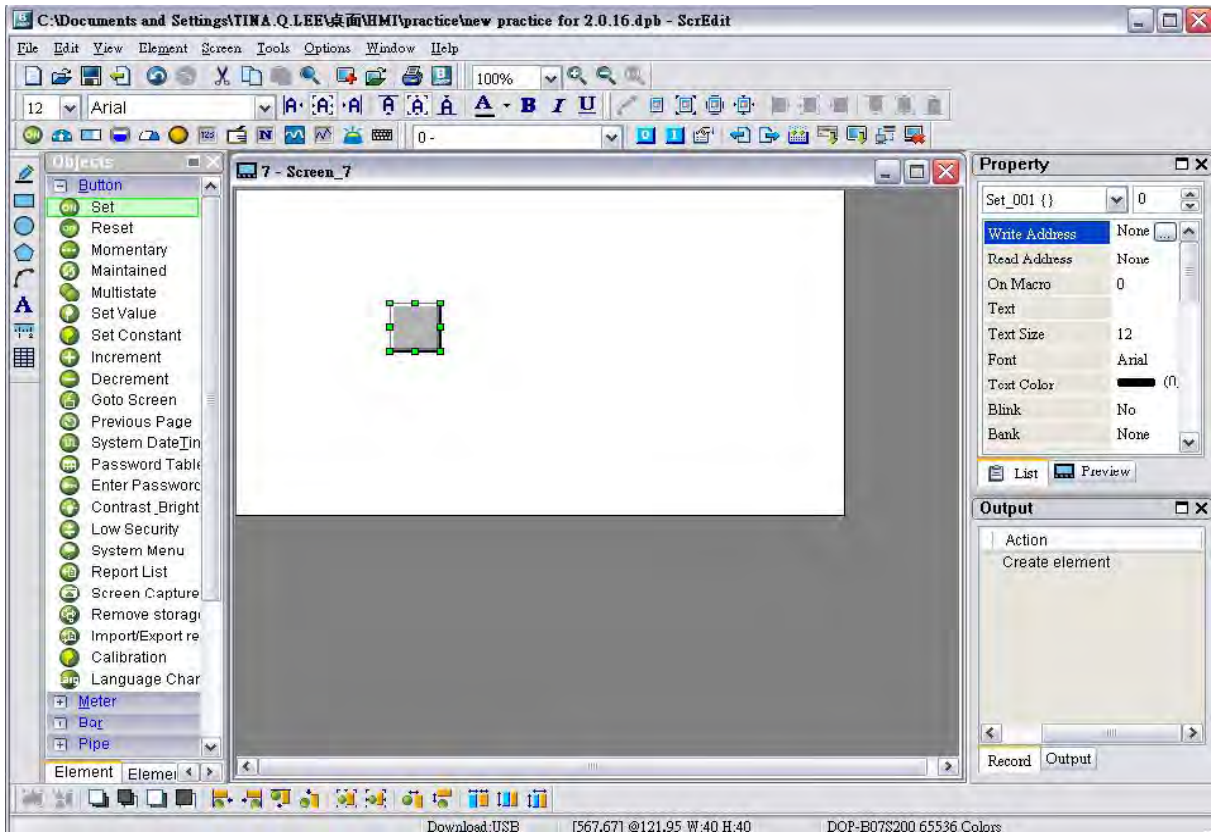
Fig. 3-8-4 Choose Element icon from Object dialog box

After selecting an element, left-click and drag the mouse on work place, and then a new element is created.
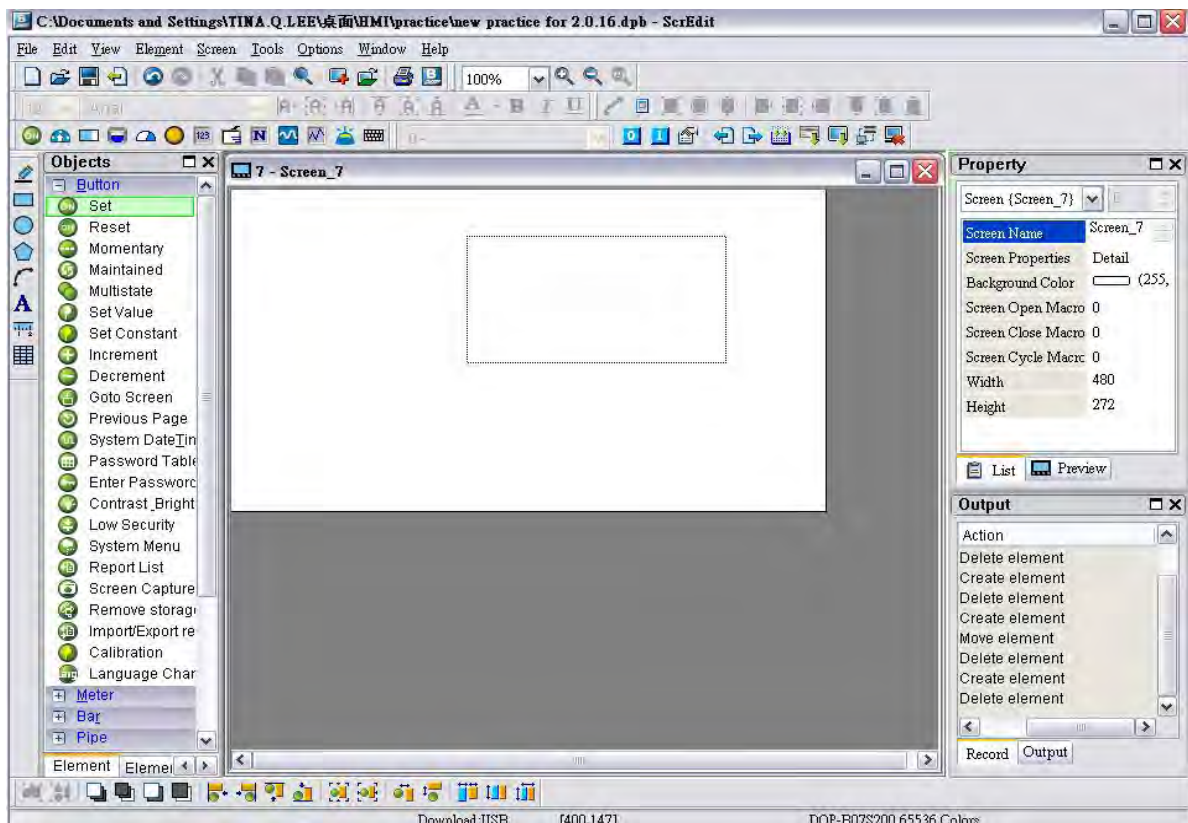
Fig. 3-8-5 Drag the mouse on work place to determine the element size
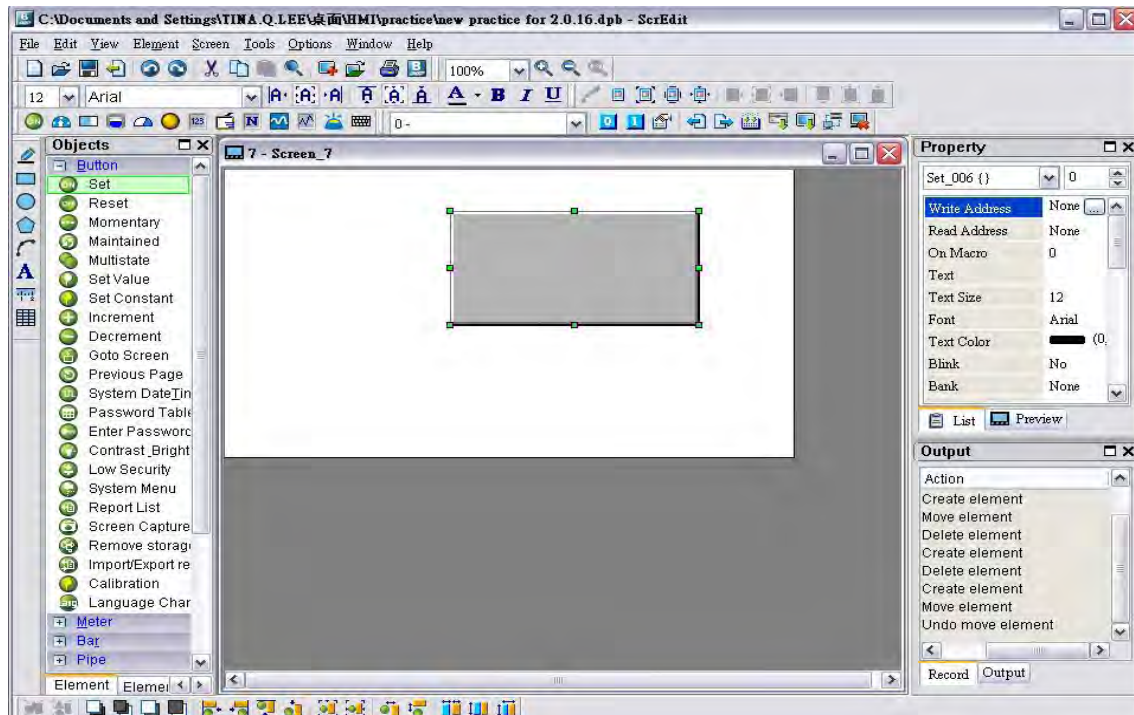
Fig. 3-8-6 Create an element

How to Create an Element

To create an element on HMI screen, first select a desired elemet from menu bar or toolbar and then click the starting point on the screen. While holding down the mouse button, move the mouse diagonally to the ending point of the element, then release the mouse button. The element will appear on the screen. Later set the property of the element (Fig. 3-8-7, Fig. 3-8-8, Fig. 3-8-9, Fig. 3-8-10).
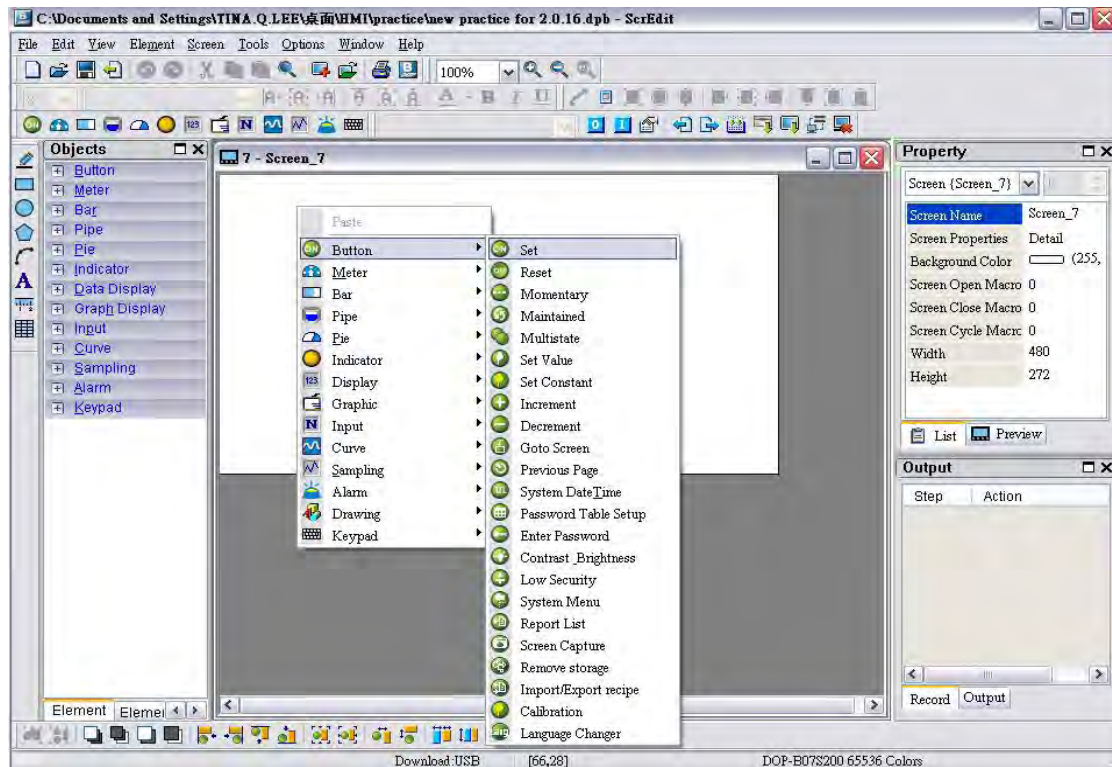
Fig. 3-8-7 Right-click the mouse to select a desired elemet
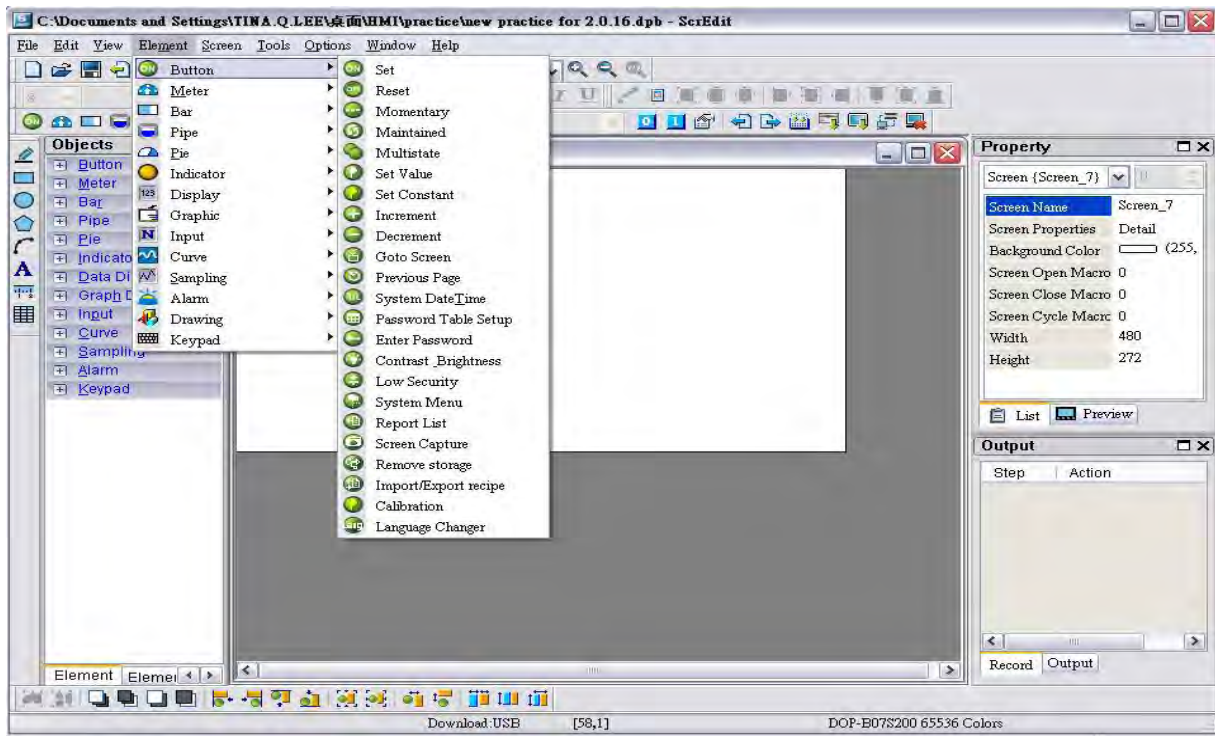
Fig. 3-8-8 Select a desired element from menu bar
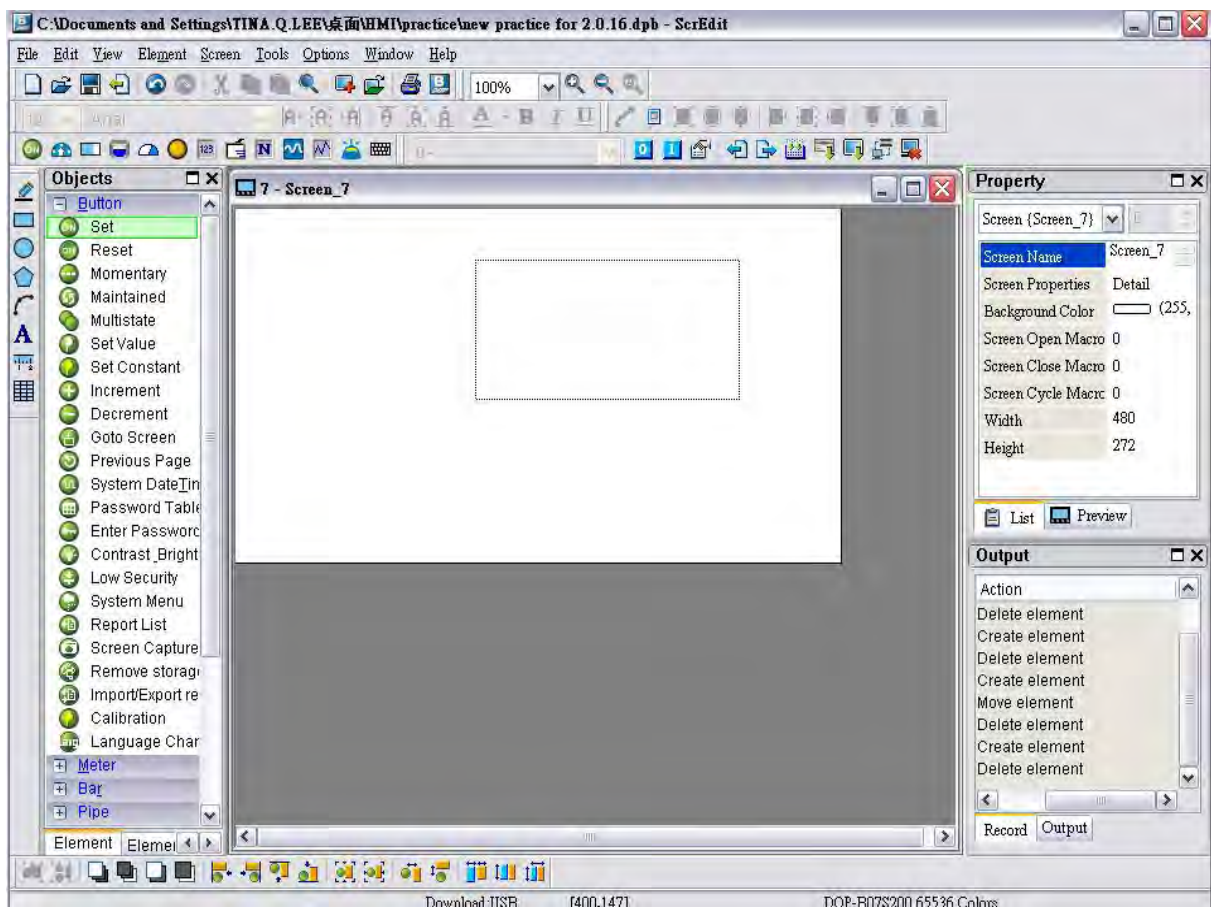
Fig. 3-8-9 Left-click and drag the mouse on work place then release the mouse button
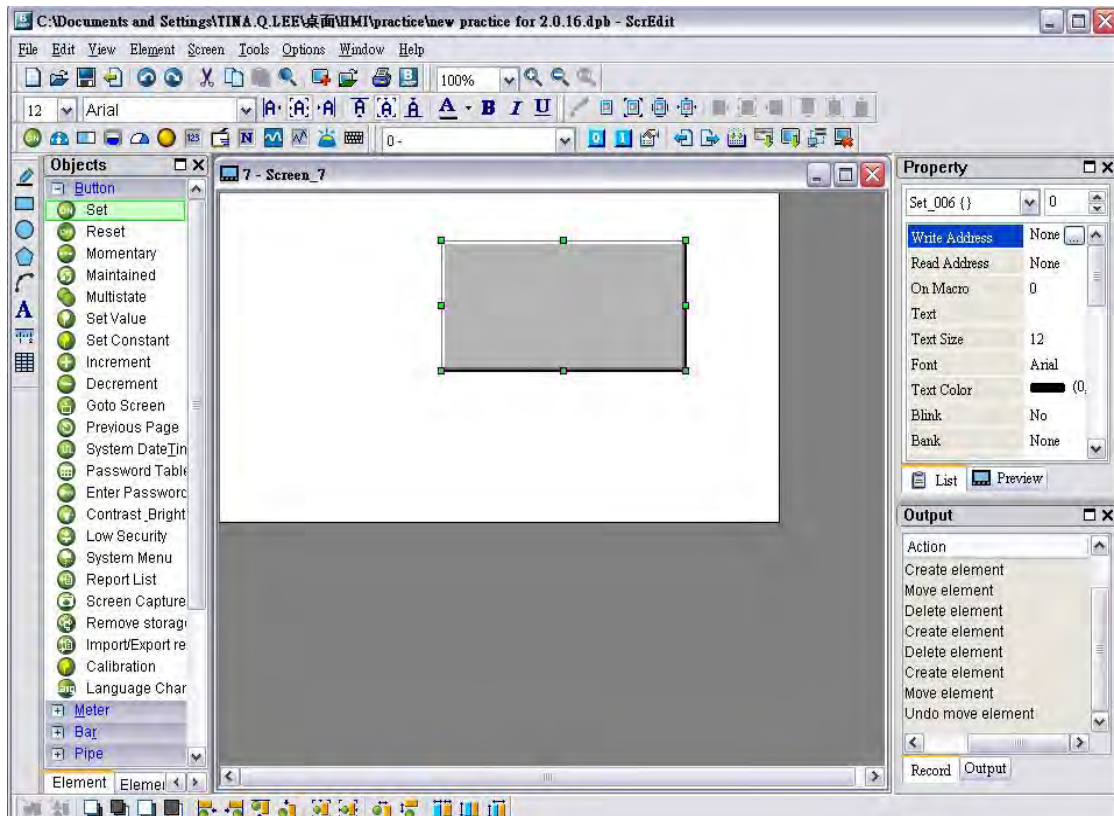
Fig. 3-8-10 An element is created

How to Move an Element

The user can use the mouse to move an element. Mouse operation is the same as working in Windows® operating system. When the mouse cursor changes to a four-arrow icon ✛, the user can left-click the mouse and move the element freely (Fig. 3-8-11).
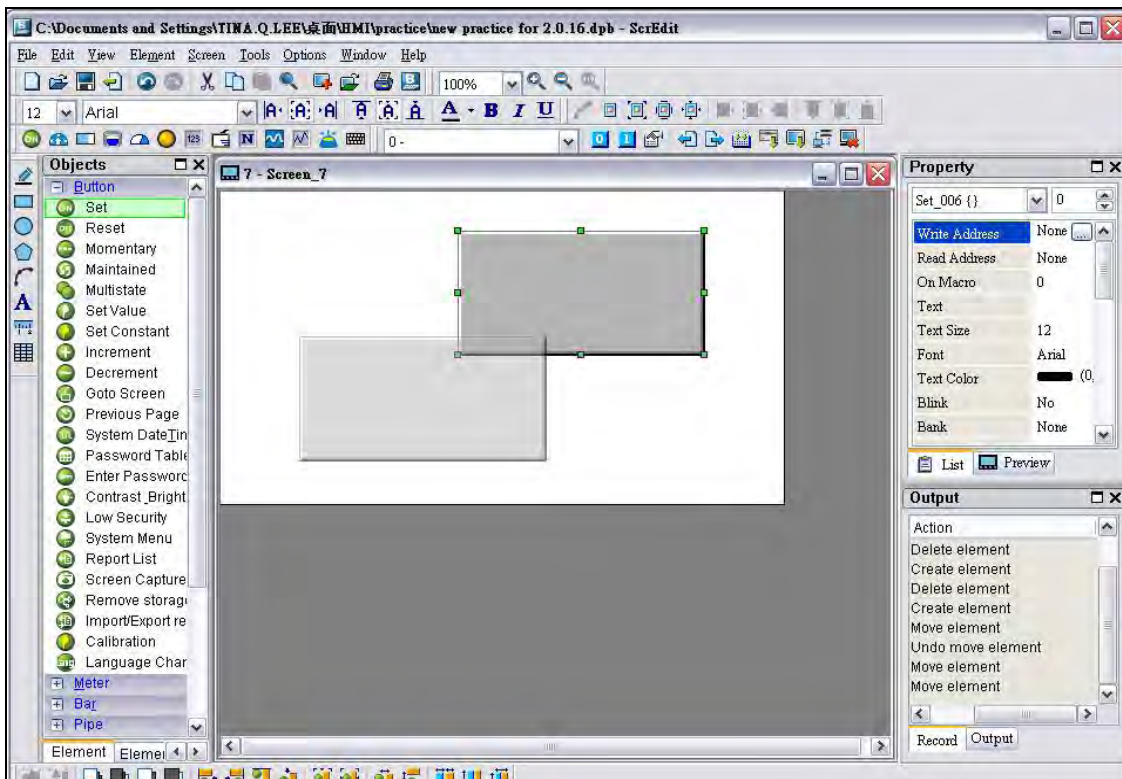
Fig. 3-8-11 Move an Element

How to Change Element Width

The user can use the mouse to modify the width of an element. When the mouse cursor changes to a two-arrow icon ←→, the user can left-click the mouse and modify the element width (Fig. 3-8-12).
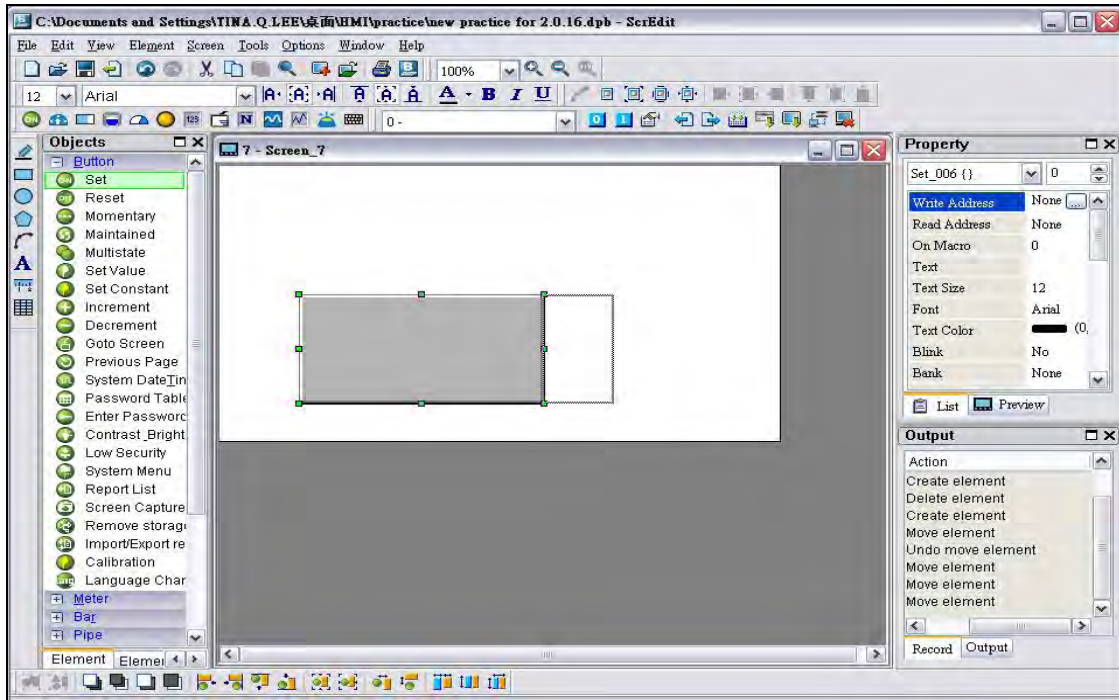
Fig. 3-8-12 Change Element Width

How to Change Element Height

The user can use the mouse to modify the height of an element. When the mouse cursor changes to a two-arrow icon ↕, the user can left-click the mouse and modify the element height (Fig. 3-8-13).
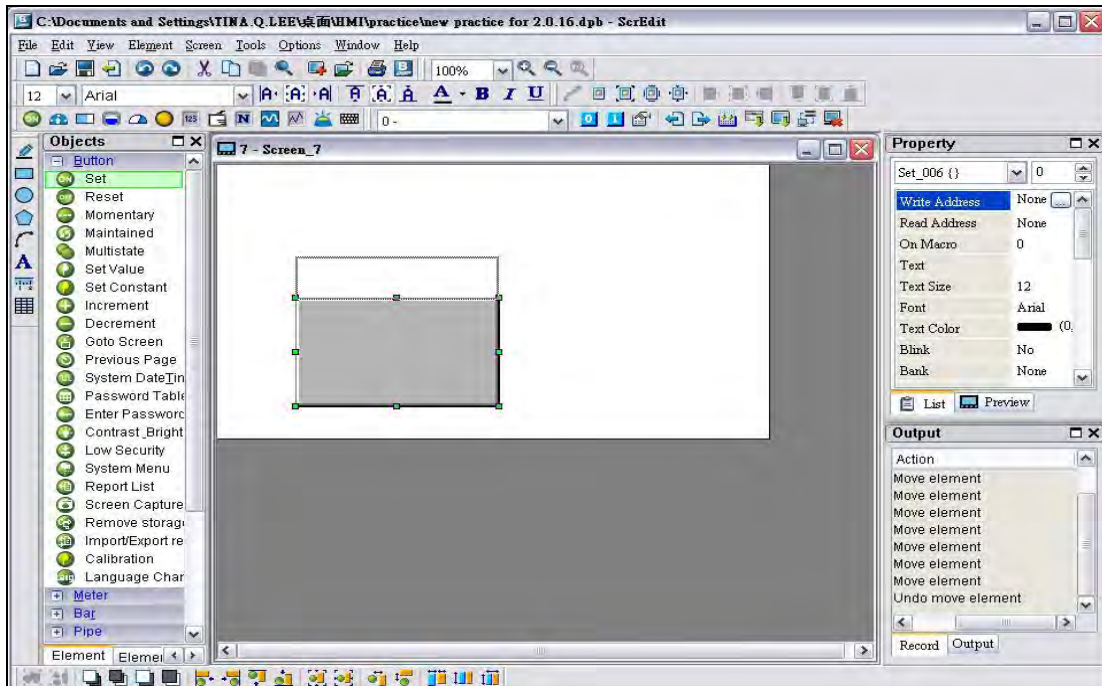
Fig. 3-8-13 Change Element Height

How to Change Element Width and Height Simultaneously

The user can use the mouse to modify the width and height of an element simultaneously. When the mouse cursor changes to a two-arrow icon ↗ or ↘, the user can left-click the mouse and modify the element width and height at the same time (Fig. 3-8-14).
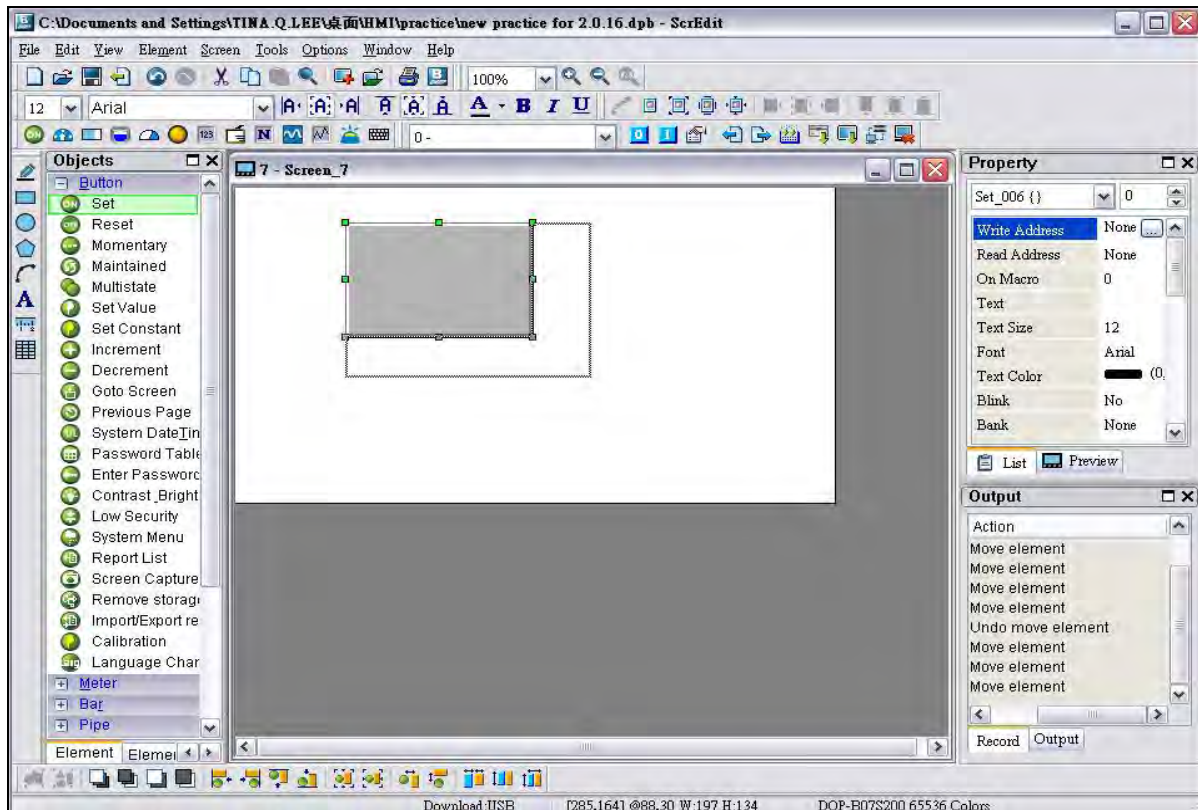
Fig. 3-8-14 Change Element Width and Height Simultaneously

How to Input Characters

The user can input a string of characters that Windows® operating system accepts in the property table. When the mouse cursor changes to an icon I , the user can start to input any characters that Windows® operating system accepts where the cursor $|$ blinks (Fig. 3-8-15).
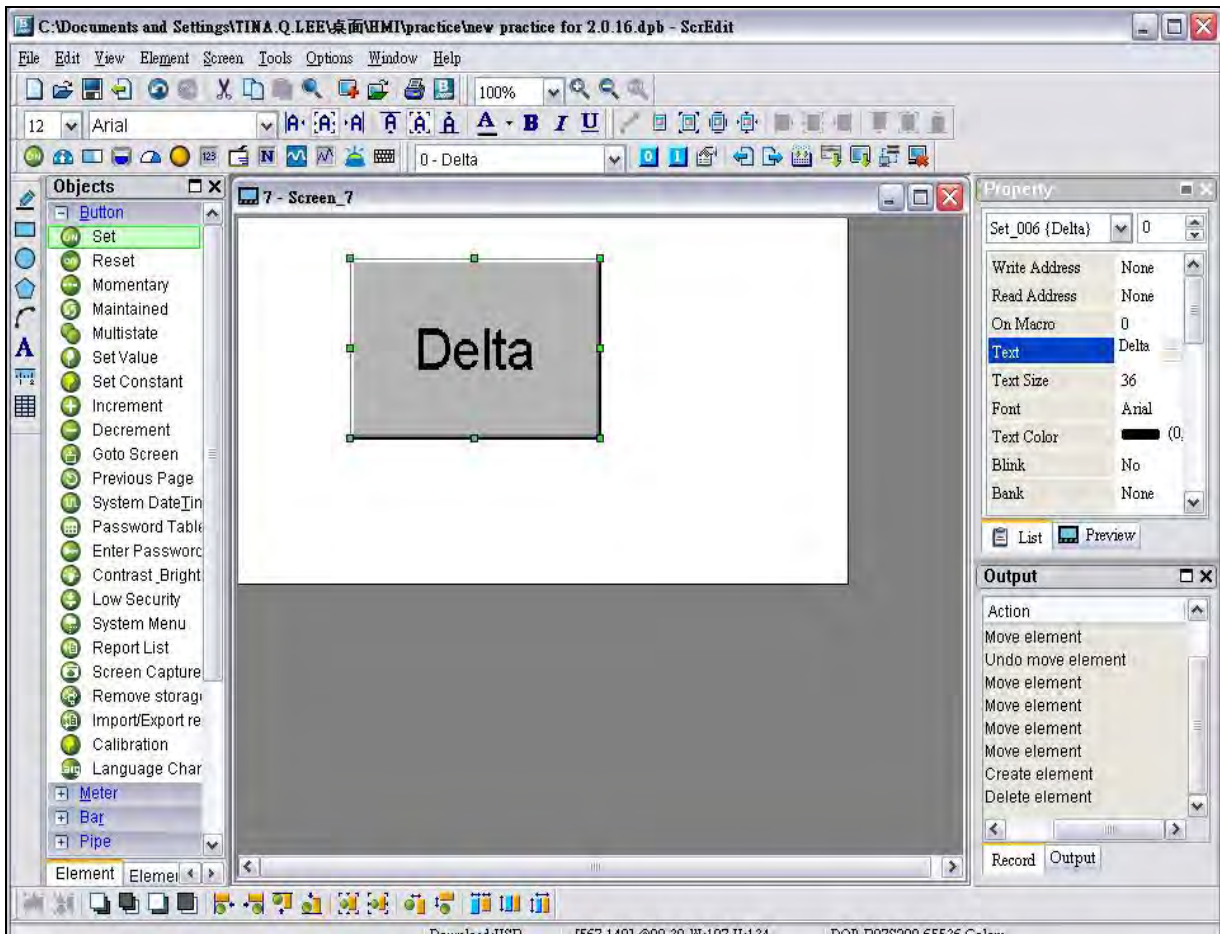
Fig. 3-8-15 Input Characters

Right-click the Mouse

The user can find that different menu will pop up when right-clicking the mouse (Fig. 3-8-16, Fig. 3-8-17, Fig. 3-8-18).
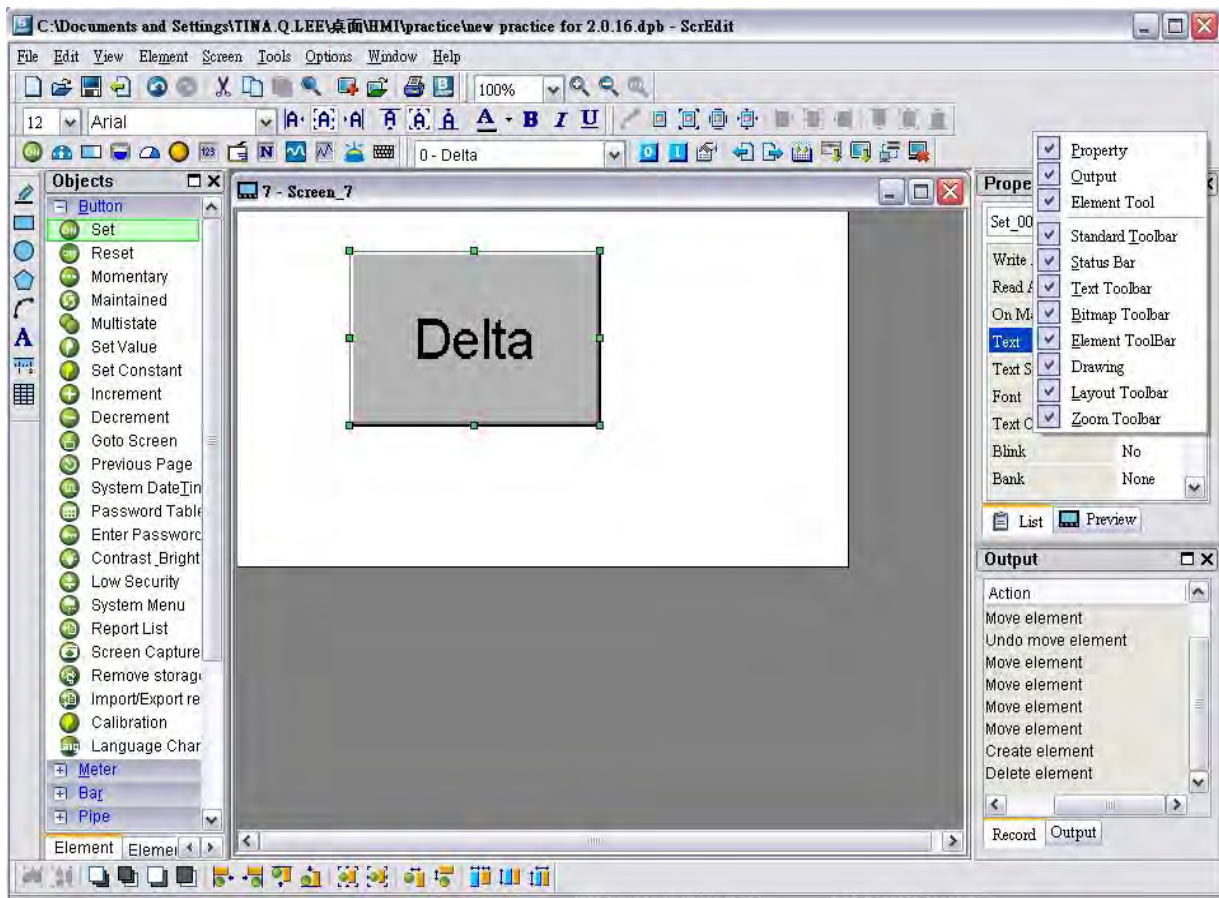
Fig. 3-8-16 Right-click the mouse on Toolbar - Toolbars docking window
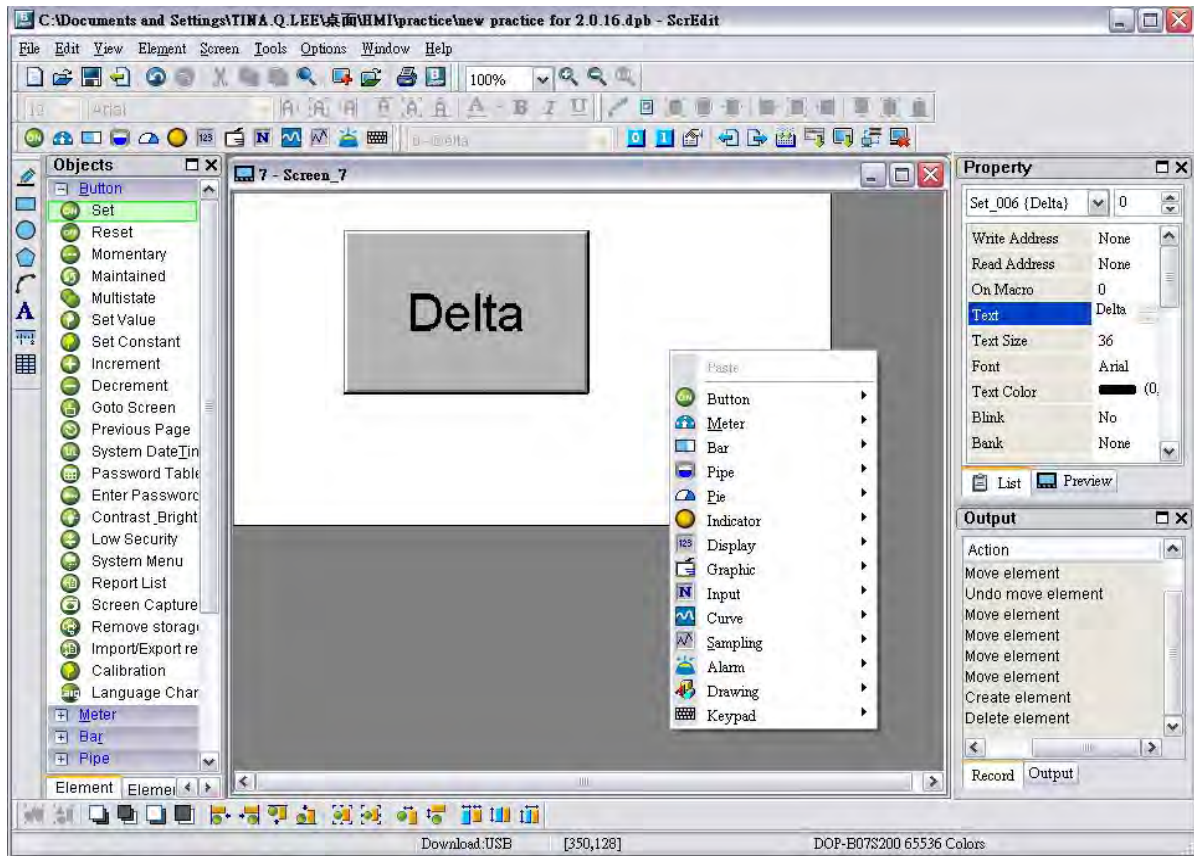
Fig. 3-8-17 Right-click the mouse on Work Place - Element Selection
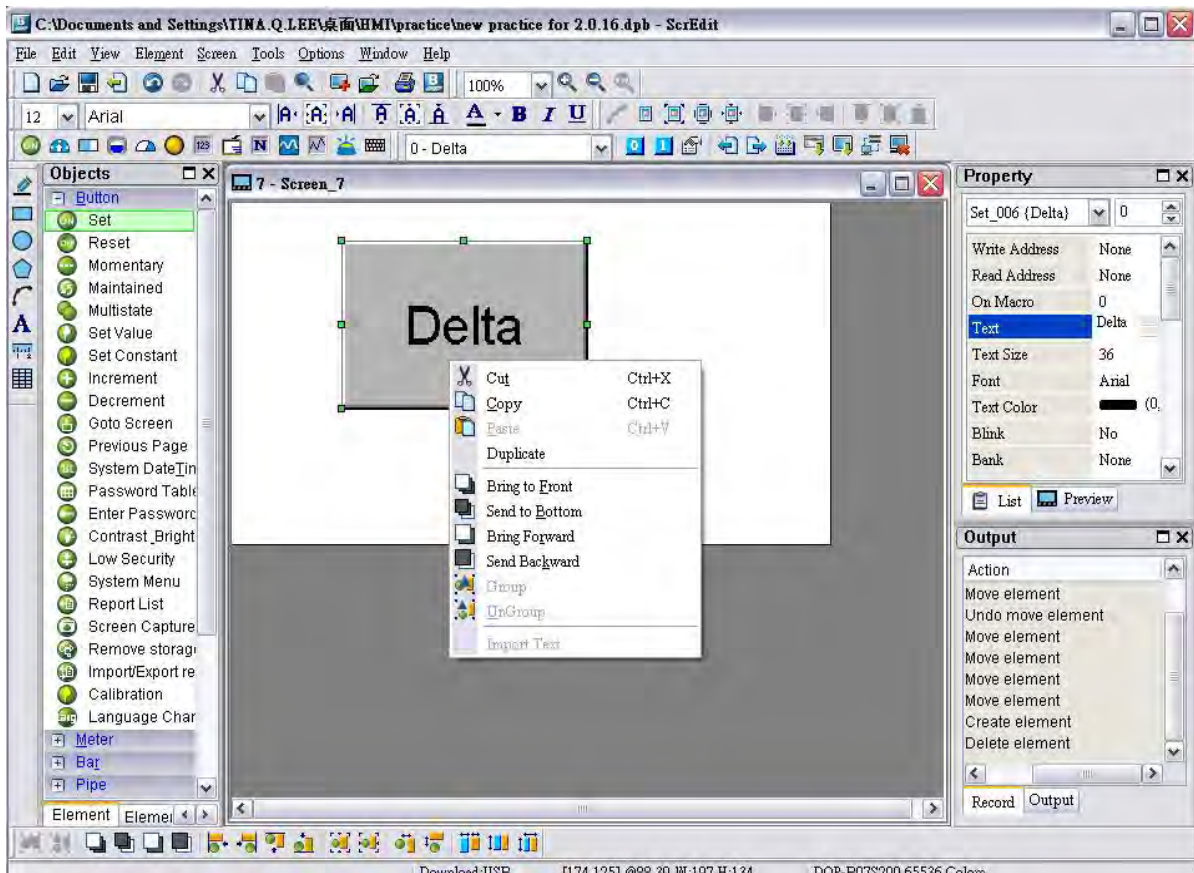
Fig. 3-8-18 Right-click the mouse on the element - Editing options (Layout Toolbar)

3.8.2   Button Elements

Fig. 3-8-19 Button Elements

Table 3-8-1 Button Elements

Button Type	Macro	Read	Write	Function
Set	ON	V	V	After pressing this button, the state of the setting address (Bit) will always be set to ON. If there is an ON Macro, it will be executed simultaneously.
Reset	OFF	V	V	After pressing this button, the state of the setting address (Bit) will always be set to OFF. If there is an OFF Macro, it will be executed simultaneously.
Maintained	ON OFF	V	V	After pressing this button, the state of the setting address (Bit) will be set to ON and be OFF when releasing the button. If there is an ON or OFF Macro, it will be executed simultaneously.

Button Type	Macro	Read	Write	Function
Momentary	ON OFF	V	V	After pressing this button, the state of the setting address (Bit) will be set to ON and execute ON Macro at the same time. When pressing the button again, the state of the setting address will be OFF and execute OFF Macro simultaneously.
Multistate	X	V	V	There are 1~256 user-defined multi-states for setting. The user can set the execution sequence to the next state or the previous state.
Set Value	X	X	V	After pressing this button, the "Numeric keypad" dialog box will pop up on HMI screen for the user to input the setting value directly. After inputting the setting value and pressing ENTER key, HMI will transmit the input value to the setting address.
Set Constant	X	X	V	After pressing this button, HMI will write the specific value into the setting address.
Increment	X	V	V	After pressing this button, HMI will add up the value contained within the setting address and the setting constant value, and store the addition result back into the setting address.
Decrement	X	V	V	After pressing this button, HMI will subtract the setting constant value from the value contained within the setting address, and store the subtraction result back to the setting address.
Goto Screen	X	X	X	After pressing this button, it will switch to the screen that the user designated.
Previous Page	X	X	X	After pressing this button, it will go back to the previous screen. For example, suppose that there are three screens, screen 1, screen 2 and screen 3. If the user has switched the screen from screen 1, screen 2 to screen 3 in order, when pressing "previous page" button on screen 3, HMI will switch to screen 2. When pressing "previous page" on screen 2 again, HMI will switch to screen 3.
System DateTime	O	X	X	After pressing this button, it will set the system date and time of HMI (year-month-day, hours:minutes:seconds).
Password Table Setup	O	X	X	After pressing this button, the user can set all the passwords of user security level.

Button Type	Macro	Read	Write	Function
Enter Password	O	X	X	After pressing this button, the user can enter the password.
Contrast Brightness	O	X	X	After pressing this button, the user can adjust the contrast brightness of HMI.
Low Security	O	X	X	Press this button one time to change the user security level to the lowest level (LEVEL 0).
System Menu	O	X	X	Press this button one time to switch to the HMI system menu.
Report List	O	X	X	After pressing this button, the screen data can be output to the designated location. The user can use is function to print out the screen data.
Screen Capture	O	X	X	After pressing this button, the screen data can be captured and output to USB disk. The file output designation is located on USB disk. If a USB disk is not connected, the captured data cannot be output by HMI successfully.
Remove Storage	O	X	X	The user can press this button to remove the USB disk safely.
Import/Export Recipe	O	X	X	Press this button to import or export the recipe data in CSV Excel format from or into external memory.
Calibration	O	X	X	The user can press this button to perform calibration function.
Language Changer	O	X	X	The user can press this button to change the display language.

3.8.2.1 Set / Reset / Maintained / Momentary Buttons

After pressing these buttons, HMI will transmit ON/OFF signal to PLC or the controller. There are four types of buttons: Set button, Reset button, Maintained and Momentary buttons. Please refer to the following table 3-8-2 for the property description of these four general buttons.
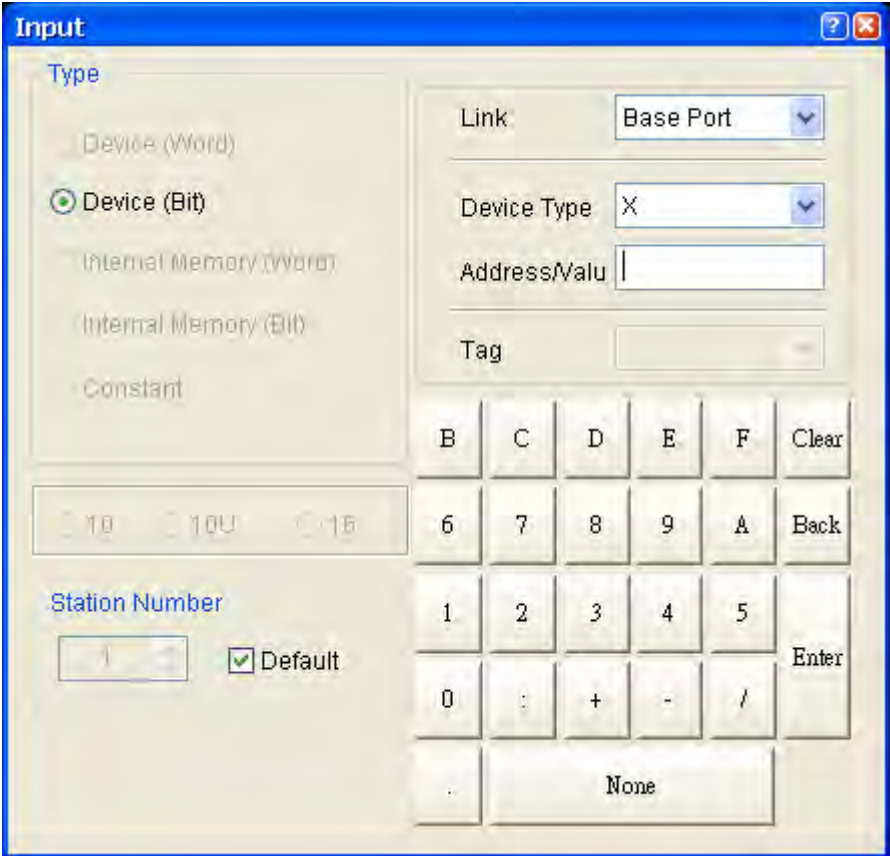
Table 3-8-2

Property Description of General Buttons	
Write Address Read Address	The address can be internal memory, internal parameter or the controller address. If only the write address is set, HMI will read the value of the write address automatically. Pressing ⋯ button next to the "Write Address" or "Read Address" the user will enter into the following "Input" dialog box and select the write address or the read address.

Property Description of General Buttons

<table>
<tr><td rowspan="2">Write Address

Read Address</td><td>

Input

Type

- Device (Word)
- ⊙ Device (Bit)
- Internal Memory (Word)
- Internal Memory (Bit)
- Constant

Link: Base Port

Device Type: X

Address/Valu:

Tag:

B	C	D	E	F	Clear
6	7	8	9	A	Back
1	2	3	4	5	Enter
0	:	+	-	/	
.	None				

○ 10   ○ 10U   ○ 16

Station Number

[1] ☑ Default

</td></tr>
<tr><td>

The link type can be Base Port (Controller) or Internal Memory or Internal Parameter. If the user is connecting to multi connections, the new connections will be added into the "Link" drop-down list. After selecting the Link option and Device Type, and correct address, press the Enter key, the corresponding numeric value will be recorded on the element that the user selected. Device types are described as follows:

$	Internal Memory	RCP	Recipe Register
$M	Non-volatile Internal Memory	RCPNO	Recipe Number Register
*$	Indirect Address Memory	RCPG	Recipe Group Number Register
		Other	Other device name supported by other brands of controller. Please refer to DOP Series HMI Connection Manual.

</td></tr>
</table>

Property Description of General Buttons	
Edit On/Off Macro	Edit On and Off Macro is available. When pressing the button, the state of the button will be ON and the commands of ON Macro will be executed simultaneously. When pressing the button again, the state of the button will be changed to OFF and the commands of OFF Macro will be executed simultaneously. However, if the button is changed via macro or external signal, not by pressing the button, ON and OFF macro will not be executed at the same time. For the Macro function, please refer to section 3-1-14 for more details.
Text Text Size Font Text Color	The user can set the text, text size, fon and text color provided by **Windows®** to determine the text display on the element. When the user presses ⬚ button next to "Font", the following "Font Detail Setting" dialog box will display. In "Font Detail Setting" dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in "Font Detail Setting" dialog box. Please refer to the example figure above.
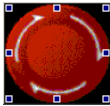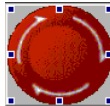
Property Description of General Buttons	
Blink	The element can blink to remind the user. The user can decide if the element blinks or not when the button is set to be ON or OFF state. The blinking color is the relative color of the button's state. For the method for switching ON or OFF state of the button, please refer to the figure shown below.
Bank (Picture Bank) Picture Name	The user can determine the picture of the element by clicking "Bank"(Picture Bank). (If "Bank" has been selected, the user can click "Picture Name" to determine the picture of the element). The following dialog box will display when the user selects the existing Picture Bank Name from the drop-down list.
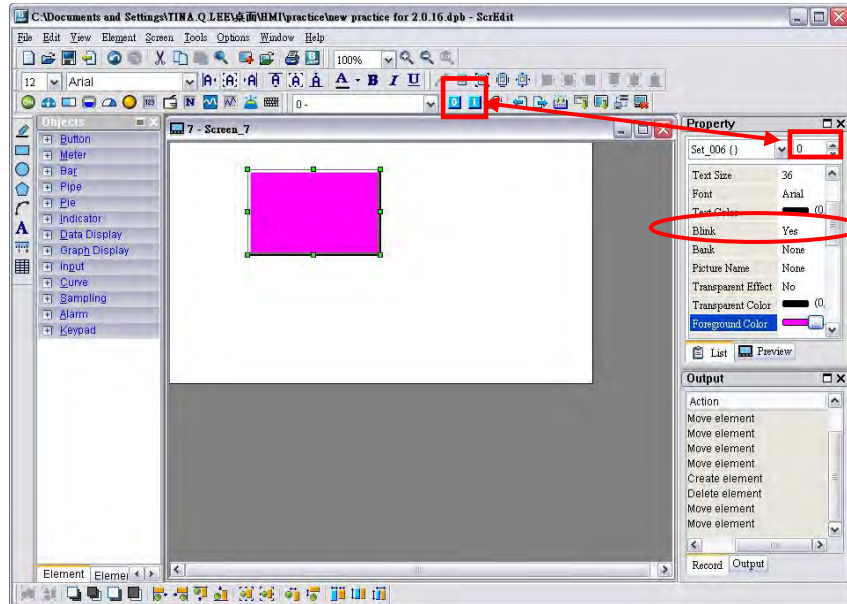
Property Description of General Buttons	
Bank Picture Name	In this dialog box, the user can double click the mouse to select an element. The user can also press Ctrl and left key of the mouse to import several pictures into the designated element at the same time. The selected pictures will be stored in each state of the element in order. If the number of the selected pictures is more than the number of the element state, only the number of the element state will be imported and the remainder will be ignored and not be imported into the element.
Transparent Effect Transparent Color	Use the sucking tool to remove the color of the element and determine the transparent color of the element. The user can click the sucking tool on toolbar or choose the transparent color by using the drop-down list. However, if the selected transparent color is too close to the element color itself, it will make no difference to the element. For example, RGB(0,0,0) is black color, but RGB(1,1,1) is also black color. When the element color is RGB(0,1,0) (it is also black color visually), even if the user selects RGB(0,0,0) as the transparent color, the element will look almost the same still. At this time, we recommend the user use the removal tool on toolbar and remove the color of the element directly. Please ensure to check whether the color of the selected element matches the color supported by HMI or not. This function is invalid and the color may not be removed successfully if the user applies this function on a 65536 colors element in a 256 colors editing environment. The effect on the element before and after this action happens is shown as the figures below.

The effect before this action happens	The effect after this action happens

Foreground Color Style	The user can specify the button style and foreground color as the figures below by using this option.

Standard	Raised	Round	Invisible

Property Description of General Buttons	
Function	The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: **Set** button, **Reset** button, **Momentary** button and **Maintained** button these four kinds of buttons.
Push Time (second)	Use this option to set the active time of the button. When this option is set, the button will be active after pressing the button longer than the setting time. Using this option can avoid malfunction. The range is within 0 ~ 10 seconds.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.2.2 Multistate Button

Property Description of Multistate Buttons	
Multistate buttons accept three kinds units, WORD, LSB and Bit and the state number will be different by the unit. There are 1-256 states if its unit is WORD, 16 states if its unit is LSB and 2 states if its unit is Bit. The unit of memory address will be different by the value unit. If the value unit is WORD or LSB, the unit of memory address will be WORD. If the value unit is Bit, the unit of memory address will be Bit. If it is needed to add or delete the total state numbers, add or delete the state numbers in only element property table.	
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Blink	The element can blink to remind the user (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.

Data Length	Bit	Multistate button can have two states.
	Word	Multistate button can have 256 states.
	LSB	Multistate button can have 16 states.

Data Format	Provide BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.
Add/Remove State	Used to set the state number of multistate button. There are 1-256 states can be set if its unit is WORD, 16 states can be set if its unit is LSB and 2 states can be set if its unit is Bit.
Sequence	Used to switch the sequence of multistate state (**Previous state/Next state**).

Property Description of Multistate Buttons	
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

Example of Multistate Buttons:

When the data length is LSB (D100.0 ~ D100.3):

S0=D100.0 ON   S1=D100.1 ON   S2=D100.2 ON   S3=D100.3 ON
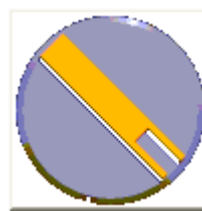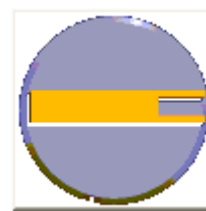
3.8.2.3 Set Value Button
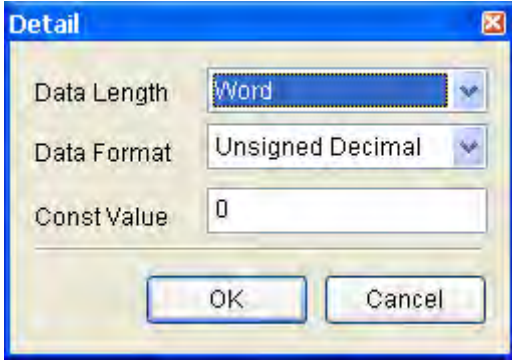
Property Description of Set Value Buttons	
After pressing this button on the screen, a system built-in numeric keypad (TEN-KEY) will show up and the user can use it to input the setting value directly. When ENTER key is pressed, HMI will send the input setting value to PLC corresponding register. The maximum and minimum input setting values are all user-defined. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.	
Write Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Range Setting	Data Length: There are 16bits Word and 32bits Double Word two options. Minimum/Maximum: The user can set the minimum and maximum of input setting value to determine the range of input setting value.

Property Description of Set Value Buttons		
Range Setting	Data Format	It provides different kinds of data format for different data length: **Word** / **Double Word** Word: 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary Double Word: 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary 7. Floating
	Integral Digits Fractional Digits	Determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as Floating.
		Press OK when you have input the minimum and maximum value, and then HMI will examine the value by referring to the selected data length, data format, and integral and fractional digits.
User Security Level		Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
Set Low Security		Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level		When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro		If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro		If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window		When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.

Property Description of Set Value Buttons	
Info the overrange message	When this option is set, an Error dialog box will appear to prompt the user the input value has exceeded the limit of the range setting.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.2.4 Set Constant Button

Property Description of Set Constant Buttons	
After pressing this button on the screen, HMI will send the specified constant value to PLC corresponding register. It has the same function as Set Value button. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.	
Write Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)

Property Description of Set Constant Buttons		
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.	
Detail Range		
	Data Length	There are 16bits Word and 32bits Double Word two options.
	Data Format	There are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Const Value	Used to enter the constant value that the user wants to write. After pressing OK button, HMI will examine the value by referring to the selected data length and data format.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.	
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).	
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.	
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.	

Property Description of Set Constant Buttons	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.2.5 Increment / Decrement

Property Description of Increment / Decrement Buttons	
After pressing this button on the screen, HMI will read the value from PLC (Controller) and add or subtract the set constant value. Then, write the result into PLC (Controller) corresponding register. If the addition or subtraction result exceeds the limit (minimum and maximum) set in HMI, HMI will save the limit value (minimum and maximum) into the PLC (Controller) corresponding address.	
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Function	The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: Increment button and Decrement button.
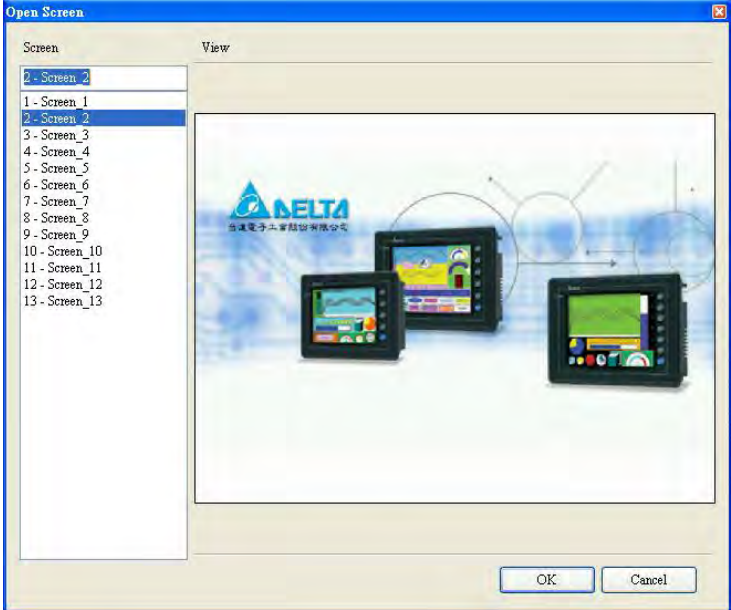
Property Description of Increment / Decrement Buttons	
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Range Setting	
	Data Length: There are 16bits Word and 32bits Double Word two options.
	Memory: There are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Inc/Dec: Used to set the increasing and decreasing value when pressing the Increment and Decrement button every time.
	Limit: Used to set the limit of increment and decrement values. Press the OK button, and HMI will examine the increment and decrement values entered and limit the value, if necessary, by referring to the selected data length and data format。
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.

Property Description of Increment / Decrement Buttons	
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.2.6 Goto Screen / Previous Page
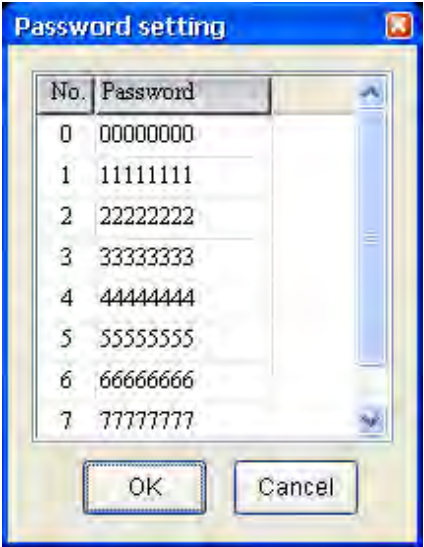
Property Description of Goto Screen / Previous Page Buttons	
Select one of the following to switch screens: 1. Press the Goto button to go the screen specified. 2. Press the Previous Page button to return to the previous screen.	
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Function	The user can modify the element characteristic directly without re-create a new element. The elements that their characteristics can be modified directly by using this option are: Goto button, and Previous page and Previous view.
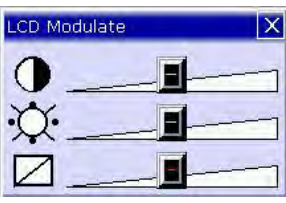
Property Description of Goto Screen / Previous Page Buttons		
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.	
Setting	This dialog box will pop up only when the button function is "Goto screen".	
	Close Sub-Screen	When this option is selected, it indicates that this Goto screen button is only valid in Sub-Screen. When pressing this button, the current (active) sub screen will be closed.
	User's security level will be set to Low Security after changing screen.	When this option is selected, it will force the current user's priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.	
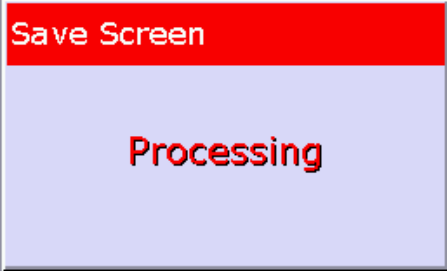
Property Description of Goto Screen / Previous Page Buttons	
Goto Screen	When clicking this option, the following dialog box will pop up: In this "Open Screen" dialog box, the user can select the desired screen from left side and the preview screen will display on the right side. After selecting the screen and pressing OK button, HMI will record the designated screen to this Goto button element.
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.2.7 System DateTime/Password Table Setup/Enter Password/Contrast Brightness/Low Security/System Menu/Report List/Screen Capture/Remove Storage/Import&Export Recipe/Calibration/Language Changer

Property Description of System Function Buttons		
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Function	System Date and Time	Use this option to set the system date and time of HMI. This function is the same as the function of pressing **SYS** button on HMI panel. The user only needs to press **SYS** button on HMI panel to enter HMI system setting screen and edit the date & time as the figure below.
	Password Table Setup	Password table can be completed via hardware and software settings. 1. Hardware Settings: After selecting this option, determine the open level according to the User Security Level in property table. After downloading screen data to HMI, if the user security level is lower than the setting level, this "Password Table" will not be opened and only the "Password Keypad" dialog box will display. Password Table can be opened or not depends on whether the user security is higher than the setting level or not.

Property Description of System Function Buttons		
Function	Password Table Setup	Even though the user can open Password Table, it only indicates that the user can change the password that level is lower than the users'. The user still cannot change or view those passwords that are higher than the users'. Please refer to the figures below.

Highest Priority

Password Level 4

2. Software Settings:

Select **Options > Password Setting**, the following dialog box will show up for the user to complete the password settings.

Property Description of System Function Buttons		
Function	Enter Password	This button provides HMI a password input interface. It will open the corresponding priority by the input password. The higher level the user inputs, the higher priority the user has. Please refer to the figure at right.
	Contrast Brightness	This button allows the user to adjust HMI LCD contrast and brightness settings. After pressing this button, the user will get the following pop-up window to adjust HMI LCD contrast and brightness settings. If the user presses "Set for default Contrast" button, it will set HMI LCD to the default settings.
	Low Security	Using this button can set the user priority to the lowest (Level 0). This option makes the user priority level become the lowest to protect control system parameter not to be modified when the user exits the different screens. It can also avoid the misoperation that may cause system error. (This function is also provided for Goto screen button.)
	System Menu	After pressing this button, HMI will be back to system menu screen. The user can return to operation screen just by activating "Run" function or startup HMI again.
	Report List	This button has many functions. It can be used flexibly depending on the properties of the "Report List" option (Please refer to page 2-124 in Chapter 2 and the following description of Report Device).

Property Description of System Function Buttons		
Function	Screen Capture	After pressing this button, the screen data can be captured and output to USB disk (BMP files). The file output designation is located on USB disk. If a USB disk is not connected, the captured data cannot be output by HMI successfully. The output BMP files will be stored in a folder named with the current date, e.g. 20090101 (it indicates the download date of that file is year 2009 January 1th). In the while, the following window will display on HMI screen. When this window shows up, it indicates that the downloading operation is processing and the screen data is written into USB disk. The BMP files will be saved in the folder in order. The first file will be named as 00001, the second file will be named as 00002 and so on. ※ Please note that only FAT32 formatted USB disk can be connected. Please refer to the description of section 2.1.
	Remove Storage	The user can press this button to remove the USB disk to ensure that the data is saved completely in USB disk. ※ Please note that only FAT32 formatted USB disk can be connected. Please refer to the description of section 2.1.
	Import/Export Recipe	The system is able to import and export 16bits Word and 32bits Double Word two kinds of data. Press this button is to import the recipe from external memory (USB disk) or export the data saved in HMI. ※ Please note that only FAT32 formatted USB disk can be connected. Please refer to the description of section 2.1.
	Calibration	Press this button to perform calibration function.
	Language Changer	Press this button to change the display language.

Property Description of System Function Buttons	
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Report Device	This option is provided in Report List button only. When the user selects a **Report List** button, the user can set this option in the property table. The Report Device window is shown as the figure above. The Report Device can be USB flash drive (USB disk), Printer and SD card.
	USB flash drive — Output the history records and alarm data to USB disk.
	Printer — HMI will check if Print Typesetting function is set or not first. If Print Typesetting function is set already, the screen data will be output to the printer directly. If HMI detects the Print Typesetting function is not set yet, the Hard Copy function will be enabled.
	SD — Output the history records and alarm data to SD card.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.

Property Description of System Function Buttons	
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Enable the confirm window	When this option is set, an Action Confirm dialog box will appear to prompt the user everytime when the button is pressed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.3   Meter Elements
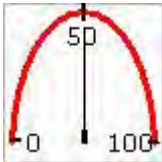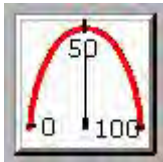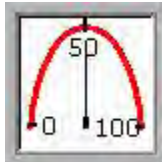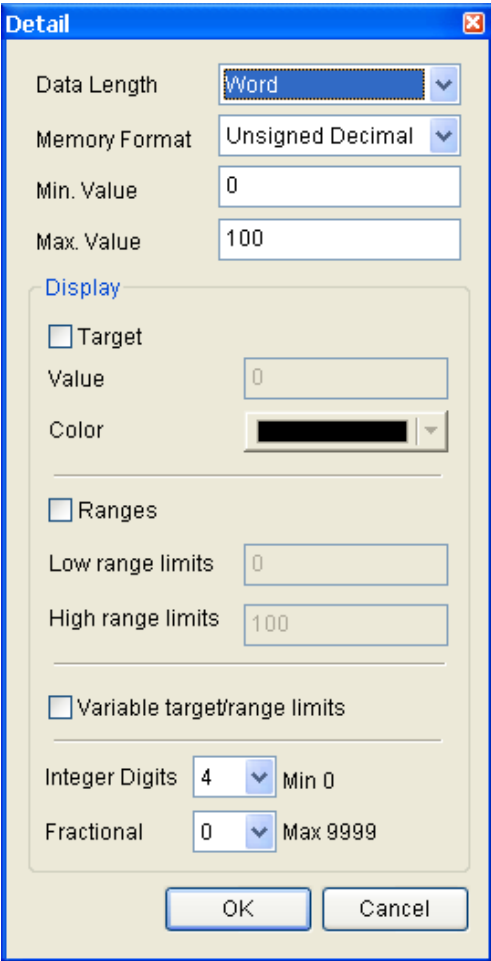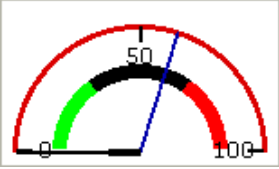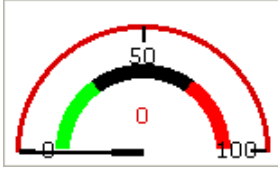
Fig. 3-8-20 Meter Elemets

Property Description of Meter Elments	
The user can set meter appearance in the property table, such as the style, the color (including border color, background color, stitch color, scale color) and the scale region number, etc. Also, the max. & min. value and high & low limit can be defined in Detail Setup dialog box. It can be used to calculate the specified address and measure if it exceeds the limit or not. The user can also use various colors to show clearly and this is convenience for the user to recognize.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Border Color	Set the border color of the element
Background Color	Set the background color of the element
Style	Standard Raised Sunken

Property Description of Meter Elements		
Setting	When the user has input the target value, minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.	
	Data Length	There are 16bits Word and 32bits Double Word two options.
	Memory Format	There are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal
	Min. Value Max. Value	Used to set the display minimum and maximum value.

Property Description of Meter Elements		
Setting	Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display just like the figure shown below: (Here we set the target value is 60 and its color is in blue.)
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format.
Low Region Color High Region Color	This option is available and displayed in the property table only when the "Ranges" option in the Detail Setup dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the meter element will be shown as the figure below:	
Stitch Color	Set the stitch color of the meter element.	
Grid Color	Set the grid color of the meter element.	
Scale Region Number	It is used to set the scale region number of the meter element. The user can use the up or down buttons to increase or decrease the scale region number. The setting rang is within 1 ~ 10.	
Rule Color	Set the rule color of the meter element.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.4 Bar Elements
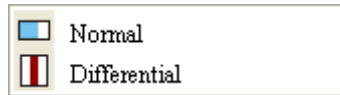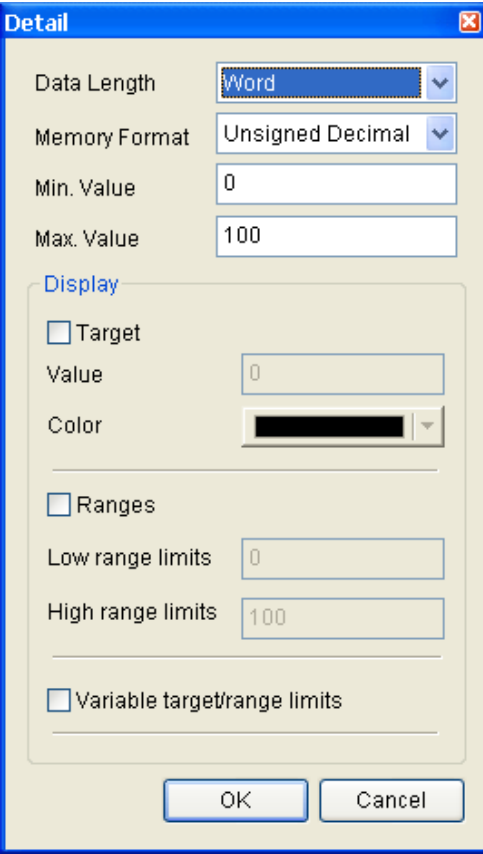
Fig. 3-8-21 Bar Elements

3.8.4.1 Normal
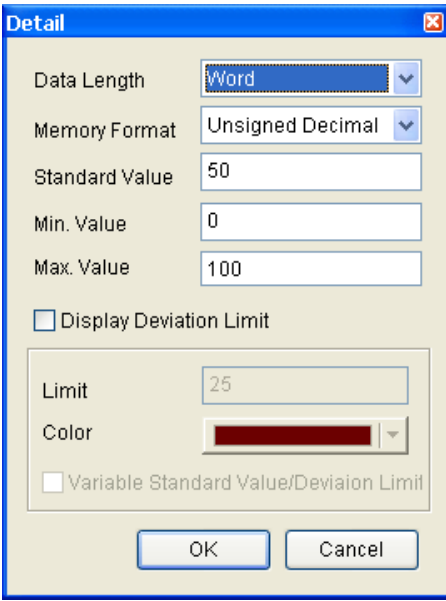
Property Description of Normal Bar Elements	
HMI reads the value of the corresponding PLC specific address (register) and converts the value to normal bar element and then displays it on the screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Border Color	Set the border color of the element
Foreground Color Background Color	It is used to set the foreground and background color of the normal bar element. For example, the foreground color of the following example bar element is green and its background color is yellow.
Style	Standard / Raised / Sunken
Display Format	Left — The display progressing direction is from right to the left.
	Right — The display progressing direction is from left to the right.
	Top — The display progressing direction is from bottom to the top.
	Bottom — The display progressing direction is from top to the bottom.

Property Description of Normal Bar Elements		
Setting	When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	
		Data Length: There are 16bits Word and 32bits Double Word two options. Memory Format: here are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex Min. Value / Max. Value: Used to set the display minimum and maximum value.
	Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display on the screen. HMI will refer to the minimum and maximum value and draw the proper reference line on the bar element just like the figure shown below: (Here we set the target value is 50 and its color is in red. The maximum and minimum value is 100 and 0 respectively.)
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.

Property Description of Normal Bar Elements	
Low Region Color High Region Color	This option is available and displayed in the property table only when the "Ranges" option in the Detail dialog box is selected. If the user sets the low limit value is 30 and the color of low limit region is in green, and then set the high limit value is 70 and the color of high limit region is in red, the bar element will be shown as the figures below (The min. & max. input value is 0 and 100 respectively.): When the value is 20 When the value is 50 When the value is 80
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.4.2 Differential

Property Description of Differential Bar Elements	
HMI reads the value of the corresponding PLC specific address (register). Subtract the setting standard value from this read value and the user has a differential value. Then, the user can convert the differential value to differential bar element and then display it on the screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Border Color	Set the border color of the element
Foreground Color Background Color	It is used to set the foreground and background color of the deviation bar element. For example, the foreground color of the following example bar element is green and its background color is yellow.

Property Description of Differential Bar Elements			
Style	**Standard** 	**Raised** 	**Sunken**
Display Format	Horizontal: The differential value display horizontally. Vertical: The differential value display vertically.		
Setting		Data Length: There are 16bits Word and 32bits Double Word two options. Memory Format: here are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex	
	Standard Value	Used to set the standard value for calculating differential value	
	Minimum Value Maximum Value	The minimum and maximum value in the differential bar element.	
	Display Deviation Limit	The differential limit and color can be set only when this option is selected. Also, the differential value will display in the designated color set by the user. If this option is not selected, the differential value will be displayed in the foreground color directly on the screen.	
	Variable Standard Value/Deviation Limit	When standard value and high limit of differential value is variable. The address of standard value is Read Address+1 and the address of differential limit value is Read Address+2.	
	When the user has input the standard value, minimum & maximum value and differential limit, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.		

Property Description of Differential Bar Elements	
Setting	For example, if the data length is set to Word, the data format is set to Unsigned Decimal, standard value is set to 50, minimum value is set to 0, maximum value is set to 100 and differential limit is set to 30, the differential bar element will be shown as the figures below: When the value is 10　　　When the value is 30 When the value is 70　　　When the value is 90
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.5   Pipe Elements
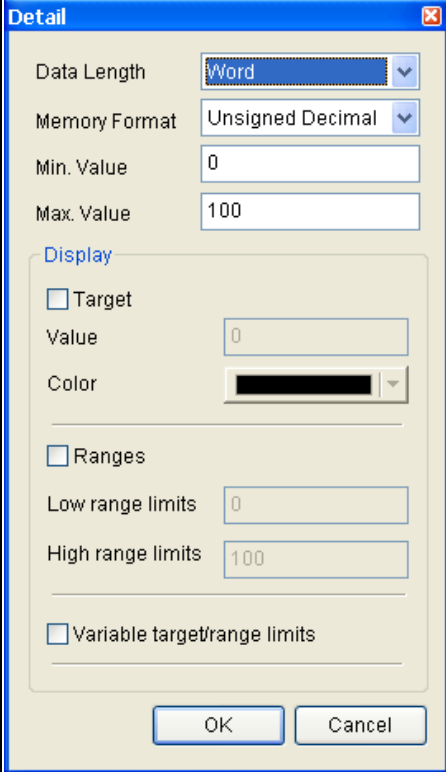
Fig. 3-8-22 Pipe Elements
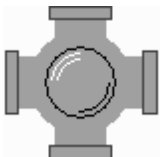
3.8.5.1 Pipe(1)/Pipe(2)

Property Description of Pipe (1) / Pipe (2) Elements	
HMI reads the value of the corresponding address (register). Then, convert the value to Pipe (1) / Pipe (2) element and then display it on the screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
WaterMark Color Inside Tube Color	Used to set the watermark color and inside tube color of Pipe (1) and Pipe (2) element Pipe (1) Pipe (2) The watermark color is in blue. The watermark color is in red. The inside tube color is in black. The inside tube color is in white.
Style	Standard Rotation 180
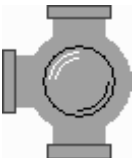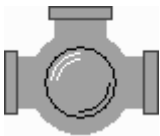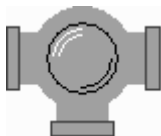
Property Description of Pipe (1) / Pipe (2) Elements		
Setting		Data Length: There are 16bits Word and 32bits Double Word two options. Memory Format: here are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex

	Minimum Value Maximum Value	Used to set the minimum and maximum capacity of the pipe element.
	Target Value Color	The user can decide if the target value displays or not by using this option.
	Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
	Variable target/range limits	When the target value and low & high limit is a variable value, the low limit address is <u>Read Address+1</u>, the high limit address is <u>Read Address+2</u> and the address of target value is <u>Read Address+3</u>.
	When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	

Property Description of Pipe (1) / Pipe (2) Elements	
Low Region Color High Region Color	This option is available and displayed in the property table only when the "Ranges" option in the Detail Setup dialog box is selected. If the user sets the low limit value is 20 and the color of low limit region is in green, and then set the high limit value is 80 and the color of high limit region is in red, the pipe element will be shown as the figures below: When the value is 20 When the value is 50 When the value is 80
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height
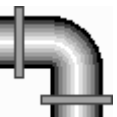
3.8.5.2 Pipe(3)

Property Description of Pipe (3) Element	
It is used to connect to water pipe element. Pipe (3) element is shown as the figure below: Pipe Gauge: Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.	
X	Used to set X coordinate
Y	Used to set Y coordinate
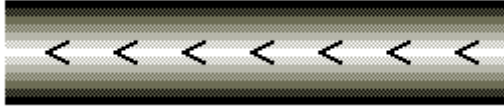
3.8.5.3 Pipe(4)

Property Description of Pipe (4) Element
It is used to connect to water pipe element. Pipe (4) element is shown as the figure below: Pipe Gauge: Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.

Style:			
Standard	Rotation 90	Rotation 180	Rotation 270

X	Used to set X coordinate
Y	Used to set Y coordinate

3.8.5.4 Pipe(5)

Property Description of Pipe (5) Element
It is used to connect to several pipes. Pipe (5) element is shown as the figure below: Pipe Gauge: Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.

Style:			
Standard	Rotation 90	Rotation 180	Rotation 270

X	Used to set X coordinate
Y	Used to set Y coordinate

3.8.5.5 Pipe(6)/Pipe(7)

Property Description of Pipe (6) / Pipe (7) Element	
Horizontal and vertical pipes. It is used to display the direction of water flow.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.) The user can decide if the read address is set or not. If the read address is set, the mobile cursor will display and move, just like the water flowing through the pipe. For example, suppose that the internal memory address of HMI is $0, when $0 is 1, and the mobile cursor color is set, the direction of water flow is from right to the left; when $0 is 2, the direction of water flow is from left to the right. When $0 is set to other value than 1 and 2, the water will not flow. In the same way, when the user select Pipe (7) element, for example, suppose that the internal memory address of HMI is $1, when $1 is 1, the direction of water flow is from bottom to the top; when $1 is 2, the direction of water flow is from top to the bottom. When $1 is set to other value than 1 and 2, the water will not flow.
Mobile Cursor Color	When there is any data occurred in the read address, the mobile cursor will display and move, just like the water flowing through the pipe. The user can use this option to set the mobile cursor color.
Pipe Gauge	Use this option to set the pipe gauge. The selectable range is from 1 ~ 5. The setting value 1 represents at least 13 pixels and the setting value 2 represents at least 26 pixels and vise versa.
X	Used to set X coordinate
Y	Used to set Y coordinate

3.8.6   Pie Elements
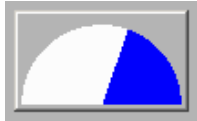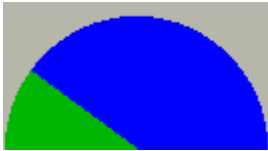
Fig. 3-8-23 Pie Elements

Property Description of Pie Elements	
There are four kinds of Pie elements for the user to select. The user can use the element property table to set the minimum & maximum value, low & high limit and element color, etc. It can be used to display the size of the set address and quickly judge its quantity by the increment and decrement measure of area. If the value of the address is less than the lower limit or higher than the high limit, it can change its color to show clearly for the user to recognize and give a warning to the user.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Border Color Foreground Color Background Color	It is used to set the border color, foreground and background color of the pie element. For example, the border color of the following example pie element is in blue, and the foreground color is set to green and its background color is in yellow.

Style	Standard	Raised	Sunken	Transparent

Property Description of Pie Elements	
Setting	**Data Length:** There are 16bits Word and 32bits Double Word two options. **Memory Format:** here are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex **Min. Value / Max. Value:** Used to set the display minimum and maximum value.

When the user has input the target value, low & high limit, and minimum & maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length and data format.	
Target Value Color	The user can decide if the target value display or not by using this option. If this option is set, the target value and its color set by the user will display on the screen. HMI will refer to the minimum and maximum value and draw the proper reference line on the bar element just like the figure shown below: (Here we set the target value is 80 and its color is in yellow.)
Ranges (Enable range setting)	Please refer to the description of Low & High Region Color.
Variable target /range limits	When the target value and low & high limit is a variable value, the low limit address is Read Address+1, the high limit address is Read Address+2 and the address of target value is Read Address+3.

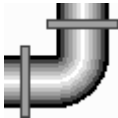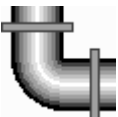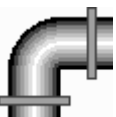| Property Description of Pie Elements	
Low Region Color High Region Color	This option is available and displayed in the property table only when the "Ranges" option in the Detail Setup dialog box is selected. If the user sets the low limit value is 20 and the color of low limit region is in green, and then set the high limit value is 80 and the color of high limit region is in red, the pie element will be shown as the figures below (The min. & max. input value is 0 and 100 respectively.): When the value is 20 When the value is 50 When the value is 80
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.7   Indicator Elements

Fig. 3-8-24 Indicator Elements
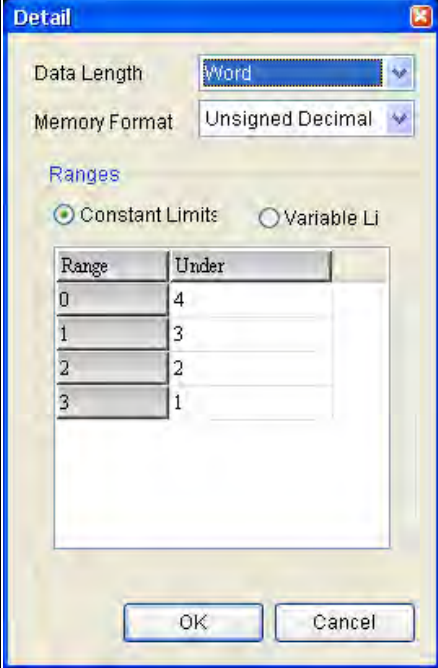
3.8.7.1 Multistate Indicator

Property Description of Multistate Indicator Element	
Multistate indicator provides a method to indicate the state of some specific address. It will send state changes message to user no matter it is Bit, LSB or WORD. If this address is an significant indicator or important message or important alarm, it can be used to inform the user immediately by changing state display method or different text setting. Or let the user know more information according to the changes of different states to make the user can also handle the corresponding situation at the first time.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.) When the read address is set to the contact of the controller, i.e. PLC, the multistate indicator will change depending on the state (ON or OFF) of PLC corresponding contact. For example, the user can set that when the value is 1, the indicator will display the text "Start" and when the value is 0, the indicator will display the text "Stop". The user also can add a picture into each state of the multistate indicator and then the corresponding picture will show when each state is activated.
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Blink	The element can blink to remind the user. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)

Property Description of Multistate Indicator Element		
Data Length	Bit	Indicator element can have two states.
	Word	Indicator element can have 256 states.
	LSB	Indicator element can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to display the read memory content.	
Add/Remove State	It is used to set the state numbers of multistate indicator. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
Invisible Address	When this option is set to On, this button element will be invisible.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.7.2 Range Indicator

Property Description of Range Indicator Element	
Range indicator provides a method to indicate the state of some specific address. HMI reads the value of the corresponding address (register) and uses this read value to correspond with the corresponding range indicator element and its setting value, and then display the corresponding state on HMI screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.) The user also can add a picture into each state of the range indicator and then the corresponding picture will show when each state is activated.
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Blink	The element can blink to remind the user. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)

Property Description of Range Indicator Element	
Foreground Color Style	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Add/Remove State	It is used to set the state numbers of range indicator. 1~256 states can be set.
Detail	Data Length: There are 16bits Word and 32bits Double Word two options. Memory Format: here are following data format provided: Word/Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal

| | Range | Constant Limits | Selecting this option can use default 5 states to set the range. If there is n numbers of states, it indicates that there is Range n-1 for the user to use. The user can specify the foreground color of state 0, 1, 2, 3, and 4 as red, green, blue, yellow and purple respectively.

Range 0	Range 1	Range 2	Range 3
100	50	33	1

When the value of read address is higher than 100, the range indicator will display in red. When the value of the read address is higher than 50, the range indicator will display in green, and vise versa. |
| | | Variable Limits | When this option is selected, there is Range n-1 for the user to use. n represents the total state numbers and n-1 represents the total range numbers. For example, if the read address is $0, and the total state number of the element is 5, it indicates that there is Range 0~4 for the user to use. Then, the lower limit value of Range 0 is $1, the lower limit value of Range 1 is $2 and vise versa. |

Property Description of Range Indicator Element	
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.7.3 Simple Indicator

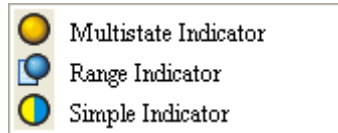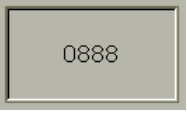| Property Description of Simple Indicator Element	
For the user's convenience, simple indicator provides two states (ON/OFF) to let the user change the XOR color of the base picture quickly.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
XOR Color	Used to set XOR color of base picture.
Redraw	When this function is enabled, this simple indicator element can be overlapped and placed on the other dynamic elements to read and display the data of the dynamic element. When this function is disabled, the data of the dynamic element can not be read and displayed.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8   Data Display Elements

Fig. 3-8-25 Data Display Elements

3.8.8.1 Numeric Display

Property Description of Numeric Display Element	
This element will read the value of the setting address and display the read value immediately in the format set by the user.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	Border Color option can be set only when the style of the numeric display element is selected as Raised and Sunken. The style of the element below is selected as "Sunken". Its background color is set to green and its border color is set to red. (If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)
Style	Standard	Raised	Sunken	Transparent
Leading Zero	The following figures show the difference if the user selects the Leading Zero option. (Please note that the integral digit is set to 4 digits.) (If YES is selected) (If NO is selected)

		Property Description of Numeric Display Element
Setting		
	Date Length	There are 16bits Word and 32bits Double Word two options.
	Data Format	There are following data format provided: Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary 7. Floating
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number (Fractional Digits) here is not a real decimal value. It is only the display format. The digit number will be a real decimal only when the data format is selected as "Floating".
	Gain **(a)** Offset **(b)** Round off	The user can use y = (a) x (read address value) + (b) this equation to determine the display numeric value (y). For example, if Gain value (a) is 2 and Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9. If Gain and Offset value is a decimal, please set the data format as "Floating". If Round off option is selected, after the operation of the equation above, all numeric values can be rounded off and display on the screen.

Property Description of Numeric Display Element	
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. <u>Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary.</u> The user can set the Fast Refresh Rate by clicking **Screen > Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8.2 Character Display

Property Description of Character Display Element	
The user can use this element to read the value of the specific address, convert them to text or character and display on the screen. The read value must be in ASCII format or the user cannot see the display text or character. (The max. string length is 28words.)	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)

Property Description of Character Display Element	
String Length	The range is with 1 ~ 28 words. Set the read address as Internal Memory 0, i.e. $0, set the string length to 6, and create three Numeric Entry elements. Then, set the data format of these three Numeric Entry elements as hexadecimal and enter the value as follows: $0 = 4241(Hex) $1 = 4443(Hex) $2 = 4645(Hex) Then, the above screen will display. Please note that character display element reads the Byte value, and the data length of the internal memory $ address is Word, which is composed of two Bytes. Therefore, one Word can represent two Bytes. However, as the high byte and low byte of the value that read by the character display element will be exchanged, when reading the Internal Memory $0 (=4241 (Hex)), the real display character will become "AB" and vise versa. Please refer to the following table.

ASCII Code / Hex Cross Reference	
ASCII	**Hex**
A	41
B	42
C	43
D	44
E	45
F	46

Property Description of Character Display Element	
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen > Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8.3 Date Display

Property Description of Date Display Element	
Display HMI system date. There are several date formats selectable for the user to use.	
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Date Format	Provide MM/DD/YY, DD/MM/YY, DD.MM.YY three kinds of formats.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8.4 Time Display

Property Description of Time Display Element	
Display HMI system time. There are several time formats selectable for the user to use.	
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Time Format	Provide HH:MM:SS, HH:MM two kinds of formats.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8.5 Day-of-week Display

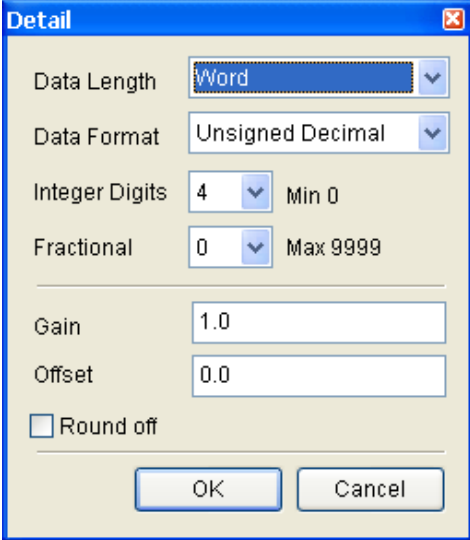| Property Description of Day-of-week Display Element	
Display the day (Sunday ~ Monday) of the week. The state default setting of the Day-of-week display element is set to 7. It indicates that there are 7 states for this element. The user can define the display text, font and color for each day directly in the property table.	
Text / Text Size Font / Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element. (Please refer to Table 3.2.2 Property Description of General Buttons.)
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.8.6 Prestored Message

Property Description of Prestored Message Element		
Display the state content of PLC corresponding contact or register directly. The user can set state number and text for each state.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)	
Data Length	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of prestored message element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.8.7 Moving Sign

Property Description of Moving Sign Element	
Moving sign is a sign that uses movement, lighting, or special display to depict and display the state content of the corresponding contact or register. The user can determine the display of the moving sign by the settings of the direction, moving points, and interval (ms) in the property table.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)

Property Description of Moving Sign Element	
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.)
Border Color Background Color	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)
Style	(Please refer to Table 3.8.2 Property Description of Numeric Display Element.)

Property Description of Moving Sign Element		
Data Length	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of moving sign element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
Direction	Left	The display progressing direction is from right to the left.
	Right	The display progressing direction is from left to the right.
	Top	The display progressing direction is from bottom to the top.
	Bottom	The display progressing direction is from top to the bottom.
Moving Points	It is used to set the movement of the moving sign. The unit is Pixel and the range is within 1 ~ 50 Pixels.	
Interval(ms)	It is used to set the interval time between two movements. The unit is ms and the range is within 50 ~ 3000 ms.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.9   Graph Display Elements
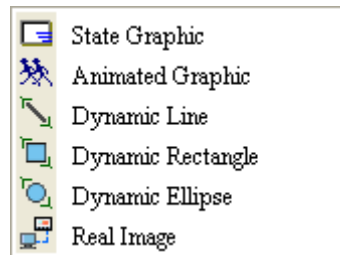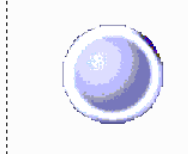
Fig. 3-8-26 Graph Display Elements

3.8.9.1 State Graphic

Property Description of Static Graphic Element		
When HMI is connected to the controller, the user can create static graphic elements to read the value of several read addresses controlled by the controller. The read value of each state can be converted and transmitted to the static graphic elements and display respectively on the HMI screen.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Foreground Color	(Please refer to Table 3.2.2 Property Description of Numeric Display Elements.)	
Data Length	Bit	It can have two states.
	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of static graphic element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	

Property Description of Static Graphic Element		
Auto Change	No	When this option is selected, the value of the read address will be regarded as the state number. It means that the state number is determined by the value of the read address. For example, if the value of the read address $0 is 0, it will switch to 0th state; if the value of the read address $0 is 5, it will switch to 5th state.
	Yes	When this option is selected and the value of the read address is a non-zero value, the static graphic element will change automatically. For example, if the value of the read address $0 is 1 and higher (a non-zero value), the element will change the picture automatically according to the change time that the user set. When the value of the read address $0 is set to 0, the static graphic element will be back to the initial state and will not change the picture automatically.
	Variation	When this option is selected, the property of the Read Address will be the condition of changing element picture. The element will change the picture automatically according to Read Address+1. For example, if $0 is set to display the address of the element and $1 is set to change the element picture, when the value of the read address $1 is 0, the user needs to use the read address $0 to switch the state of the static graphic element. At this time, the static graphic element will not change automatically, like when "No" option is selected. When $1 is 1 and higher (a non-zero value), the static graphic element will change the picture automatically, like when "Yes" option is selected.

Property Description of Static Graphic Element	
Transparent	If Yes is selected, it indicates that this element will be displayed in transparent color. It is usually used with the transparent color setting of the element. Please refer to the following example elements: The transparent color has not been set yet. / The element transparent color has been set. / The transparent color of the whole drawing has been set. Please note that if Yes option is selected (set to Transparent), the foreground color option is disabled.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

Example of Static Graphic element:

The designated read address = D100. The internal memory value and each state should be as follows:

D100=0   D100=1   D100=2   D100=3   D100=4

3.8.9.2 Animated Graphic

Property Description of Animated Graphic Element	
When HMI is connected to PLC, the user can create animated graphic elements to read the value of several read addresses controlled by PLC. The read value of each state can be converted and transmitted to the animated graphic elements and display on the HMI screen. The individual movement and moving position can also be controlled and show on the HMI screen.	
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)

Property Description of Animated Graphic Element		
Read Address	Read Address	Use the value of <u>Read Address</u> to switch the state of animated graphic element.
	Read Address+1	Use the value of <u>Read Address+1</u> to be the horizontal axis position of the animated graphic element.
	Read Address+2	Use the value of <u>Read Address+2</u> to be the vertical axis position of the animated graphic element.
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)	
Clear Picture	Use this option to clear previous animated graphic element when moving the element or changing the state of the element.	
Data Length	Word	It can have 256 states.
	LSB	It can have 16 states.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Add/Remove State	It is used to set the state numbers of animated graphic. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

Example of Animated Graphic element:

The designated read address = D100. The internal memory value and each state should be as follows:

State control register D100

X-axis control register D101

Y-axis control register D102
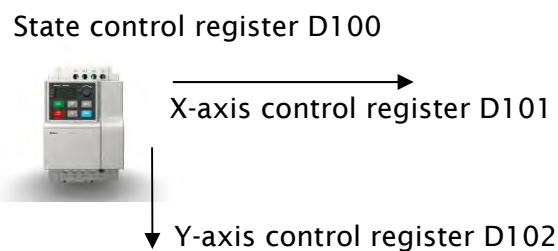
3.8.9.3 Dynamic Line

Property Description of Dynamic Line Element		
The dynamic line element can be changed and moved depending on the value of the corresponding contact or register.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Position option is set to Yes. It is used to represent the left-top horizontal position (Left) of the element, i.e. the first X coordinate on the screen (X_1).
	Read Address +1	The value of the Read Address+1 can be used only when Variable Position option is set to Yes. It is used to represent the left-top vertical position (Top) of the element, i.e. the first Y coordinate on the screen (Y_1).
	Read Address +2	The value of the Read Address+2 can be used only when Variable Position option is set to Yes. It is used to represent the right-bottom horizontal position (Right) of the element, i.e. the second X coordinate on the screen (X_2).
	Read Address +3	The value of the Read Address+3 can be used only when Variable Position option is set to Yes. It is used to represent the right-bottom vertical position (Bottom) of the element, i.e. the second Y coordinate on the screen (Y_2)..
	Read Address +4	The value of the Read Address+4 can be used only when Variable Color option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65536.
	Read Address +5	The value of the Read Address+5 can be used only when Blink option is set to Yes. When the value is higher than 1, the dynamic line element will blink. If the value is 0, it will not blink.

Property Description of Dynamic Line Element	
Line Color	Used to set the display color of the dynamic line element.
Blink	The element can blink to remind the user. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.
Line Style	There are following line styles can be selected.
Variable Position	(Please refer to the description of Read Address above)
Variable Color	(Please refer to the description of Read Address above)
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.9.4 Dynamic Rectangle

Property Description of Dynamic Rectangle Element		
The dynamic rectangle element, including element size and color can be changed and moved depending on the value of the corresponding contact or register.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Position option is set to Yes. It is used to represent the left-top horizontal position (Left) of the element, i.e. the first X coordinate on the screen (X_1).
	Read Address +1	The value of the Read Address+1 can be used only when Variable Position option is set to Yes. It is used to represent the left-top vertical position (Top) of the element, i.e. the first Y coordinate on the screen (Y_1)..

Property Description of Dynamic Rectangle Element		
Read Address	Read Address +2	The value of the <u>Read Address+2</u> can be used only when <u>Variable Size</u> option is set to Yes. It is used to represent the right-bottom horizontal position (Right) of the element, i.e. the width.
	Read Address +3	The value of the <u>Read Address+3</u> can be used only when <u>Variable Size</u> option is set to Yes. It is used to represent the right-bottom vertical position (Bottom) of the element, i.e. the height.
	Read Address +4	The value of the <u>Read Address+4</u> can be used only when <u>Variable Color</u> option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65535.
	Read Address +5	The value of the <u>Read Address+5</u> can be used only when <u>Blink</u> option is set to Yes. When the value is higher than 1, the dynamic line element will blink. If the value is 0, it will not blink.
	Please note that when <u>Variable Position</u> option is set to No, the internal memory address of <u>Variable Size</u> option will increase one (one increment) automatically. (<u>Read Address</u> will represent the right-bottom horizontal position (Right) of the element. <u>Read Address+1</u> will represent the right-bottom vertical position (Bottom) of the element. <u>Read Address+2</u> will represent the foreground color of the element.)	
Blink	The element can blink to remind the user. (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Foreground Color	Used to set the foreground color of the dynamic rectangle element.	
Line Size	The unit is Pixel and the range is within 1 ~ 8.	
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	

Property Description of Dynamic Rectangle Element	
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.
Round Radius	0~38 pixels round radius are provided for selection.
Variable Position	(Please refer to the description of Read Address above)
Variable Size	(Please refer to the description of Read Address above)
Variable Color	(Please refer to the description of Read Address above)
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.9.5 Dynamic Ellipse

Property Description of Dynamic Ellipse Element		
The dynamic ellipse element, including element size and color can be changed and moved depending on the value of the corresponding contact or register.		
Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.)	
	Read Address	The value of the Read Address can be used only when Variable Central Point option is set to Yes. It is used to represent the horizontal position of the element center point, i.e. the first X coordinate on the screen (X_1).
	Read Address +1	The value of the Read Address+1 can be used only when Variable Central Point option is set to Yes. It is used to represent the vertical position of the element center point, i.e. the first Y coordinate on the screen (Y_1).
	Read Address +2	The value of the Read Address+2 can be used only when Variable Radius option is set to Yes. It is used to represent the horizontal radius of the element, i.e. the width.

Property Description of Dynamic Ellipse Element		
Read Address	Read Address +3	The value of the Read Address+3 can be used only when Variable Radius option is set to Yes. It is used to represent the vertical radius of the element, i.e. the height.
	Read Address +4	The value of the Read Address+4 can be used only when Variable Color option is set to Yes. It is used to represent the line color. The range is different depending on selected HMI. The range for 16 shades of gray model is within 0 ~ 15, the range for 256 colors model is within 0 ~ 255 and the range for 65536 colors is within 0 ~ 65536.
	Read Address +5	The value of the Read Address+5 can be used only when Blink option is set to Yes. When the value is higher than 1, the dynamic line element will blink. If the value is 0, it will not blink.
	Please note that when Variable Central Point option is set to No, the internal memory address of Variable Radius option will increase one (one increment). (Read Address will represent the horizontal radius of the element. Read Address+1 will represent the vertical radius of the element. Read Address+2 will represent the foreground color of the element.)	
Line Color	Used to set the display color of the dynamic ellipse element.	
Blink	The element can blink to remind the user. (Please refer to Table 3-8-2 Property Description of General Buttons.)	
Foreground Color	Used to set the foreground color of the dynamic ellipse element.	
Line Size	The unit is Pixel and the range is within 1 ~ 8.	
Data Format	It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.	
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.	
Variable Central Point	(Please refer to the description of Read Address above)	
Variable Radius	(Please refer to the description of Read Address above)	
Variable Color	(Please refer to the description of Read Address above)	

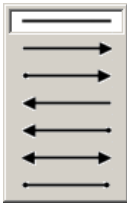| Property Description of Dynamic Ellipse Element	
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.9.6 Real Image

Property Description of Real Image Element	
1. This element provides a Dll Library which allows the user to transmit the user-defined image to HMI by using external programs through serial communication interface. 2. One screen can have a real image element only.	
Foreground Color	Used to set the foreground color of the real image element.
Interface	Used to set the communication protocol, RS232/RS-485。
COM	Used to set the HMI communication port. Please note that this COM port cannot be used for PLC communication at the same time.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

Example	1. Load ImgTrans.dll (the file is saved in Utility folder under the location of the installation destination directory. (under destination directory \Utility)
	
	2. Data Structure:
	
	    typedef struct _COMM_INFO
	    {
	        char szCOM[8];
	    } COMM_INFO;
	，szCOM is a string of characters and the sent values aire COM1, COM2, COM3, …。
	
	3. List of Commands:
	   (1) int hmOpen(const COMM_INFO* pCommInfo);
	   (2) int hmSendImageFromFile(LPCTSTR szFileName);
	   (3) HANDLE hmAsyncSendImageFromFile(LPCTSTR szFileName);
	   (4) int hmSendImage(HBITMAP hbmp);
	   (5) HANDLE hmAsyncSendImage(HBITMAP hbmp);

Property Description of Real Image Element	

Example	(6) int hmAbortAction();
	
	(7) int hmClose();
	
	4. Brief Explanation of the commands
	
	   (1) Command: int hmOpen(const COMM_INFO* pCommInfo);
	     Input Value: COMM_INFO structure
	     Return Value: 1: Succeeded , 0: Failed
	     Explanation: Enable HMI communication. Input the name of COM Port, such as COM1, COM2 etc.
	
	   (2) Command: int SendImageFromFile(LPCTSTR szFileName);
	     Input Value: File name of the image
	     Return Value: 1: Succeeded , 0: Failed
	     Explanation: After converting the input image format into the width and height of the element, and Bit value, the system will start to transmit the image to HMI. This command is a synchronous command. After the data transmission to HMI is completed, this command will return.
	
	   (3) Command: HANDLE hmAsyncSendImageFromFile(LPCTSTR szFileName);
	     Input Value: File name of the image
	     Return Value: 0: Failed, none zero value: Thread Handle
	     Explanation: After converting the input image format into the width and height of the element, and Bit value, the system will start to transmit the image to HMI. This command is an asynchronous command. The user can perform relevant operation by using Thread Handle data.
	
	   (4) Command: int hmSendImage(HBITMAP hbmp);
	     Input Value: HBITMAP Handle in Window
	     Return Value: 1: Succeeded , 0: Failed
	     Explanation: After converting the input image format into the width and height of the element, and Bit value, the system will start to transmit the image to HMI. This command is a synchronous command. After the data transmission to HMI is completed, this command will return.
	
	   (5) Command: HANDLE hmAsyncSendImage(HBITMAP hbmp);
	     Input Value: HBITMAP Handle in Window
	     Return Value: 0: Failed, none zero value: Thread Handle

Property Description of Real Image Element	
Example	Explanation: After converting the input image format into the width and height of the element, and Bit value, the system will start to transmit the image to HMI. This command is an asynchronous command. The user can perform relevant operation by using Thread Handle data. (6) Command: int hmAbortAction(); Input value: None Return Value: 0: Succeeded , 1: Failed Explanation: This command is used to terminate the image transmission via asynchronous command. (7) Command:int hmClose(); Input value: None Return Value: 1: Succeeded , 0: Failed Explanation: This command is used to terminate the communication of HMI (When DLL ends up, this command will be activated automatically.)

3.8.10   Input Elements
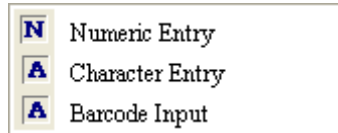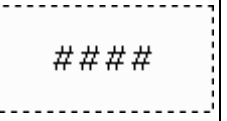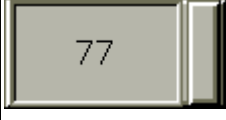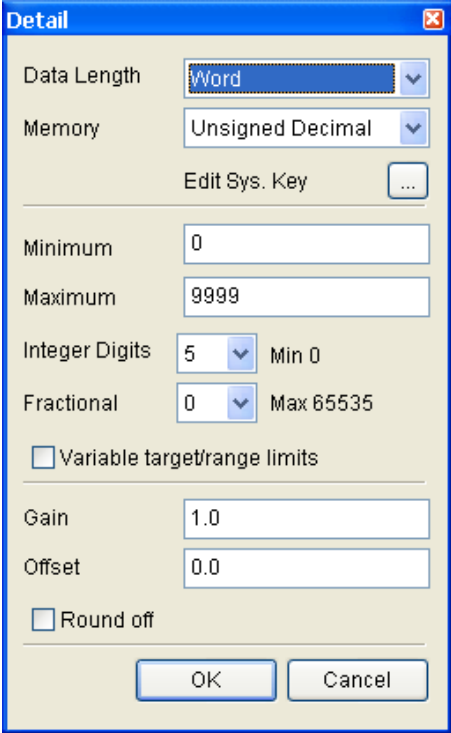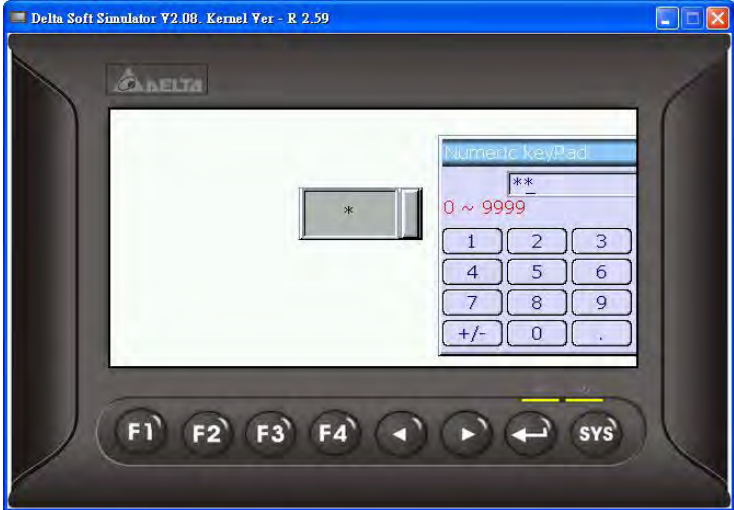
Fig. 3-8-27 Input Elements

3.8.10.1 Numeric Entry

Property Description of Numeric Entry Elements	
After pressing this numeric entry element on the screen, a system built-in numeric keypad (TEN-KEY) will show up and the user can use it to input the setting value directly. When ENTER key is pressed, HMI will send the input setting value to the corresponding register. The maximum and minimum input setting values are all user-defined. The user can also specify the trigger mode to trigger the designated PLC address before or after writing the setting value.	
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	Border Color option can be set only when the style of the numeric entry element is selected as Raised and Sunken. The style of the element below is selected as "Rasied". Its background color is set to blue and its border color is set to red. （If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)

	Standard	Raised	Sunken	Transparent
Style	####	####	####	####

Leading Zero	The following figures show the difference if the user selects the Leading Zero option. (Please note that the integral digits are set to 4.) 0077 (If Yes is selected) 77 (If NO is selected)	

Property Description of Numeric Entry Elements	
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Setting	

	Date Length	There are 16bits Word and 32bits Double Word two options.
	Data Format	There are following data format provided: Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary Double Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Binary 7. Floating
	Edit System Keypad	When the input mode is Touch Popup, the user can define the style of the keypad, including title, font, font size, font color and keypad color. The position that the system keypad cannot display will be placed in the center of the screen.

Property Description of Numeric Entry Elements			
Setting	Edit System Keypad	(icon)	Adjust the system keypad size
		Title:40	Set the height of the title bar
		10	Set the font size
		Arial	Set the font
		A ·	Set the font color
		☐ ·	Set the background color
		(icon)	Return to the default setting
	Minimum Maximum	The user can set the minimum and maximum of input setting value to determine the range of input setting value.	
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as "Floating".	
		When Variable Minimum/Maximum Value option is selected, it indicates that the minimum value is determined by Read Address+1 and the maximum value is determined by Read Address+2.	
	Gain(a) Offset(b) Round off	The user can use **y = (a) x (read address value) + (b)** this equation to determine the display numeric value (y). For example, if Gain value (a) is 2 and Offset value (b) is 3, when the read address value is 3, then the display numeric value will be equal to (2) x 3 + (3) = 9. If Gain and Offset value is a decimal, please set the data format as "Floating". If Round off option is selected, after the operation of the equation above, all numeric values can be rounded off and display on the screen.	
		When the user have input the minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.	
Input Mode	There are Touch Popup, Active Non-Popup and Touch Non-Popup three options. The default setting is Touch Popup. For the description of Active Non-Popup and Touch Non-Popup mode, please refer to section 3.8.14 Keypad Elements.		

Property Description of Numeric Entry Elements	
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.
Display Asterisk (*)	If YES is selected, the screen will show as the following figure when inputting the setting value.
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. <u>Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary</u>. The user can set the Fast Refresh Rate by clicking **Screen > Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

Property Description of Numeric Entry Elements	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Info the overrange message	When this option is set, an Error dialog box will appear to prompt the user the input value has exceeded the limit of the range setting.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.10.2　Character Entry
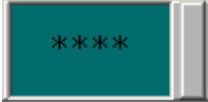
Property Description of Character Entry Elements	
The user can set write and read address to input the data of the specific address by text or character and display them on the screen. The input and display text or character must be in ASCII format. Write and read address can be the same or different. (The max. string length is 28words.)	
Write Address Read Address	The address can be internal memory or the controller address. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	Border Color option can be set only when the style of the character entry element is selected as Raised and Sunken. The style of the element below is selected as "Raised". Its background color is set to blue and its border color is set to gray. (If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)
Style	<table><tr><td>Standard</td><td>Raised</td><td>Sunken</td><td>Transparent</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>

Property Description of Character Entry Elements	
Character Length	The range is with 1 ~ 28 words. The default setting is 4words.
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Edit System Keypad	When the input mode is Touch Popup, the user can define the style of the keypad, including title, font, font size, font color and keypad color. The position that the system keypad cannot display will be placed in the center of the screen. |	
		Adjust the system keypad size
		Set the height of the title bar
		Set the font size
		Set the font
		Set the font color
		Set the background color
		Return to the default setting
Input Mode	There are Touch Popup, Active Non-Popup and Touch Non-Popup three options. The default setting is Touch Popup. For the description of Active Non-Popup and Touch Non-Popup mode, please refer to section 3.8.14 Keypad Elements.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.

Property Description of Character Entry Elements	
Display Asterisk (*)	If YES is selected, the screen will show as the following figure when inputting the setting value.
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen > Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

Property Description of Character Entry Elements	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Invisible Address	When this option is set to On, this button element will be invisible.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.10.3 Barcode Input

Property Description of Character Barcode Input Elements	
The user can set write and read address to input the data of the specific address by text or character and display them on the screen. The input and display text or character must be in ASCII format. Write and read address can be the same or different. (The max. string length is 127words.)	
Write Address Read Address	The address can be internal memory or the controller address. If only write address is set, HMI will read the the value of write address automatically. (Please refer to Table 3-8-2 Property Description of General Buttons.)
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.
Border Color Background Color	Border Color option can be set only when the style of the character entry element is selected as Raised and Sunken. The style of the element below is selected as "Raised". Its background color is set to blue and its border color is set to gray. (If the style of the element is set to Transparent, the Border Color and Background Color these two options are disabled.)
Style	<table><tr><td>Standard</td><td>Raised</td><td>Sunken</td><td>Transparent</td></tr><tr><td></td><td></td><td></td><td></td></tr></table>
Character Length	The range is with 1 ~ 127 words. The default setting is 4words.

Property Description of Character Barcode Input Elements	
Trigger Trigger Type	The user can use this setting to trigger the designated controller address to be ON before or after writing the setting value. Please note that this function can only trigger the controller address to be ON. If the controller address needs to be triggered again, the user should set the address to be OFF manually.
Edit System Keypad	When the input mode is Touch Popup, the user can define the style of the keypad, including title, font, font size, font color and keypad color. The position that the system keypad cannot display will be placed in the center of the screen.

🗖	Adjust the system keypad size
Title:40	Set the height of the title bar
10	Set the font size
Arial	Set the font
A ·	Set the font color
▢ ·	Set the background color
🖬	Return to the default setting

Input Mode	There are Touch Popup, Active Non-Popup and Touch Non-Popup three options. The default setting is Touch Popup. For the description of Active Non-Popup and Touch Non-Popup mode, please refer to section 3.8.14 Keypad Elements.
User Security Level	Use this option to set the user priority for pressing this element. Only the priority that is equal to or higher than the current setting can use this element.

Property Description of Character Barcode Input Elements	
Display Asterisk (*)	If YES is selected, the screen will show as the following figure when inputting the setting value.
Fast Refresh	If this option is selected, the element can be displayed immediately when switching the screen. Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, only 4 elements (including display element and input element) can be fast refreshed on one screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary. The user can set the Fast Refresh Rate by clicking **Screen > Screen Properties** command. There are three levels of the Fast Refresh Rate and they are High, Medium and Low.
Set Low Security	Use this option to force the current priority to be the lowest after the button is pressed. This can prevent the misoperation made by the user (operator).
InterLock Address InterLock Level	When InterLock Address is set to be ON or OFF (this is determined by the property of "InterLock Level"), this button can be enabled.
Before Execute Macro	If this option is set, when the user presses the button, the system will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

Property Description of Character Barcode Input Elements	
After Execute Macro	If this option is set, when the user presses the button, the system will perform the operation of this button first and then execute the command of this macro. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.
Invisible Address	When this option is set to On, this button element will be invisible.
Popup Bit	When this bit is turned to ON, the user can edit it manually.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.11   Curve Elements
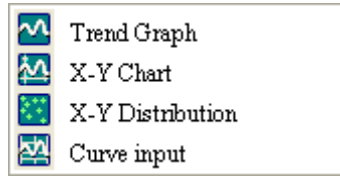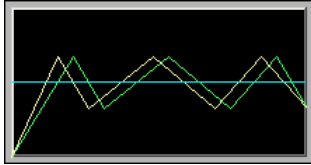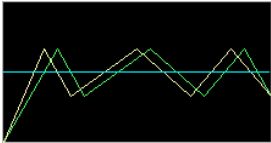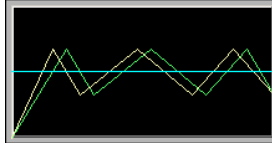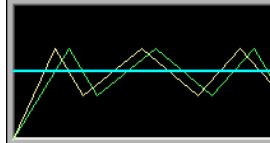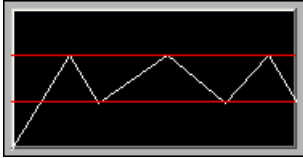
Fig. 3-8-28 Curve Elements

3.8.11.1 Trend Graph
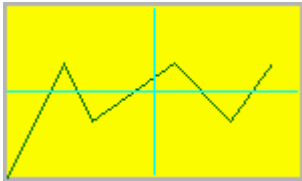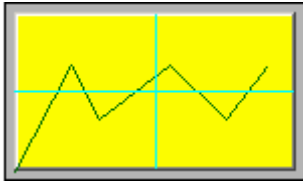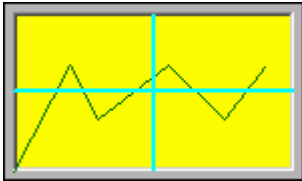
Property Description of Trend Graph Elements

The first step for setting trend graph is to set the curve number in "Curve Field Total" option (range is 1~4) in property table. Then, setting the read address, read format, curve width and color in "Detail Setup" option to complete the setup.

The trend graph will continuously read numbers of addresses from the read address set by the user, convert the read data into trend graph and display on HMI screen. The numbers of the addresses is determined by the setting of "Sample Number".

This function is used to read the values of the internal memory addresses and display on HMI screen statically. After setting, the user needs to set the specific address of the control block to trigger the drawing and clear operation of the trend graph. For the settings of the control block, please refer to Chapter 5.

Border Color Background Color	Border Color option can be set only when the style of the trend graph element is selected as Raised and Sunken. The style of the element below is selected as "Raised". Its background color is set to black and its border color is set to gray.

	Standard	Raised	Sunken
Style			

Curve Field Total	1~4 curves can be set and displayed.

Property Description of Trend Graph Elements		
Setting		
	Sample Number Max. Sample Number	Sample Number can be set to a constant or a variable value. When Sample Number is a constant: The sample number represents a curve which is composed of the data of several addresses (registers). When the sample number exceeds the width range that the element can draw, the following warning dialog box will display. It means that if the allowable width range of the created element is 10 sample numbers, when the sample number set by the user is higher than 10, the warning dialog box above will display.

Property Description of Trend Graph Elements		
Setting	Sample Number Max. Sample Number	**Please note that when the sample number is a constant, the Max. Sample Number option is disabled.** When Sample Number is a variable value: When the sample number is set to the address (register), the sample number is a variable value. The user can change the value of the address to modify the sample number at the same time. When the sample number is a variable value, the Max. Sample Number option must be set. If the read value is more than the set Max. Sample Number, the system will take the set Max. Sample Number as the actual maximum sample number.
	Data Format	Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The trend graph will continuously read numbers of addresses from the read address set by the user, convert the read data into trend graph and display on HMI screen. The numbers of the addresses is determined by the setting of "Sample Number".
	Sample Flag	It is used to set trigger and clear flag. When sample flag is triggered, it will start to read data and draw the graph. This sample flag is located within the control block. Please refer to section 3.4 in Chapter 3 for the settings of the control block.
	Minimum Maximum	It is used to set the minimum and maximum value of the display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
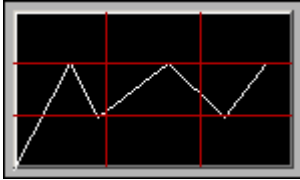
Property Description of Trend Graph Elements		
Setting	Line Size	Used to the display line width. The range is within 1 ~ 8 and the unit is pixel.
	Line Color	Used to set the display line color.
Grid Line Color Grid Number in Horiz.	Please refer to the figure below. The grid color is set to red and the grid number in horizontal direction is set to 3. 	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.11.2 X-YChart
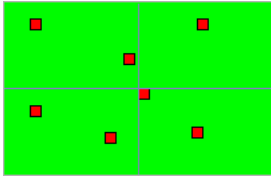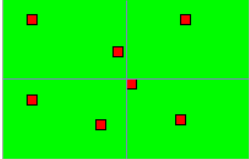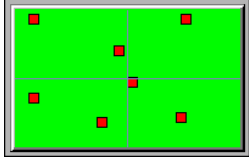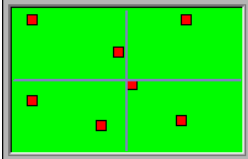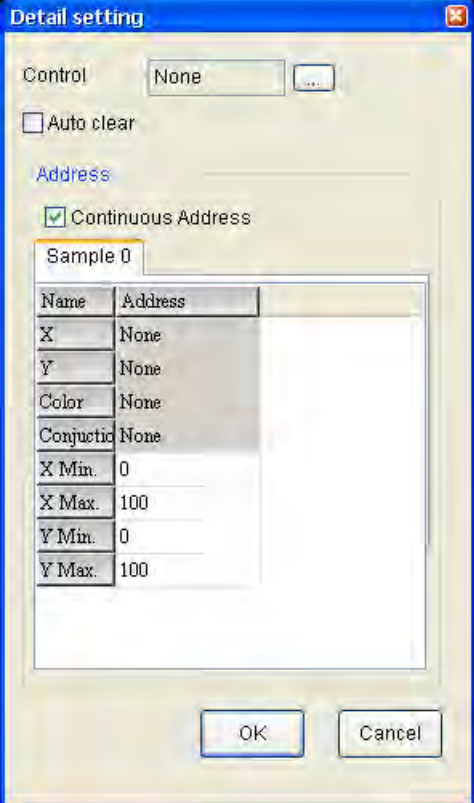
Property Description of X-Y Chart Elements		
HMI will read and convert a series value of setting address to a X-Y chart on the screen. This function is used to read the values of the internal memory addresses and display on HMI screen statically. After setting, the user needs to set the specific address of the control block to trigger the drawing and clear operation of the trend graph, i.e. Trend Draw and Trend Clear. For the settings of the control block, please refer to section 3.4 in Chapter 3.		
Border Color Background Color	Border Color option can be set only when the style of the X-Y chart element is selected as Raised and Sunken. The style of the element below is selected as "Raised". Its background color is set to yellow and its border color is set to gray. 	
Style	Standard 	Raised 	Sunken
Connect Two Points	If Yes option is selected, when drawing the X-Y chart on the screen, the space between two points on the X-Y chart will be connected by lines.	
Curve Field Total	1~4 curves can be set and displayed.	

Property Description of X-Y Chart Elements	
Setting	
	Sample Number Max. Sample Number	Sample Number can be set to a constant or a variable value. When Sample Number is a constant: The sample number represents a curve which is composed of the data of several addresses (registers). When the sample number exceeds the width range that the element can draw, the following warning dialog box will display. It means that if the allowable width range of the created element is 10 sample numbers, when the sample number set by the user is higher than 10, the warning dialog box above will display.

Property Description of X-Y Chart Elements		
Setting	Sample Number Max. Sample Number	 **Please note that when the sample number is a constant, the Max. Sample Number option is disabled.** When Sample Number is a variable value: When the sample number is set to the address (register), the sample number is a variable value. The user can change the value of the address to modify the sample number at the same time. When the sample number is a variable value, the Max. Sample Number option must be set. If the read value is more than the set Max. Sample Number, the system will take the set Max. Sample Number as the actual maximum sample number.
	Data Format	Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex
	Horiz. Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The X-Y chart will continuously read numbers of addresses from the horizontal read address set by the user, convert the read data into the points of X-axis and display on HMI screen. The numbers of the addresses is determined by the setting of "Sample Number".

Property Description of X-Y Chart Elements		
Setting	Vert. Read Address	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) The X-Y chart will continuously read numbers of addresses from the vertical read address set by the user, convert the read data into the points of Y-axis and display on HMI screen. The numbers of the addresses is determined by the setting of "Sample Number".
	Sample Flag	It is used to set trigger and clear flag. When sample flag is triggered, it will start to read data and draw the X-Y chart. This sample flag is located within the control block 2. Please refer to Chapter 5 for the settings of the control block.
	Horiz. Minimum Horiz. Maximum	It is used to set the minimum and maximum value of the horizontal display data, i.e. the minimum and maximum value of X-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Vert. Minimum Vert. Maximum	It is used to set the minimum and maximum value of the vertical display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Line Size	Used to the display line width. The range is within 1 ~ 8 and the unit is pixel.
	Line Color	Used to set the display line color.
Grid Line Color Horiz. Line Number Vert. Line Number	Please refer to the figure below. The grid color is set to red and the grid numbers in horizontal and vertical direction are both set to 2.	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.11.3 X-Y Distribution

Property Description of X-Y Distrubution Elements	
HMI will read and convert non- consecutive or consecutive data of the setting addressto a X-Y distribution graph on the screen. This function is used to read the values of the internal memory addresses and display on HMI screen statically. After setting, the user needs to set the specific address of the control block to trigger the drawing and clear operation of the trend graph, i.e. Trend Draw and Trend Clear. For the settings of the control block, please refer to section 3.4 in Chapter 3.	
Border Color Background Color	The background color of the element below is set to green and its border color is set to gray.
Style	Standard / Raised / Sunken
Sample	1~4 X-Y distribution point display can be set.
Setting	

Property Description of X-Y Distrubution Elements		
Setting	Control	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.). The user can set the function is to sample or clear. When BIT 0 is turned ON (OFF→ON), it indicates that HMI will read the sampling points. When BIT 1 is turned ON (OFF→ON), it indicates that HMI will clear the sampling points.
	Auto Clear	When this option is selected, HMI will disable the control address (ON→OFF) after reading the sampling points.
	Continuous Address	When this option is selected, the system will regard read address X as the starting address and designate the consecutive read addresses from read address X automatically. Doing this can save the communication time of the controller. For example, when read address X is set to 1@D301, if this option is selected, HMI will take 1@D302 as read address Y, 1@D303 as color address, 1@D304 as conjunction address. If this option is not selected, they can be specified to other kinds of addresses.
	Read Address X	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) When the data is read, it will be converted to X distribution points and display on the screen.
	Read Address Y	The address can be internal memory or the controller address. (Please refer to Table 3.2.2 Property Description of General Buttons.) When the data is read, it will be converted to Y distribution points and display on the screen.
	Color	Used to determine the color of the sampling points (distribution points). It can be an internal memory, PLC address or constant. The range is from 0~65535.

Property Description of X-Y Distrubution Elements		
Setting	Conjunction	Used to determine if a line is connected between the distribution points. It can be an internal memory, PLC address or constant. 0: Without a line; 1: With a line
	X Min. X Max.	Used to set the minimum and maxmum value of X-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Y Min. Y Max.	Used to set the minimum and maxmum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
Grid Line Color Horiz. Line Number Vert. Line Number	Please refer to the figure below. The grid color is set to red and the grid numbers in horizontal and vertical direction are both set to 2. 	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	
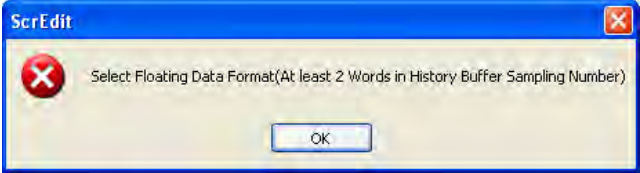
3.8.12   Sampling Elements
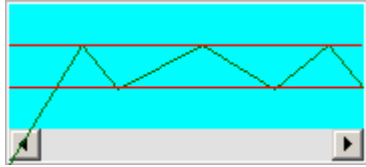
Fig. 3-8-29 Sampling Elements
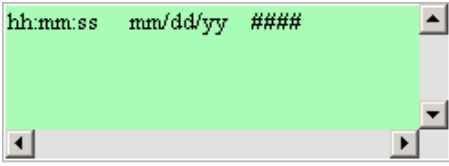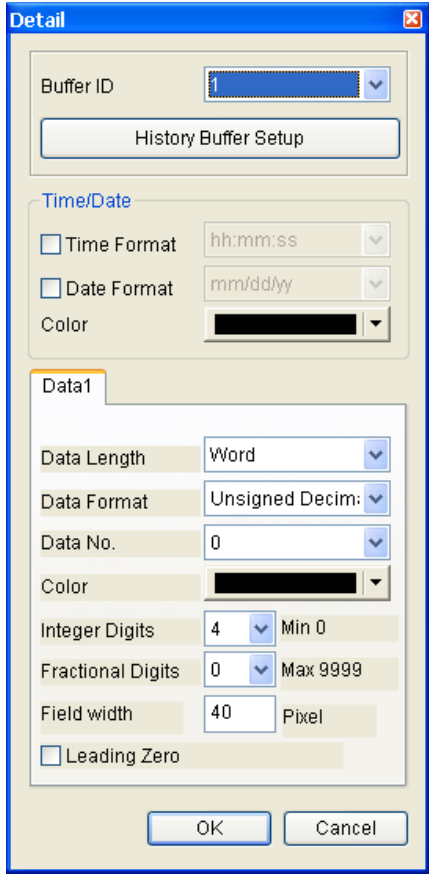
3.8.12.1 Historical Trend Graph

Property Description of Historical Trend Graph Elements	
Property Description of Historical Trend Graph Element	
Border Color Background Color	The below element background color is set to black and its border color
Curve Field Total	1~8 curves can be set and displayed.
Setting	
Buffer ID	Use this option to set the number (No.1 ~ No.12) of history buffer for reading the data of PLC corresponding address. The user can press the **History Buffer Setup** button or click **Option > History Setup** (Choosing History Setup command from menu bar) to set the PLC corresponding address.

Property Description of Historical Trend Graph Elements		
Setting	Data Format	Word 1. BCD 2. Signed BCD 3. Signed Decimal 4. Unsigned Decimal 5. Hex 6. Floating Please note that if the data format is selected as **Floating**, the **Data Length option in the History Setup dialog box must be greater than or equal to 2words** or the following warning message dialog box will display on the screen. ScrEdit — Select Floating Data Format(At least 2 Words in History Buffer Sampling Number) — OK
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as "Floating".
	Global Range	When this option is selected, it indicates that the user can set the minimum and maximum value of the history data. If this option is not selected, each curve can have its own minimum and maxmum value.
	Minimum Maximum	It is used to set the minimum and maximum value of the display data, i.e. the minimum and maximum value of Y-axis. If the read value is more the maximum or less than the minimum, the system will display the minimum and maximum value still.
	Time/Date	
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY**, **DD.MM.YY**, **YY.MM.DD**, **YY/MM/DD**, **MM.DD**, **MM/DD** seven kinds of formats.
	Color	When time or date format is selected, the user can use this option to designate the display color.

Property Description of Historical Trend Graph Elements		
Setting	Enable	If this option is selected, the following curve options are enabled and can be set.
	Data No.	It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option. **Please note that if the data format is selected as "Floating", and the Data Length option in the History Setup dialog box is an odd numbers of words, ensure to set the Data No. as an even number.**
	Line Size	Used to the display line width. The range is within 1 ~ 8 and the unit is pixel.
	Line Color	Used to the display line color.
	Min. Value Max. Value	Each display line (curve) can have its min. and max. values. If there are 8 lines in this history data, there will be 8 groups of min. and max. values
Grid Line Color Grid Number in Horiz.		Please refer to the figure below. The grid color is set to red and the grid number in horizontal direction is set to 3.
X		Used to set X coordinate
Y		Used to set Y coordinate
Width		Used to set the element width
Height		Used to set the element height

3.8.12.2 Historical Data Table

Property Description of Historical Data Table Elements
Convert the history data to numeric data and display on HMI screen by a data table. The read address in the History Setup dialog box needs to be set and its data length should be in several words. The range of data length is within 1 ~ 8words. The Data No. in History Data Detail dialog will also correspond to the selected Data Length in Buffer Properties of History Setup.

Border Color Background Color	The below element background color is set to green and its border color is set to gray.
Data Field Number	1~8 data fields can be set.
Setting	
Setting	Buffer ID	Use this option to set the number (No.1 ~ No.12) of history buffer for reading the data of PLC corresponding address. The user can press the **History Buffer Setup** button or click **Option > History Setup** (Choosing History Setup command from menu bar) to set the PLC corresponding address.

Property Description of Historical Data Table Elements		
Setting	Time/Date	
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY**, **DD.MM.YY**, **YY.MM.DD**, **YY/MM/DD**, **MM.DD**, **MM/DD** seven kinds of formats.
	Color	When time or date format is selected, the user can use this option to designate the display color.
	Date Length	There are 16bits Word and 32bits Double Word two options.
	Data Format	There are following data format provided: Word　　　　　　　　Double Word 1. BCD　　　　　　　1. BCD 2. Signed BCD　　　　2. Signed BCD 3. Signed Decimal　　3. Signed Decimal 4. Unsigned Decimal　4. Unsigned Decimal 5. Hex　　　　　　　5. Hex 6. Binary　　　　　　6. Binary 　　　　　　　　　　7. Floating
	Data No.	It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option. **Please note that if the data format is selected as "Floating", and the Data Length option in the History Setup dialog box is an odd numbers of words, ensure to set the Data No. as an even number.**
	Display Color	It is used to the display data color.
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as "Floating".
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.12.3 Historical Event Table

Property Description of Historical Event Table Elements	
Property Description of Historical Event Table Element	
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element (Please refer to Table 3-8-2 Property Description of General Buttons.) It will show the input history message of every state. HMI system will list all input history messages in the event table. If there is no input history message, "?" will display.
Border Color Background Color	The below element background color is set to light yellow and its border color is set to black.
Data Length	Word It can have 256 states. LSB It can have 16 states.
Data Format	This option can be set only when the data length is selected as Word. It provides BCD, Signed Decimal, Unsigned Decimal and Hex four kinds of data format to define the read memory content.
Add/Remove State	It is used to set the state numbers of historical event table element. If the data length of the value is in Word, 1~256 states can be set. If the data length of the value is in LSB, 16 states can be set. If the data length of the value is in Bit, only 2 states can be set.
Setting	

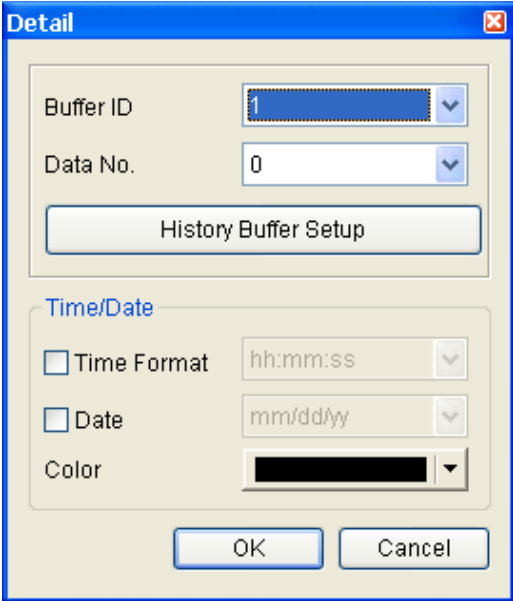| Property Description of Historical Event Table Elements		
Setting	Buffer ID	Use this option to set the number (No.1 ~ No.X) of history buffer for reading the data of PLC corresponding address. The user can press the **History Buffer Setup** button or click **Option > History Setup** (Choosing History Setup command from menu bar) to set the PLC corresponding address.
	Data No.	It is used to set the reading Word data when triggering every time. For example, if the Data Length option in the History Setup dialog box is set to 3words, there are 0 ~ 2 data numbers can be selected in this option.
	Time/Date	
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY**, **DD.MM.YY**, **YY.MM.DD**, **YY/MM/DD**, **MM.DD**, **MM/DD** seven kinds of formats.
	Color	When time or date format is selected, the user can use this option to designate the display color.
X		Used to set X coordinate
Y		Used to set Y coordinate
Width		Used to set the element width
Height		Used to set the element height
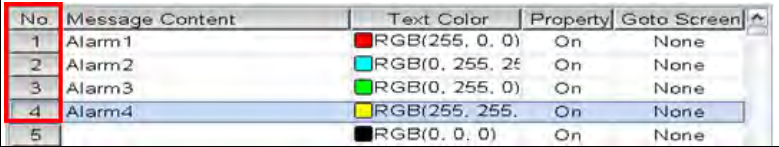
3.8.13   Alcarm Elements
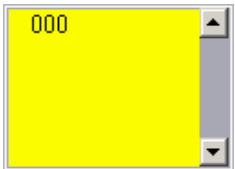
Fig. 3-8-30 Alarm Elements
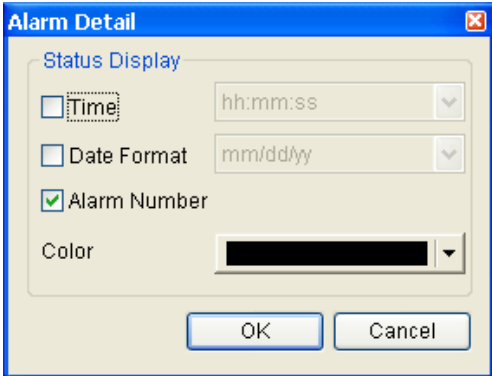
3.8.13.1 Alarm History Table

Property Description of Alarm History Table Elements	
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the alarm message will be converted to Alarm History Table element and display on the screen.	
Background Color	The background color of the following two elements is set to white and blackish green respectively. The background color is set to white. The background color is set to blackish green.
Setting	
Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
Date Format	Provide **MM/DD/YY**, **DD/MM/YY**, **DD.MM.YY**, **YY.MM.DD**, **YY/MM/DD**, **MM.DD**, **MM/DD** seven kinds of formats.

Property Description of Alarm History Table Elements		
Setting	Alarm Number	If this option is selected, when the alarm occurs, the alarm number that is designated in **Alarm Setup** dialog box will also be shown in front of the alarm message. Please refer to the figures below:
	Color	When time or date format is selected, the user can use this option to designate the display color.
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.13.2 Active Alarm List

Property Description of Active Alarm List Elements	
HMI will only display the current alarm message by using Active Alarm List element on the screen.	
Background Color	The background color of the following two elements is set to white and yellow respectively. The background color is set to white. The background color is set to yellow.
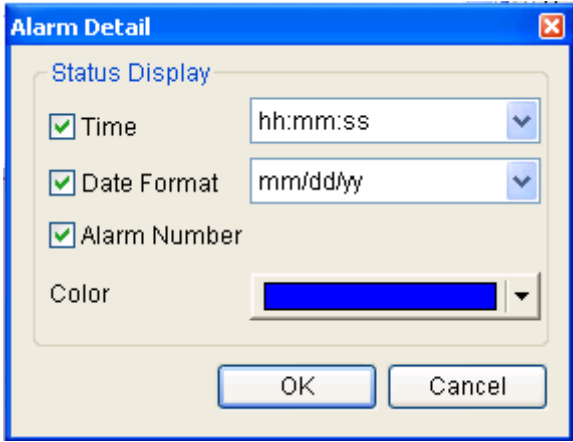
Property Description of Active Alarm List Elements		
Setting		
	Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format	Provide **MM/DD/YY**, **DD/MM/YY**, **DD.MM.YY**, **YY.MM.DD**, **YY/MM/DD**, **MM.DD**, **MM/DD** seven kinds of formats.
	Alarm Number	If this option is selected, when the alarm occurs, the alarm number for the alarm message will always be shown ahead. Please refer to the figures below:
	Color	When time or date format is selected, the user can use this option to designate the display color.
X		Used to set X coordinate
Y		Used to set Y coordinate
Width		Used to set the element width
Height		Used to set the element height

3.8.13.3 Alarm Frequency Table

Property Description of Alarm Frequency Table Elements	
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the ON or OFF frequency of the contact will be converted to Alarm Frequency Table element and display on the screen.	
Background Color	The background color of the following two elements is set to white and yellow respectively. The background color is set to white. The background color is set to yellow.
Setting	
	Time Format: Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
	Date Format: Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.
	Alarm Number: If this option is selected, when the alarm occurs, the time and date when the alarm occurred will also be shown in front of the alarm message. Please refer to the figure below:
	Display for Counting Zero: Use this option to decide if show the message on the Alarm Frequency Table element or not when the occurring times of the alarm message is zero.
	Color: When Time and Date these two options are selected, the user can designate the display color by using this option.

Property Description of Alarm Frequency Table Elements	
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.13.4 Alarm Moving Sign

Property Description of Alarm Moving Sign Elements	
HMI will monitor and read the read address in a fixed time automatically. If some certain Bit contact of the address is ON or OFF, the current alarm message will display on the screen via Alarm Moving Sign element.
Border Color Background Color	The background color of the element below is set to blue green and its border color is set to red.
Style	Standard / Raised / Sunken / Transparent
Moving Points	It is used to set the movement of the moving sign. The unit is Pixel and the range is within 1 ~ 50 Pixels.
Interval(ms)	It is used to set the interval time between two movements. The unit is ms and the range is within 50 ~ 3000 ms.
Setting	
Time Format	Provide **HH:MM:SS**, **HH:MM** two kinds of formats.
Date Format	Provide **MM/DD/YY**, **DD/MM/YY** and **DD.MM.YY** three kinds of formats.

Property Description of Alarm Moving Sign Elements		
Setting	Alarm Number	If this option is selected, when the alarm occurs, the alarm number that is designated in Alarm Setup dialog box will also be shown in front of the alarm message. Please refer to the figures below: 004 Support Up/Down load For Screen Data
	Color	When Time and Date these two options are selected, the user can designate the display color by using this option.
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.14   Keypad Elements
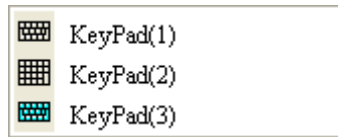
Fig. 3-8-31 Keypad Elements

Property Description of Keypad (1) / (2) / (3) Elements
Provide three kinds of default keypad elements for selection. The user can select decimal, hexadecimal or character these three kinds of keypad according to difference application requirement.
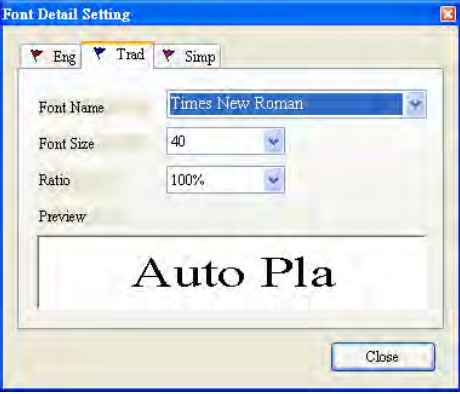
Keypad (1) Decimal Keypad   Keypad (2) Hexadecimal Keypad
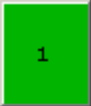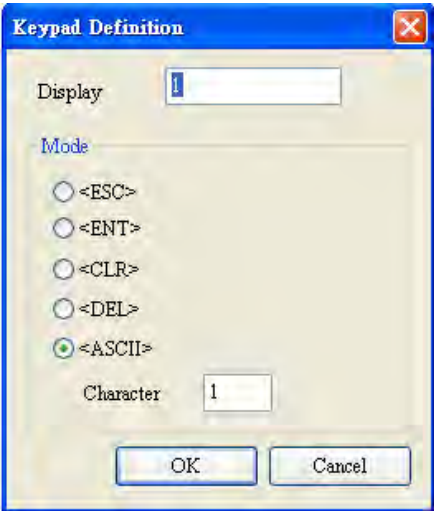
Keypad (3) Character Keypad

The user can redefine the display text of each button shown on the keypad. The other buttons, such as **<ESC>** (Escape), **<ENT>** (Enter), **<CLR>** (Clear), **<DEL>** (Delete) and **<ASCII>** (Input Character) can also be renamed flexibly. Please refer to the following figure below:

Property Description of Keypad (1) / (2) / (3) Elements

When the "Text" option is inputted as number "1", the display text on the button will be "1". If the user refines it as number "2", the display text will be changed to "2". If it is refined as character "A", the display text will be changed to "A". If it is changed to character "%", the display text will be changed to "%" and vise versa.

The keypad is displayed in a "Group" on the screen. The user can use "Ungroup" command from "Edit" menu bar to ungroup all the buttons. Then, the user move and change the button size freely. At this time, the user can redefine the display text shown on the button in the property table.

The keypad element should be used with the Numeric / Character Entry elements. For these two kinds of elements, the user has to set the Input Mode as "Active Non-Popup" and "Touch Non-Popup" and InterLock Address should be set also. Please refer to section 3.8.8.1 and 3.8.8.2 for the property description of Numeric / Character Entry elements. (The difference between "Active Non-Popup" and "Touch Non-Popup" is that when InterLock Address is set, the element will twinkle automatically if its input mode is set to "Active Non-Popup"; however, when InterLock Address is set, if its input mode is set to "Touch Non-Popup", the element will not twinkle until the user touches the element.)

Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element. The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. When the user press ▢ button next to **Font**, the following **Font Detail Setting** dialog box will display. In **Font Detail Setting** dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in **Font Detail Setting** dialog box. Please refer to the example figure above.

Property Description of Keypad (1) / (2) / (3) Elements	
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color Style	There are Standard and Raised these two options. (When the style is selected as Standard and the foreground color is set to green.) (When the style is selected as Raised and the foreground color is set to red.)
Setting	The user can redefine the buttons of the keypad.
	Display: Display text or character Mode: The are following modes provided:: 1. <ESC> Escape/Cancel (If the keypad is put on the sub window, this key can be used to close the sub window. 2. <ENT> Enter 3. <CLR> Clear 4. <DEL> Delete 5. <ASCII> Character

3.8.15　Drawing Elements
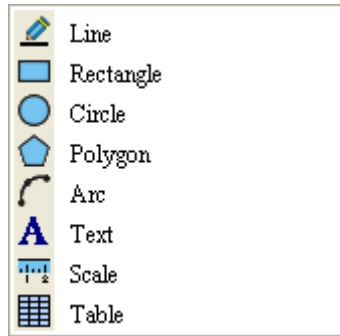
Fig. 3-8-32 Drawing Elements

3.8.15.1 Line

Property Description of Line Drawing Elements	
Left-click the mouse to draw and edit the line graphic element. The user can click where the user wants to start the line and drag across the work place on the screen. Then, release the mouse to finish the line. When selecting this line graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the line more quickly and conveniently. The user can set line color, size and style in property table freely. The range out of the line graphic element itself will be displayed in transparent color. Line Direction　　　　Line Size (from 1 to 8)	
Curve Color	It is used to set the display color of the line element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Line Style	There are following line styles can be selected.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.15.2 Rectangle

Property Description of Rectangle Drawing Element	
Left-click the mouse to draw and edit the rectangle graphic element. The user can drag the mouse across work place on the screen until the rectangle is the size that the user wants. Then, release the mouse to finish. The user can import the picture into the rectangle from picture bank and set rectangle color, size and style in property table.	
Curve Color	It is used to set the display color of the rectangle element.
Bank (Picture Bank) Picture Name	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Transparent Effect Transparent Color	(Please refer to Table 3-8-2 Property Description of General Buttons.)
Foreground Color	It is used to set the display color of the rectangle graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.
Round Radius	0~38 pixels round radius are provided for selection.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.15.3 Circle

Property Description of Circle Drawing Element
The user can draw an ellipse or circle by using this option. The user can drag the mouse across work place on the screen until the ellipse or circle is the size that the user wants. Then, release the mouse to finish. If the width and height of the circle graphic element are the same size, the circle graphic element will be a round shape circle. If the width and height of the circle graphic element are not the same size, it will be an ellipse element. When selecting this circle graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the circle more quickly and conveniently. Changing the size of the rectangle range is changing the size of circle graphic element directly. The range out of the circle graphic element itself will be displayed in transparent color. There is a "Transparent" option in the element property table. Once Yes is selected, the element will display only with the border and there is no color in the element. If there is any other element under this circle graphic element, it will show up and can be viewed on the screen. An ellipse that its "Transparent" setting in the property table is set to "No" An circle that its "Transparent" setting in the property table is set to "No". An circle that its "Transparent" setting in the property table is set to "Yes".
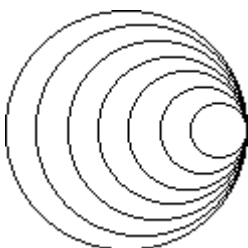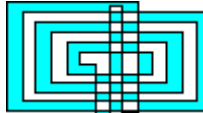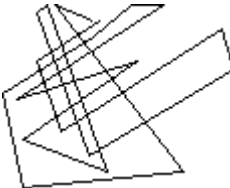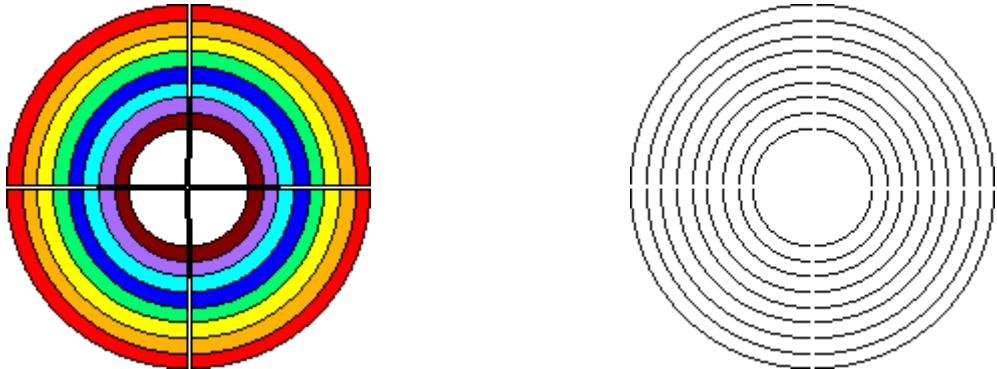
Property Description of Circle Drawing Element	
An ellipse that its "Transparent" setting in the property table is set to "Yes".	
Curve Color	It is used to set the line color of the circle graphic element.
Foreground Color	It is used to set the display color of the circle graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.
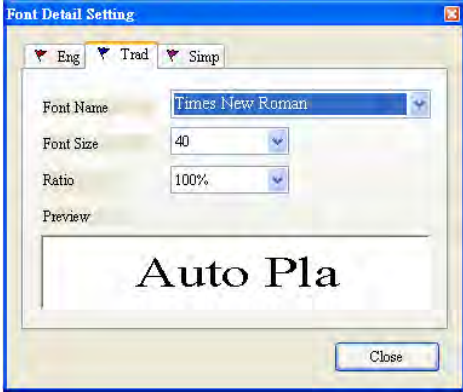
3.8.15.4 Polygon

Property Description of Polygon Drawing Element	
Left-click the mouse to determine each node of the polygon graphic element. The user can click where the user wants to place the first node and drag the mouse across work place on the screen until the next node is decided and left-click the mouse again to determine the position of the next node. Repeat the above action until the polygon is the size that the user wants. Then, right-click the mouse the mouse to finish. When selecting this polygon graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the polygon more quickly and conveniently. Changing the size of the rectangle range is changing the size of circle graphic element directly. The range out of the circle graphic element itself will be displayed in transparent color. There is a "Transparent" option in the element property table. Once Yes is selected, the element will display only with the border and there is no color in the element. If there is any other element under this circle graphic element, it will show up and can be viewed on the screen.	
Curve Color	It is used to set the line color of the polygon graphic element.
Foreground Color	It is used to set the display color of the polygon graphic element. Please refer to the figures below: The foreground color is set to blue. The foreground color is set to turquoise.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also. Please refer to the figures below: A polygon that its "Transparent" setting in the property table is set to "No". A polygon that its "Transparent" setting in the property table is set to "Yes".

3.8.15.5 Arc
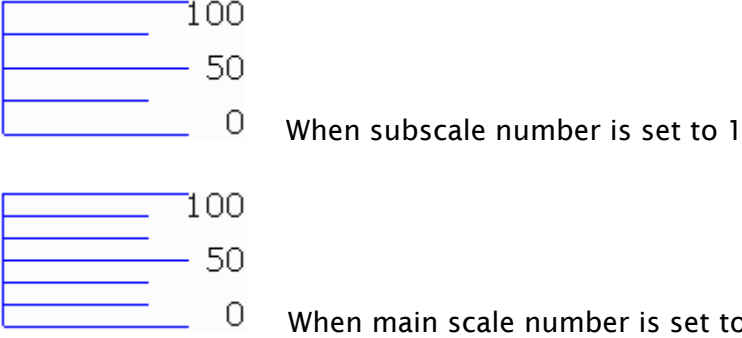
Property Description of Arc Drawing Element
Left-click the mouse to draw and edit the arc graphic element. The user can click where the user wants to start the arc and drag across the work place on the screen. Then, release the mouse to finish the arc. When selecting this arc graphic element, the user can see a rectangle range and this is designed for the user to move and adjust the arc more quickly and conveniently. Changing the size of the rectangle range is changing the size of arc graphic element directly. There is a "Transparent" option in the element property table. If this option is set to Yes, it indicates that this element is an arc. If this option is set to No, it indicates that this element is a sector. The range out of the circle graphic element itself will be displayed in transparent color.   When "Transparent" is set to "No"   When "Transparent" is set to "Yes".

Curve Color	It is used to set the line color of the arc graphic element.
Foreground Color	It is used to set the display color of the arc graphic element.
Line Size	The unit is Pixel and the range is within 1 ~ 8.
Transparent	When this option is selected, the element will display only with the border and there is no color in the element. The Foreground Color option will be disabled also.

3.8.15.6 Text
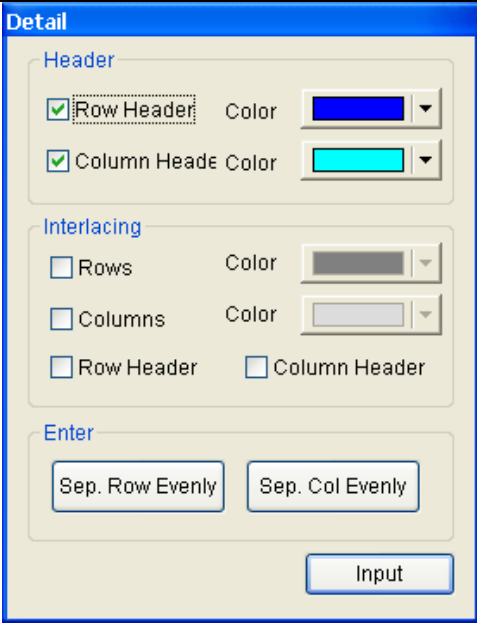
Property Description of Text Drawing Element	
This text graphic element is used to create a text frame, and add and edit the text on the screen. The user can drag the mouse across work place on the screen until the text frame is the size that the user wants and release the mouse to finish. Then, add and edit the text in the text frame. The foreground color is the color of the text frame.	
Text Text Size Font Text Color	The user can set the text, text size, font and text color provided by Windows® to determine the text display on the element. The user can set the text, text size, font and text color that provided by Windows® to determine the text display on the element. When the user press [···] button next to **Font**, the following **Font Detail Setting** dialog box will display. In **Font Detail Setting** dialog box, the user can select Font Name, Font Size and Ratio of the text and view the text format from the Preview window in advance. If the multi-language function is used, the user can see different language tabs and edit different language font setting in **Font Detail Setting** dialog box. Please refer to the example figure above.
Foreground Color	It is used to set the text frame color. Please refer to the figure below. The foreground color of this text graphic element is set to blue.
Transparent	When this option is selected, the element will display the text only and there is no color in the element. The Foreground Color option will be disabled also.
X	Used to set X coordinate
Y	Used to set Y coordinate
Width	Used to set the element width
Height	Used to set the element height

3.8.15.7 Scale

Property Description of Scale Drawing Element			
The user can change the scale direction, main and sub scale number, and grid color in the property table to create a special and unique scale graphic element. The "Display Mark" option can be used to determine if the scale value display next to the scale or not. The minimum and maximum of the scale value can be set in "Detail Setup" option.			
Text Size Text Color	The user can set the text size and text color that provided by HMI to determine the text display on the element. HMI provides 8~64 kinds of default text font for the user to use.		
Style	Standard	Rotation 90	Rotation 180	Rotation 270

Note: The table continues with visual scale examples.

	Standard	Rotation 90	Rotation 180	Rotation 270

Main Scale — Please refer to the figures below::

When main scale number is set to 2

When main scale number is set to 3

Setting

Date Length	There are 16bits Word and 32bits Double Word two options.

Property Description of Scale Drawing Element		
Setting	Data Format	There are following data format provided: Word/Double Word 1. BCD 2. Signed Decimal 3. Unsigned Decimal
	Minimum Maximum	The user can set the minimum and maximum of input setting value to determine the range of input setting value.
	Integral Digits Fractional Digits	Use this option to determine the digit number of integer and decimal fraction. The digit number is not a real digit number value. It is only the display format. The digit number will be a real decimal number only when the data format is selected as "Floating".
	When the user have input the minimum and maximum value, after pressing OK button, HMI will examine the value by referring to the selected data length, data format, integral and fractional digits.	
SubScale Number	When the main scale number is set to 3 and the subscale number is also used, the scale graphic element will display as the figures below: When subscale number is set to 1 When main scale number is set to 2	
X	Used to set X coordinate	
Y	Used to set Y coordinate	
Width	Used to set the element width	
Height	Used to set the element height	

3.8.15.8 Table

Property Description of Table Drawing Element	
The user can change the cell numbers of the table, appearance and color in the property table to create a special and unique table graphic element. If it is used with other elements, each element will display more completely on the screen.	
Background Color	It is used to set the display color of the table scale element.
Setting	
	Row Header — It is used to the color of the first row of the table. The user can enable or disable this option by checking the check box next to "Row Header".
	Col umn Header — It is used to the color of the first column of the table. The user can enable or disable this option by checking the check box next to "Column Header".
	Rows — It is used to the color of the interlacing rows of the table. The user can enable or disable this option by checking the check box next to "Rows".
	Columns — It is used to the color of the interlacing rows of the table. The user can enable or disable this option by checking the check box next to "Rows".
	Row Header — It is used to the color of the interlacing row header of the table. The user can enable or disable this option by checking the check box next to "Row Header".

Property Description of Table Drawing Element		
Setting	Columns Header	It is used to the color of the interlacing column header of the table. The user can enable or disable this option by checking the check box next to "Columns Header".
	Sep. Rows Evenly	It is used to distribute rows of the table evenly.
	Sep. Col Evenly	It is used to distribute columns of the table evenly.
Border Color		It is used to set the border color of the table.
Grid Line Color		It is used to set the grid color of the table.
Number of Rows		The range is within 1 ~ 99.
Number of Columns		The range is within 1 ~ 99.
X		Used to set X coordinate
Y		Used to set Y coordinate
Width		Used to set the element width
Height		Used to set the element height

3.9   Menu Bar and Toolbar (Screen)
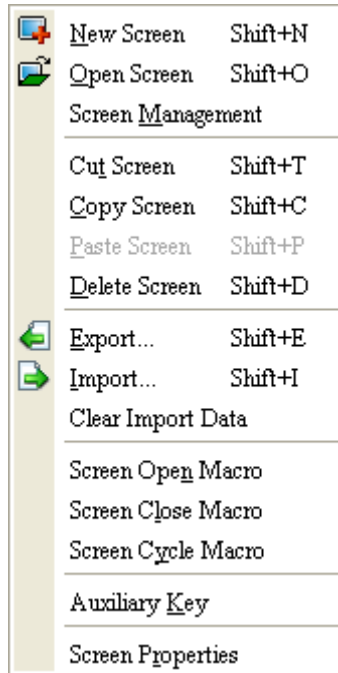
In Screen options, ScrEdit provides some screen editing functions.

3.9.1   New Screen

Create a new screen. The user can choose **Screen > New Screen** or click the New Screen icon
, or press **Shift + N** to open a new editing screen. The new screen can be named and numbered by the user. The setting dialog box is shown as Fig. 3-9-1.
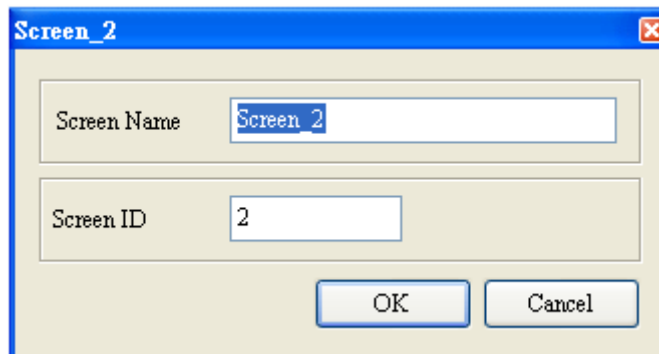
Fig. 3-9-1 New Screen dialog box

3.9.2   Open Screen

Open an old screen. The user can choose **Screen > Open Screen** or click the Open Screen

icon , or press **Shift + O**. When choosing open screen, the user can preview each screen

in Open Screen dialog box (Fig. 3-9-2).
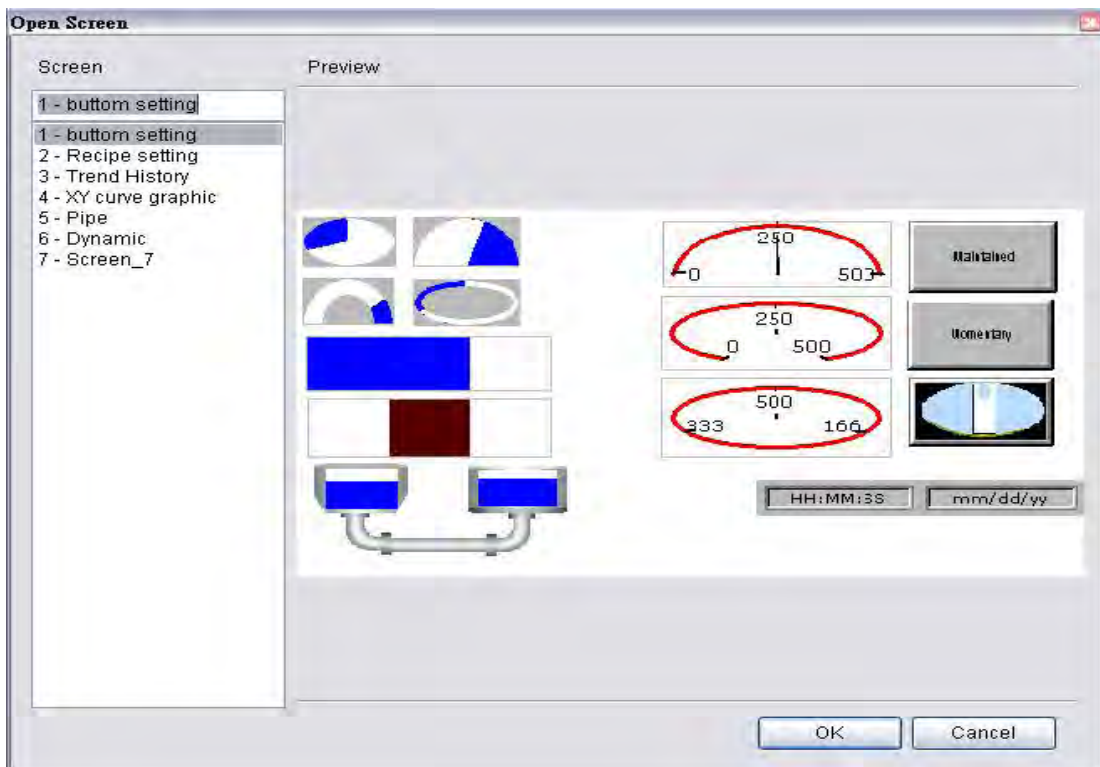
Fig. 3-9-2 Open Screen dialog box

3.9.3 Screen Management

When **Screen Management** function is enabled (Fig. 3-9-3), the user can duplicate, paste and cut the screen using the mouse, just like the function of Windows Explorer in Windows® operating system. In **Screen Management** dialog box, the user can right click the mouse to manage all of the screens (Fig. 3-9-4). Please note that the user cannot undo the action of cut screen. It is the same as delete screen that screen will be lost but it can be pasted to get the same screen (Fig. 3-9-5). Besides, right-click the mouse to select the **Edit Save Screen** function, and then the user can drag the mouse to determine the screen saver display (Fig. 3-9-6). For the setting of screen saver, please click **Options > Configuration > Other**.
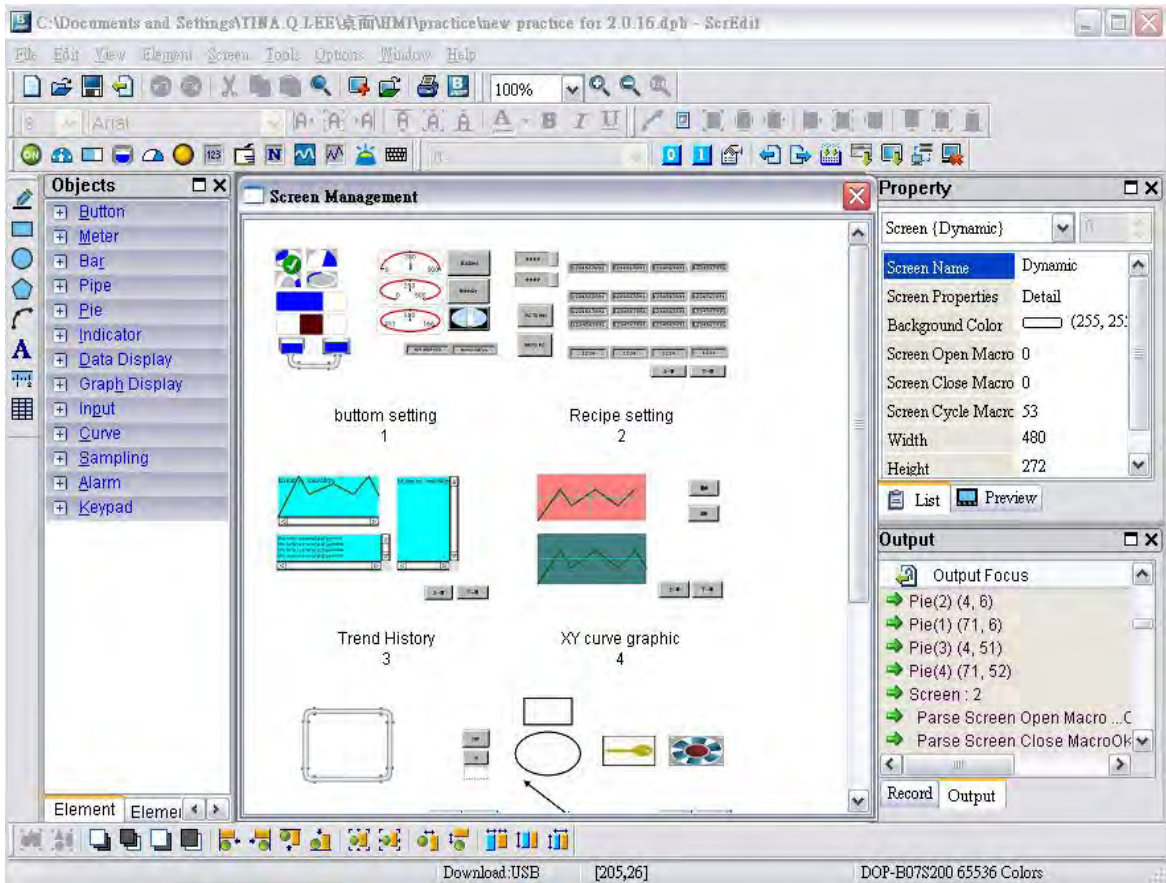
Fig. 3-9-3 Screen Management dialog box
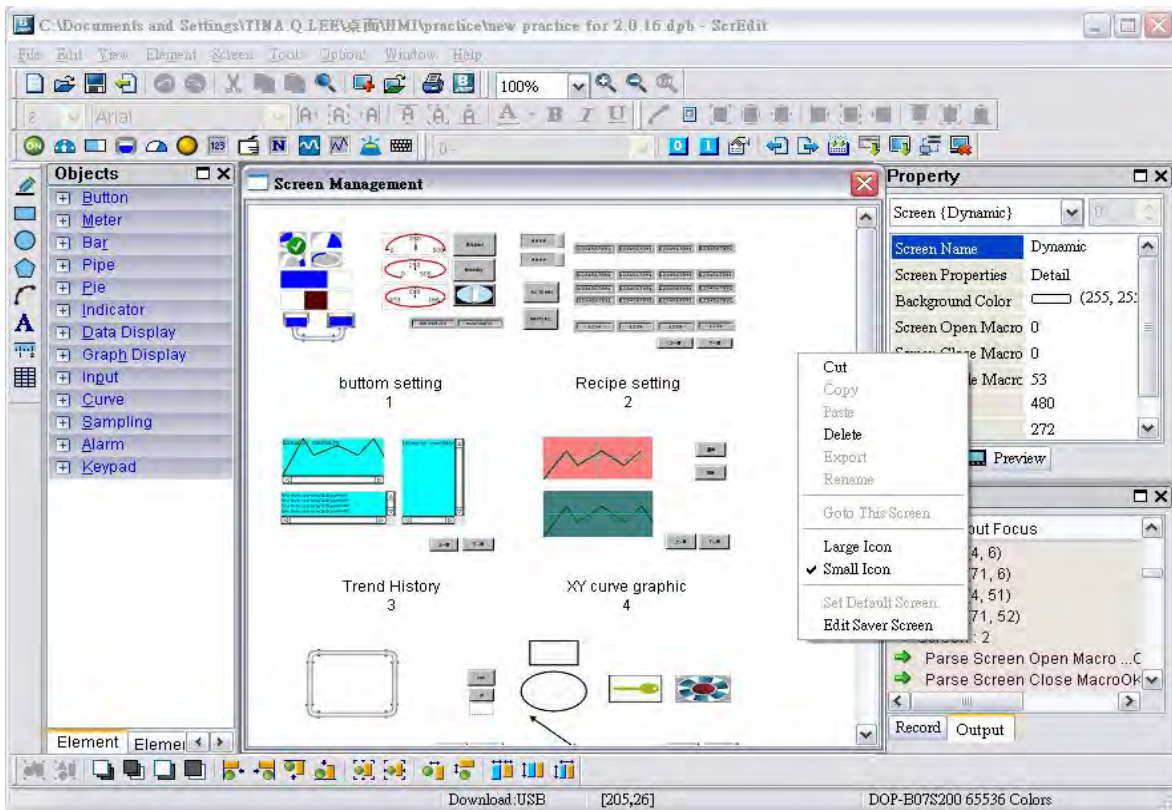
Fig. 3-9-4 Right-click the mouse
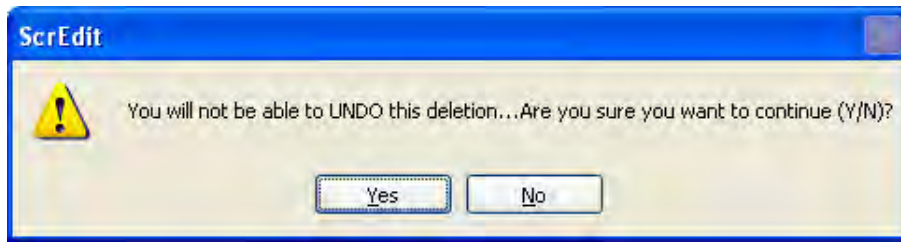
Fig. 3-9-5 Warning message after screen is cut
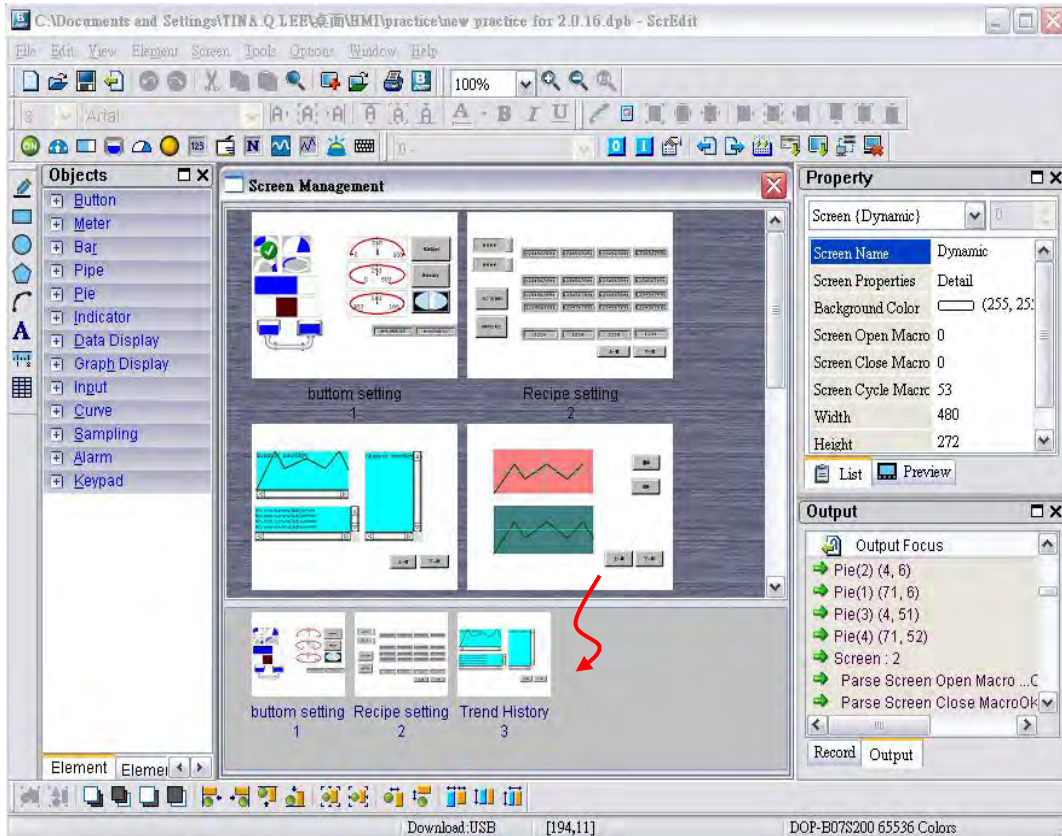
Fig. 3-9-6 Drag the mouse to determine the screen saver display

3.9.4 Cut Screen

Cut whole screen to clipboard, just like the Microsoft Office Clipboard function. The difference is that Microsoft Office Clipboard allows the user to cut text and graphic items and the Cut Screen function only allows the user to cut a whole screen. The user can execute this function by choosing **Screen > Cut Screen**, or pressing **Shift + T**.

Please note that the user cannot undo the action of cut screen. It is the same as delete screen that screen will be lost but it can be pasted from the clipboard to recover (Fig.3-9-7).
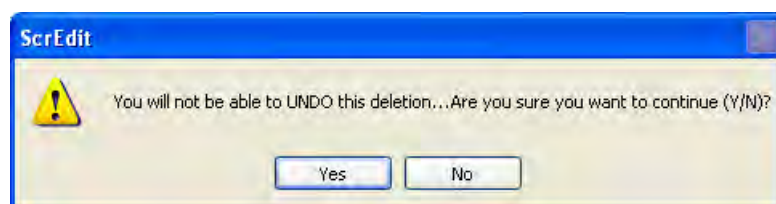
Fig. 3-9-7 Cut Screen message

3.9.5 Copy Screen

Copy whole screen. The user can execute this function by clicking **Screen > Copy Screen** or use keyboard shortcuts by pressing **Shift + C**.

3.9.6 Paste Screen

The user can paste a screen by clicking **Screen > Paste Screen** or pressing **Shift + P**. The screen settings are the same as the original screen, except for the new screen name. Screen Editor gives a screen name automatically.

3.9.7 Delete Screen

Delete the current editing screen or element. The user can delete a screen by clicking **Screen > Delete Screen** or pressing **Shift + D**.
Please note that It is not possible to undo the delete operation. After selecting the Delete command, the user will see the dialog box below. Make sure that the user selects a correct screen before deleting it.
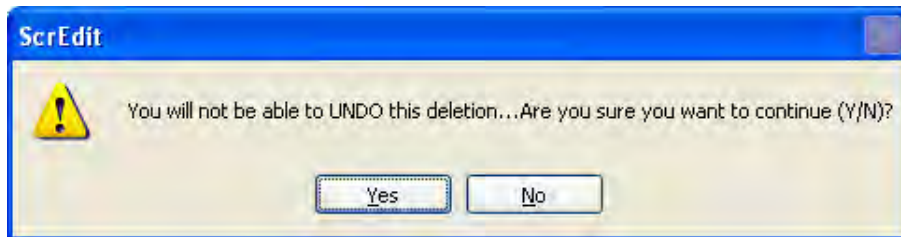
Fig. 3-9-8 Delete Screen Message

3.9.8 Export

Export an project to BMP format. The user can execute this function by clicking **Screen > Export** or clicking the Export icon , or pressing **Shift + E**.

3.9.9 Import

This command imports a picture to be the ground of the editing screen. Please note that the ground of the editing screen is different than the base screen. The nature of an imported picture differs greatly from that of the base screen. The imported picture cannot exist in ScrEdit as an element. However, the base screen can be regarded as an element and then exist in the editing screen after a compile operation is completed (The definition and usage of the base screen will be introduced more in the section of "Screen Properties"). The file types of available imported picture can be BMP, JPG and GIF, etc. The user can execute this function by clicking **Screen > Import** or pressing **Shift + I**.

3.9.10 Clear Import Data

The user can free more disk space by clearing the imported data that the user does not want to use. Execute this function by clicking **Screen > Clear Import Data**.

3.9.11 Screen Open Macro

When **Screen Open Macro** function is selected, the Macro will be executed automatically once opening screen occurs. The user also can click the **Screen Open Macro**, **Screen Close Macro** and **Screen Cycle Macro** options from the Property Table to enter intro Screen Open Marco editing environment (Fig. 3-9-9). For details on how to use and edit macro commands, refer to section 3.1.14.
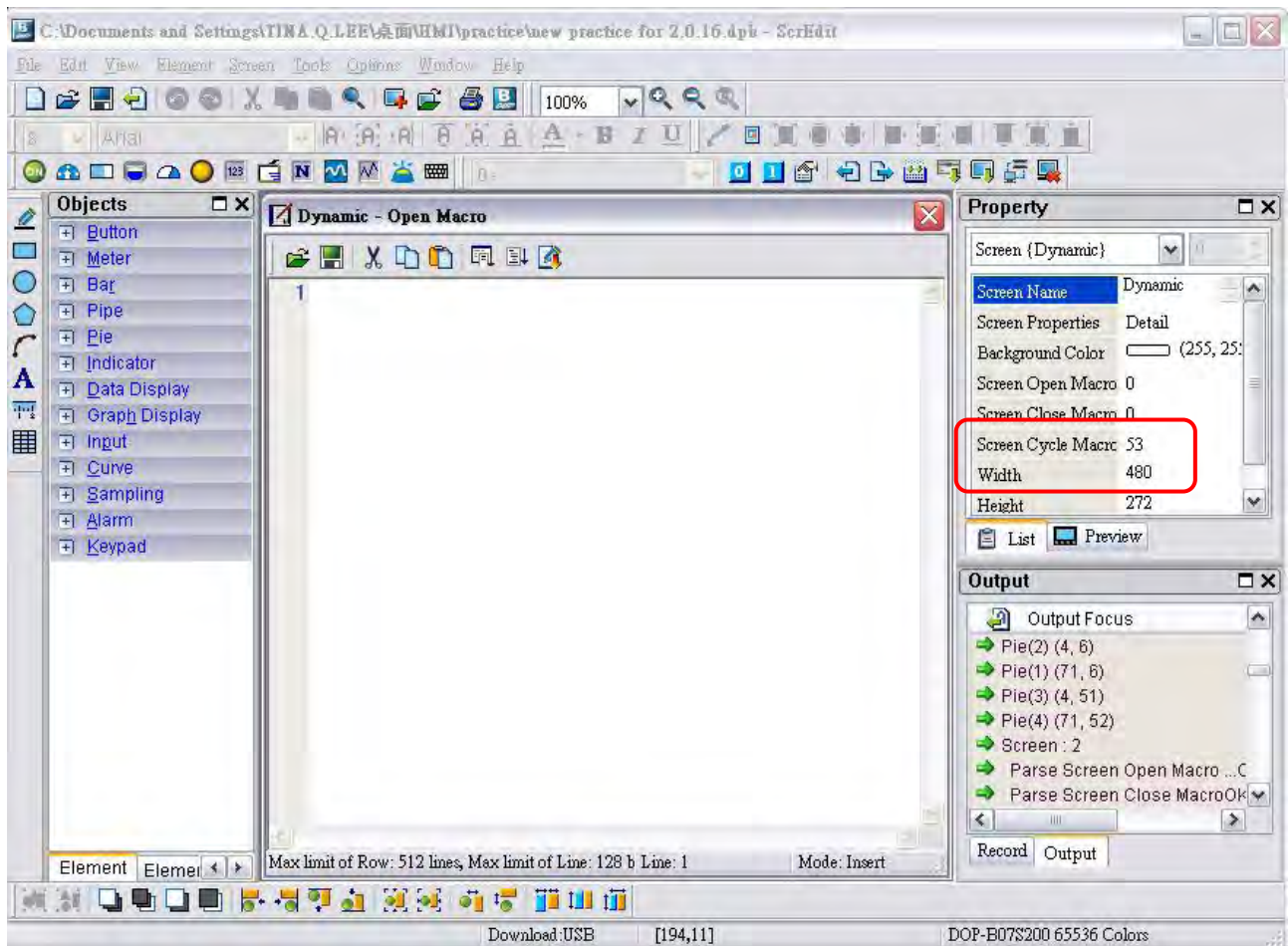
Fig. 3-9-9 Screen Open Macro dialog box

3.9.12 Screen Close Macro

When **Screen Close Macro** function is selected, the Macro will be executed automatically once the screen is closed. For details on how to use and edit macro commands, refer to section 3.1.14.

3.9.13 Screen Cycle Macro

When **Screen Cycle Macro** function is selected, the Macro will be executed continuously once the screen is displayed. (Macro will be executed continuously by the cycle time setting) For details on how to use and edit macro commands, refer to section 3.1.14.

The user also can click the **Screen Open Macro**, **Screen Close Macro** and **Screen Cycle Macro** options from the Property Table to enter intro Screen Open Marco editing environment (Fig. 3-9-9).

3.9.14 Auxiliary Key

DOP-B series HMI allows the user to determine the function of auxiliary keys in each screen. The user can execute this function by clicking **Screen > Auxiliary Key**. Auxiliary key setup for each screen can be completed by pressing the auxiliary keys on HMI panel or on the screen (Fig. 3-9-10).
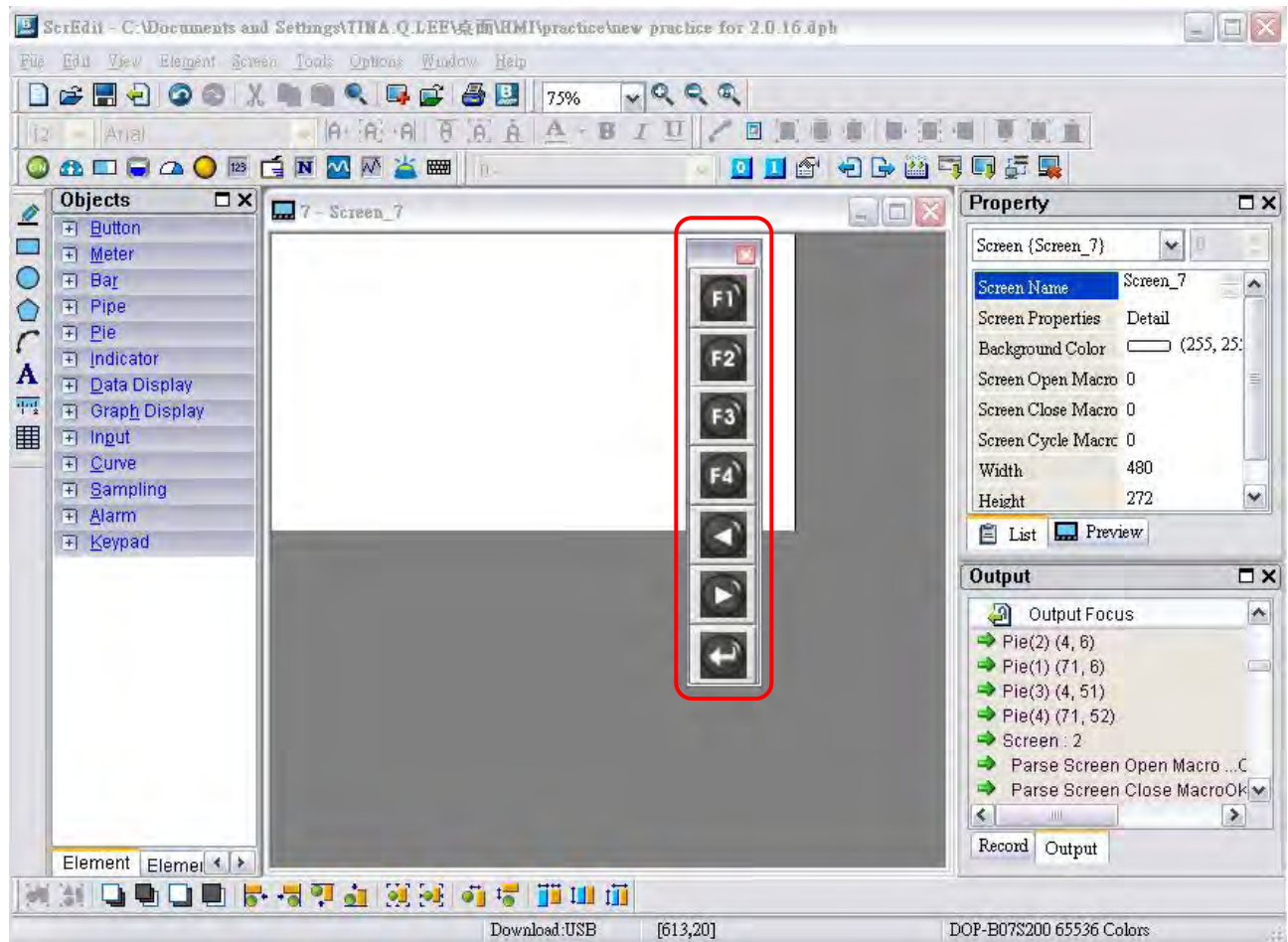
Fig. 3-9-10 Auxiliary Key setup

3.9.15   Screen Properties

This function sets the properties of the current screen. The user can view and choose the properties of the current editing screen by selecting **Screen > Screen Properties** or choosing **Screen Properties** from docking windows (Fig. 3-9-11, 3-9-12）.
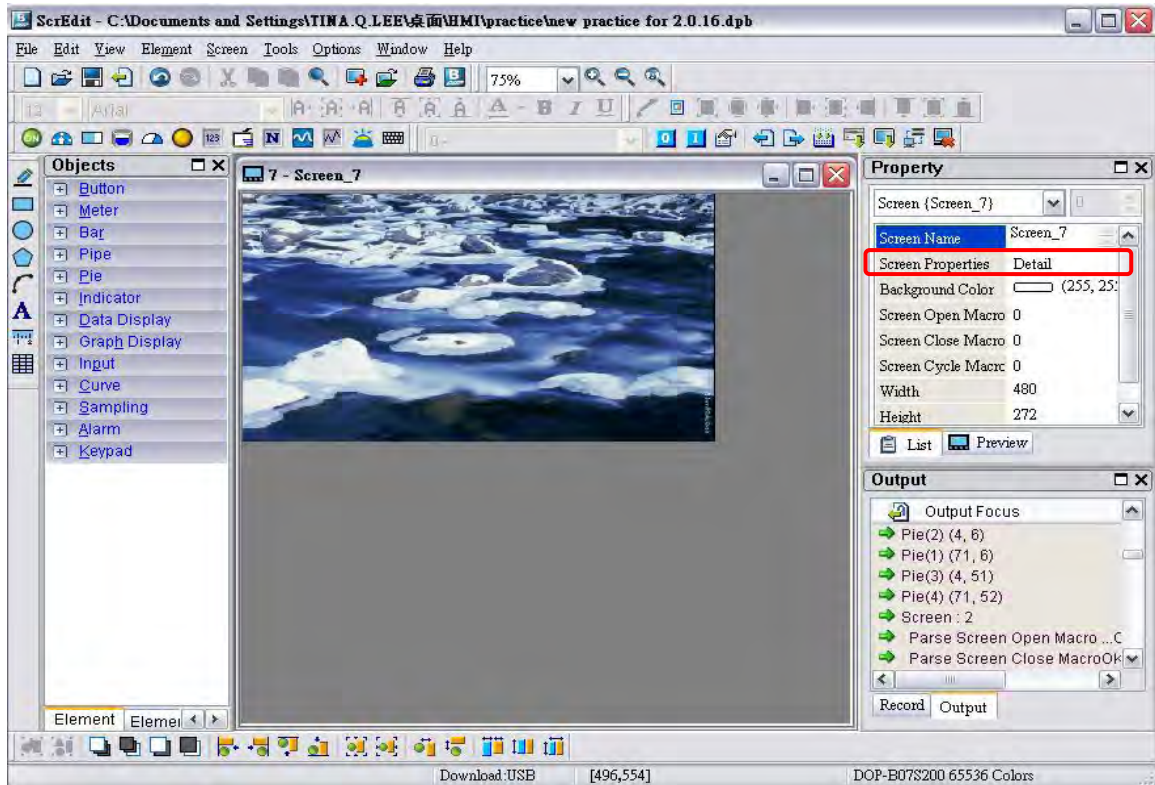
Fig. 3-9-11 Choosing Screen Properties
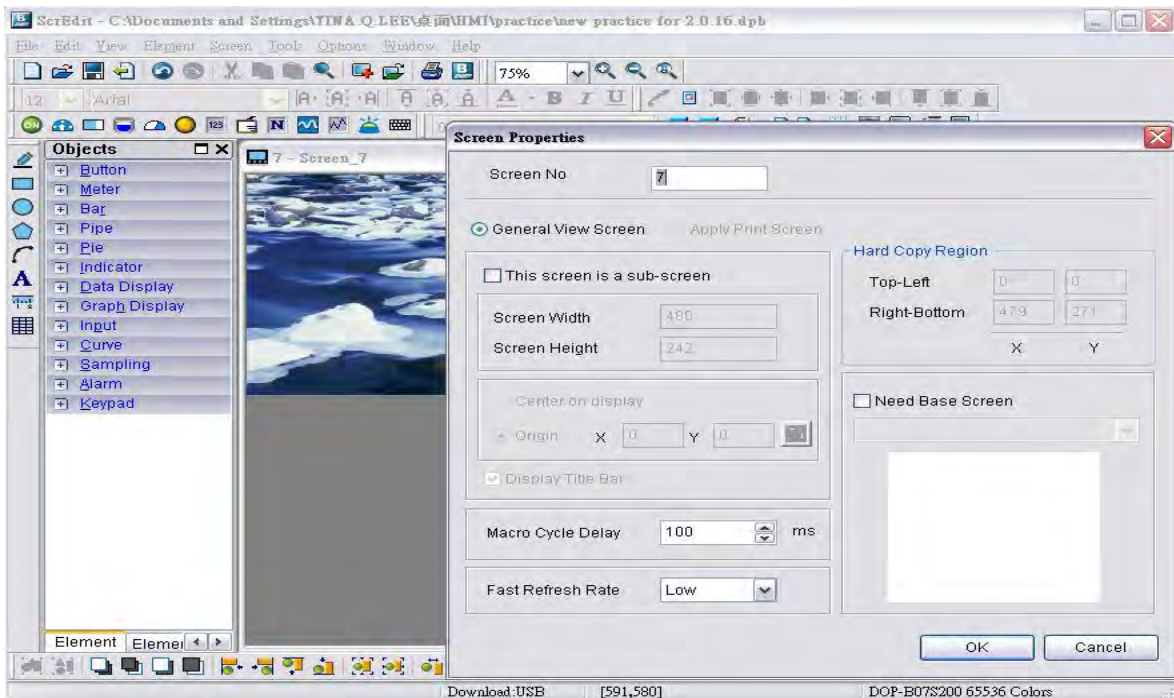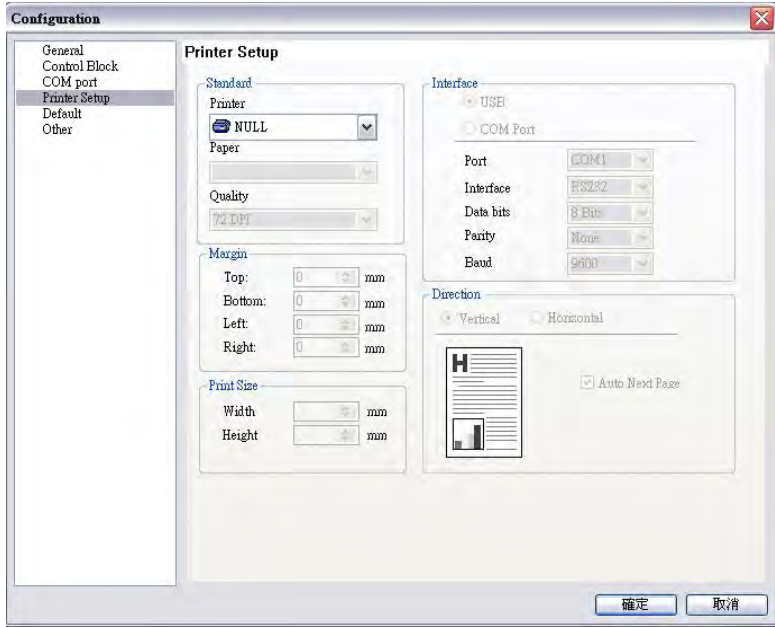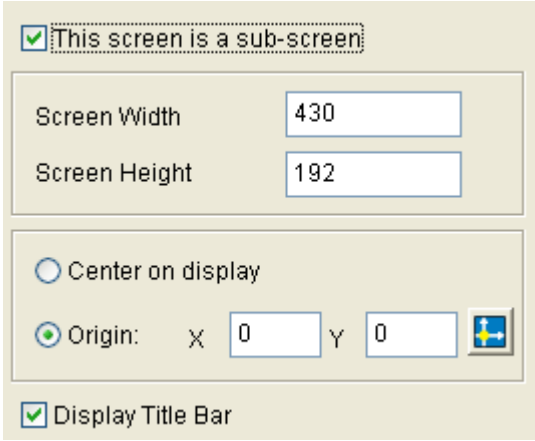
Fig. 3-9-12 Screen Properties dialog box

Function		Description
Screen Number		The range is between 1 and 65535. Each screen number must be unique. The user cannot use the same number two times.
Screen Application	General View Screen	Regarded as general view screen.
	Apply Print Screen	1. Regarded as print screen. The printer can print the element created by the user after a compile operation. This option is only available in DOP-B series HMI which supports printer function. 2. When Apply Print Screen function is selected, the editing range will be scaled to the actual paper size of the printer. The user can only print the elements within the range of the paper size. This option is usually used for print typesetting (print layout management function). For the setting of print function, please click **Options > Configuration > Printer Setup**.

Function		Description
Sub-screen	Sub-screen setting	The check box next to "This screen is a sub-screen" can be checked only when **General View Screen** option is selected. Therefore, before setting sub-screen function, ensure the **General View Screen** option is selected.
	Screen Width	Set the width of sub-screen and the unit is Pixel.
	Screen Height	Set the height of sub-screen and the unit is Pixel.
Sub-screen	Sub-screen Position	This option can show the sub-screen on the center of the HMI screen or on a position you specify. To specify the position, · input the coordinate value directly (X and Y axis) or · press the icon to drag the sub-screen.
	Title Bar	The user can select this option to display the title bar on the screen.

Function		Description
Cycle Macro Delay Time		Sets Macro Cycle Delay time every time this screen is executed. The range of the macro cycle delay time is between 100ms to 5s.
Fast Refresh Rate		There are three levels of the Fast Refresh Rate and they are High, Medium and Low. The purpose of this function is used to make some elements be displayed immediately when switching screens. **Please note that this function is designed to provide fast value refresh speed for the element which performs communication frequently. Therefore, it only allows four elements that can be renewed immediately in each screen. If the user uses this function on too many elements, it may affect the normal speed of HMI operation. So, we recommend the user not to activate this function if not necessary.**
Hard Copy Region	Setting	The user can find this function only in DOP-B series HMI which supports printer function. If the user wants to enable this function, setting the printer in advance is necessary. Please go to **Option > Configuration > Printer Setup** and select the printer first. When this function is enabled, if one report list button is created and its assigned output device is a printer, once the user presses the report list button, HMI will refer to the setting in Hard Copy Region option and execute the screen-printing.
	Top-Left	Set the region of HMI printing area (also called Hard Copy Region) and the unit is Pixel.
	Right-Bottom	
Need Base Screen	Setting	Every screen can specify any one of the editing screens as a base screen. When the check box next to **Need Base Screen** is checked, the base screen will be moved to the back (behind all other elements) as a ground picture. After compile operation is completed and the screen data is downloaded to HMI, HMI will execute all of the elements on the base screen correctly.

3.10 Menu Bar and Toolbar (Tools)

	Compile	Ctrl+F7
	Download Screen & Recipe	Ctrl+F8
	Upload Screen & Recipe	
	Download Screen	Ctrl+F9
	Upload recipe	
	Download Recipe	
	On-line Simulation	Ctrl+F4
	Off Line Simulation	Ctrl+F5
	Upgrade firmware	
	Get Firmware Information	
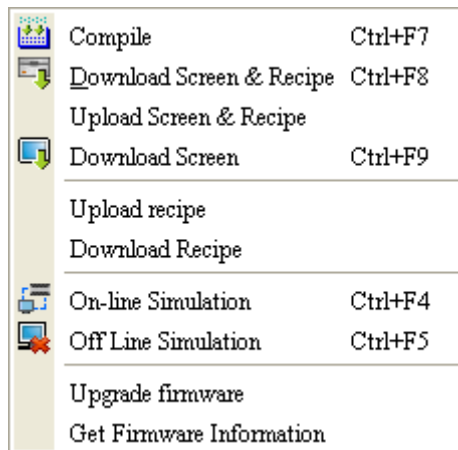
3.10.1 Compile

It is used to compile editing screen to the format for HMI. During compiling, all of the compiling messages, including any errors, will be written to output field. When there is any error occurs, system will remind the user. If there was no error during compiling process, an object file would be produced.

To compile the editing screen, select **Tools > Compile** or click icon [icon] directly or press **Ctrl + F7**. If this project is a new project, it will remind the user of saving before compiling. If this project has been saved or it is an old project, it will compile directly without prompt. After compile operation is finished, ScrEdit will save the file again automatically.

Debug Compiling Error during Compiling Process
1. Create a new project.
2. Create a button element and a numeric entry element on HMI screen and do not change the element default property as the figure below.
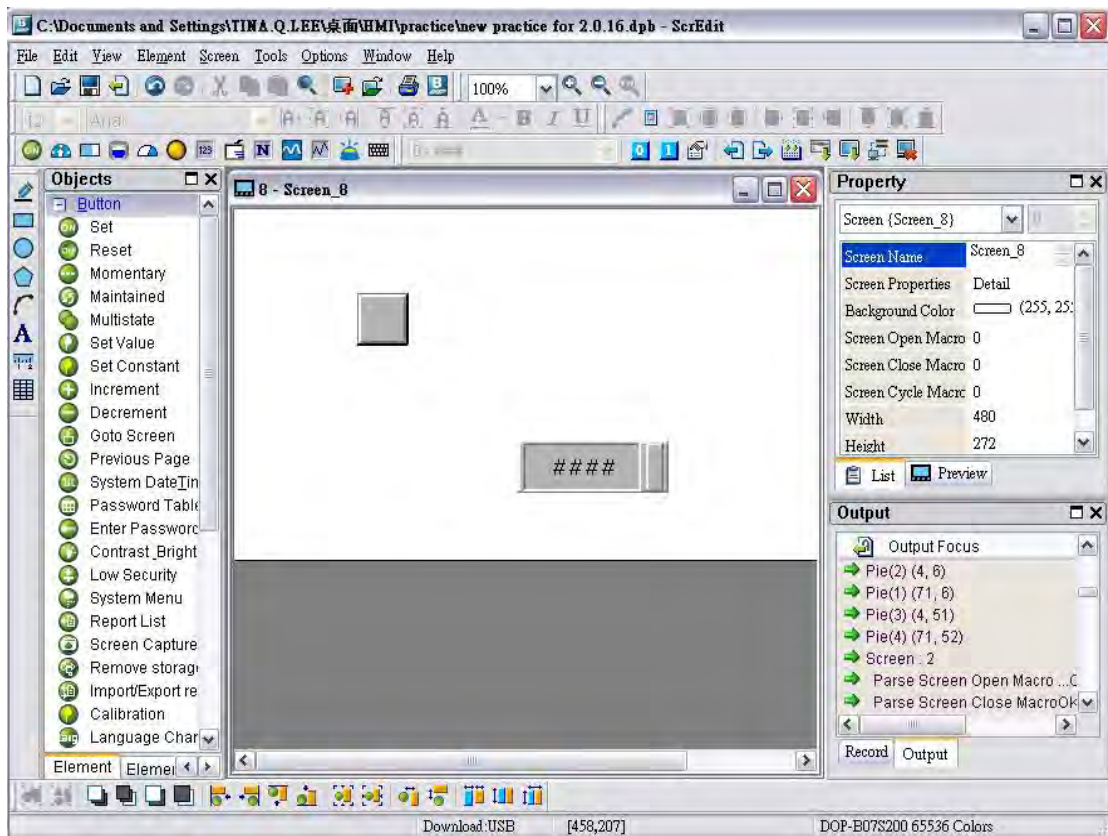
3. When pressing ▦ icon to execute compile operation, the error message dialog box will pop up to warn the user of compiling error and show how many errors there are. In the following figure, we can see that there are two errors occurred and they are all displayed in the output window.
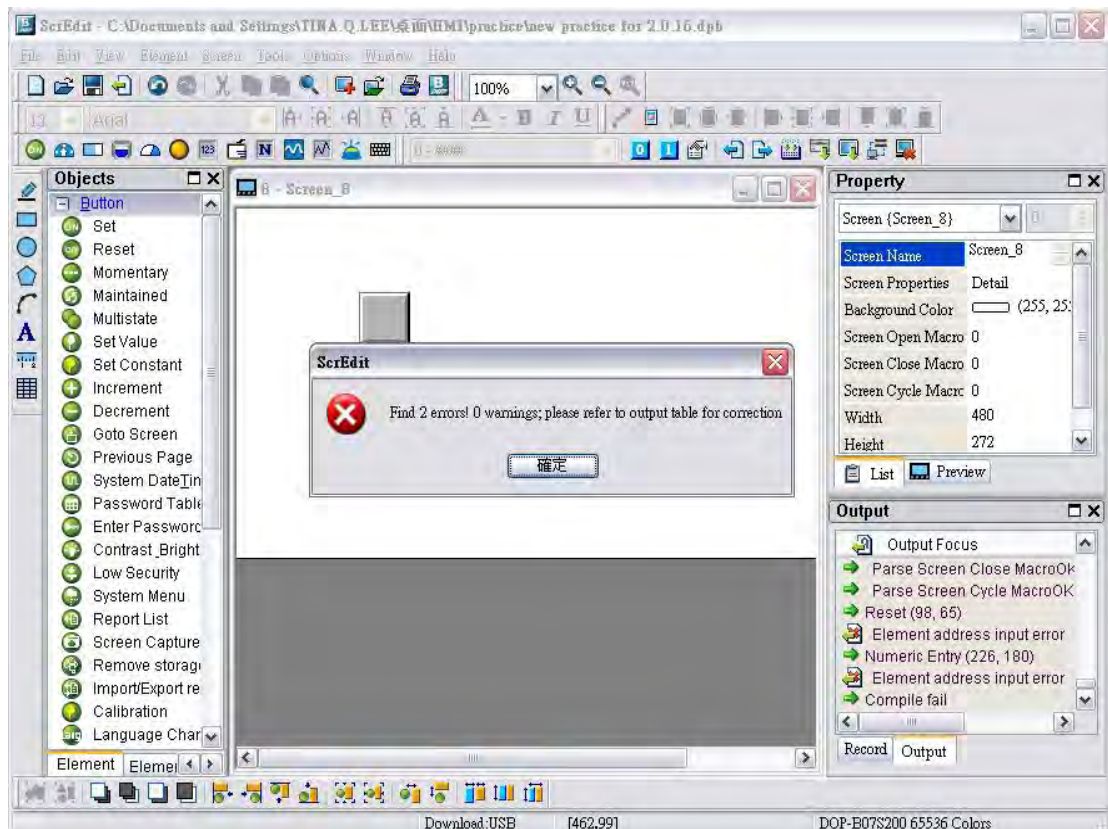
4. Once error occurs, the correspondent message will display in output window. The user can click the error message and ScrEdit will switch to error element window automatically.

3.10.2   Download Screen & Recipe

The user can download screen data and recipe to HMI by clicking **Tools > Download Screen & Recipe** or clicking 🖳 icon directly or pressing **Ctrl + F8**.

If PC cannot connect to HMI, the error messages will be displayed and warn the user (Fig. 3-10-1, Fig. 3-10-2, Fig. 3-10-3 and Fig. 3-10-4). The user can set download interface by using the following methods:

1. Clicking **Options > Configuration** or

2. Clicking **Options > Environment**. The download interface can be USB or RS-232.
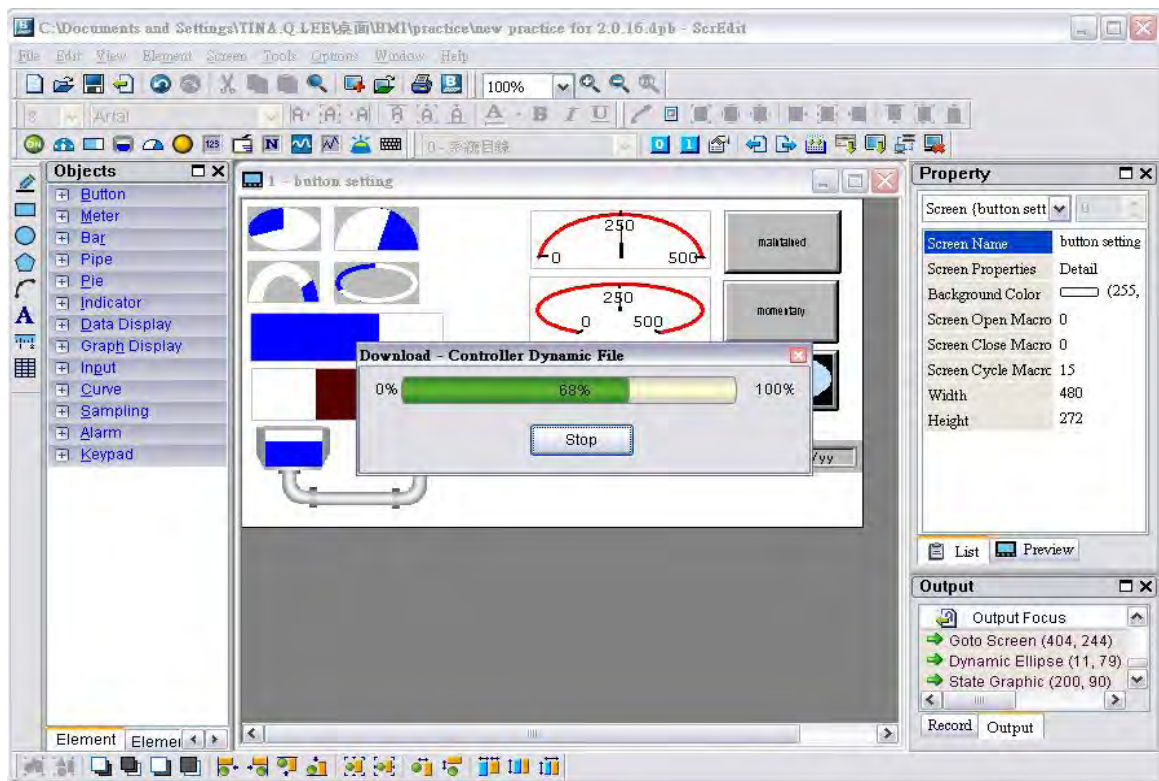
Fig. 3-10-1 Start download (the progress will be from 0 to 100%)
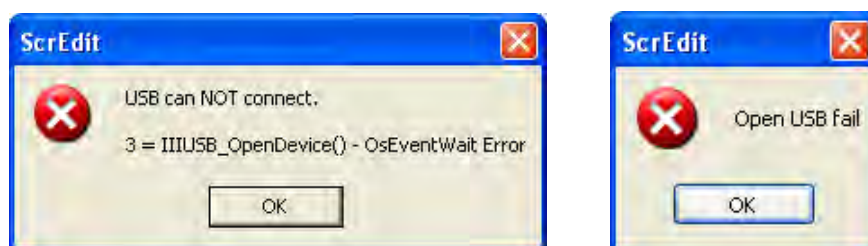
Fig. 3-10-2 USB open error message

Fig. 3-10-3 USB disconnect error message
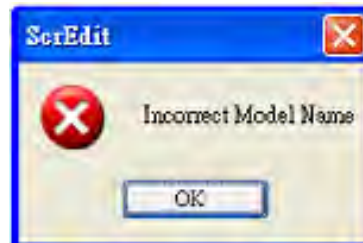
Fig. 3-10-4 Incorrect model name error message

3.10.3   Upload Screen & Recipe

After clicking **File > Upload Screen & Recipe**, the password dialog box will show up first (Fig. 3-10-5), the user needs to input password (the password is the highest priority saved in HMI, which is set by clicking **Options > Configuration > General > Security**). When entering the correct password, the user can get save as dialog box (Fig. 3-10-6). After inputting project file name, the uploading will start (Fig. 3-10-7). The user can get the progress with progress box and stop uploading by clicking Stop button. When progress goes to 100%, it indicates that the uploading is complete. The user can press Stop button to exit the dialog box. The file that is uploaded from HMI can be restored to original editing file for user to edit. This option is to avoid losing the original editing file. If the user wants to upload data with pictures also, just select the **Include Picture Data when uploading** in Environment dialog box by clicking **Options > Environment**.
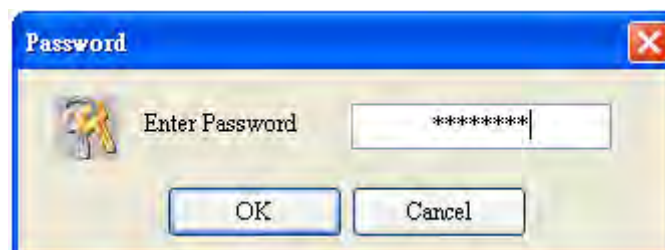
Fig. 3-10-5 Password dialog box
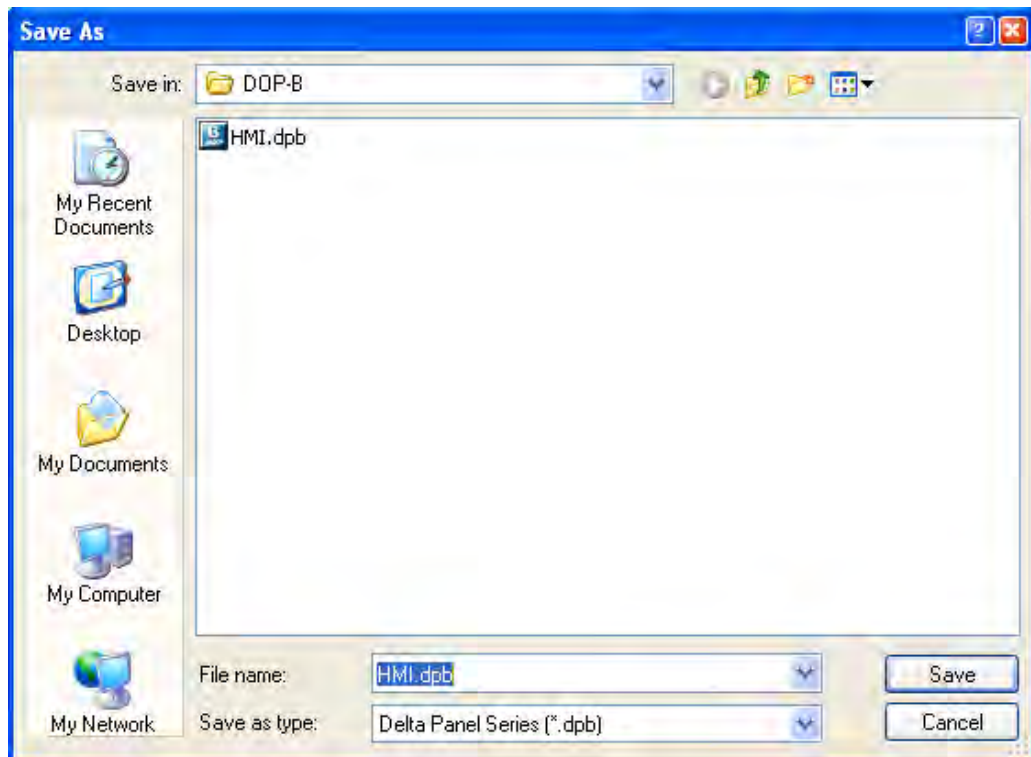
Fig. 3-10-6 Save as dialog box
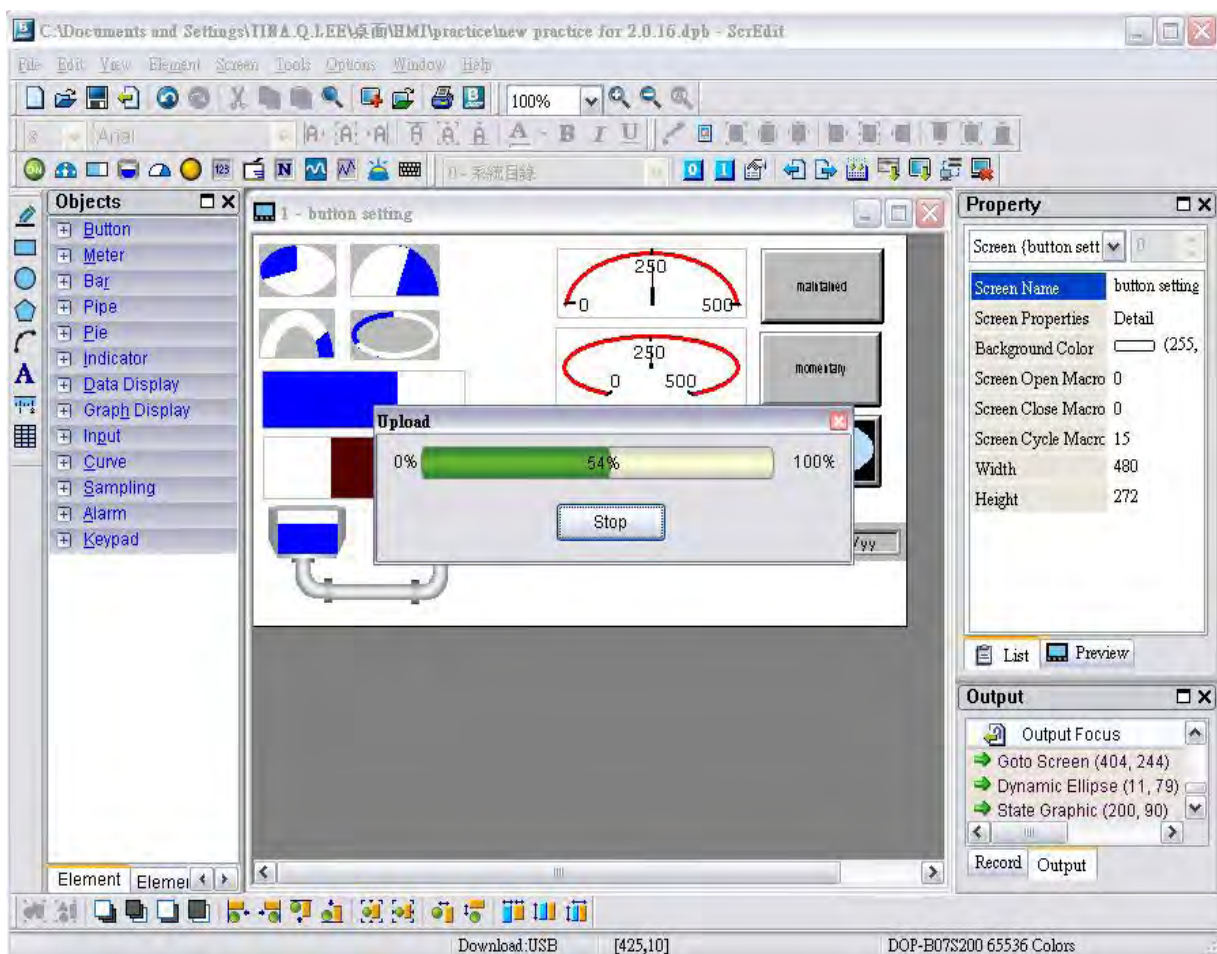
Fig. 3-10-7 Upload screen and recipe data
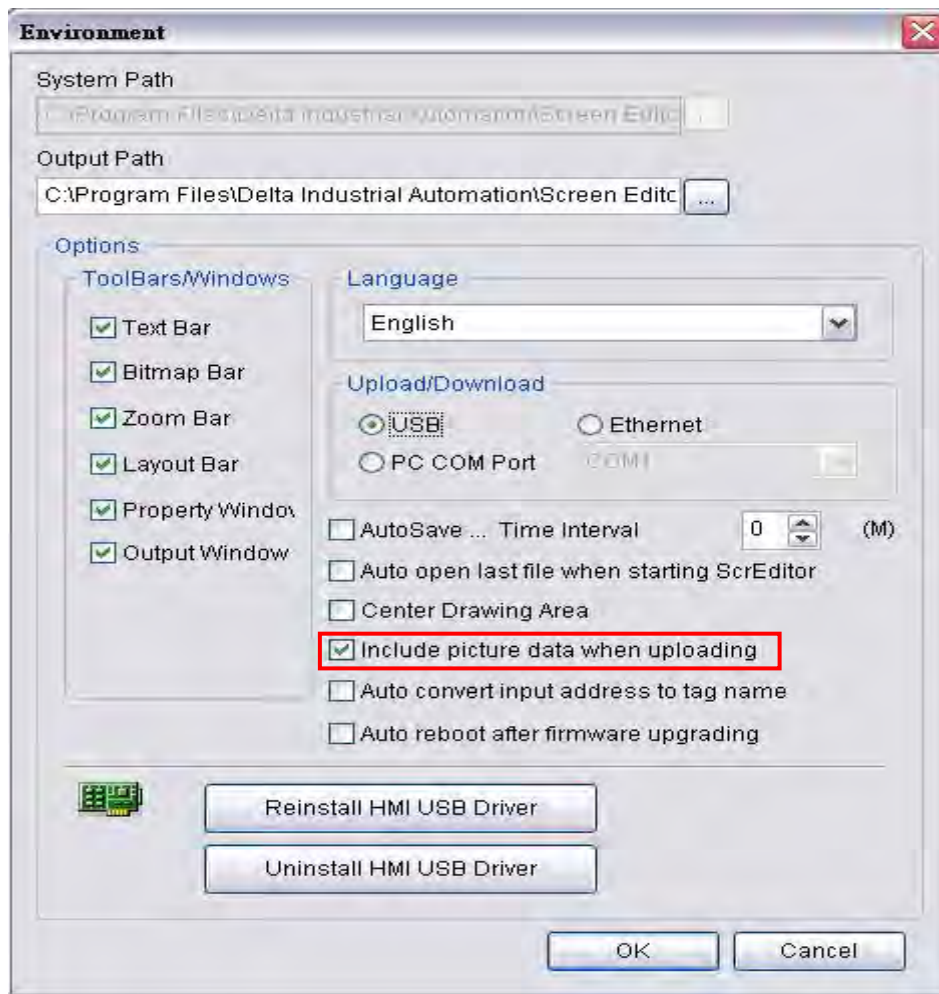
Fig. 3-10-8 Environment dialog box

3.10.4 Download Screen

To download screen data to HMI, select **Tools > Download Screen** or click ![icon] icon directly or press **Ctrl + F9**. The download process is the same as the function of Download Screen & Recipe. The only difference is that the function of Download Screen & Recipe allows the user to download the screen data and recipe data both but the function of Download Screen allows the user to download screen data only.

3.10.5 Upload Recipe

To upload the recipe data only, select **Tools > Upload Recipe**. Then, the password dialog box is displayed. The user must enter a password to access the HMI (the password is the highest priority saved in HMI, which is set by clicking **Options > Configuration > General > Security**). Enter the name of the recipe to start the upload. When the progress goes to 100%, the upload is complete. To monitor the progress of the upload, access the progress box. To stop the upload, click the Stop button.

3.10.6   Download Recipe

To download the recipe data only, select **Tools > Download Recipe**. The file extension name of a recipe file is **.rcp** (Fig. 3-10-9).
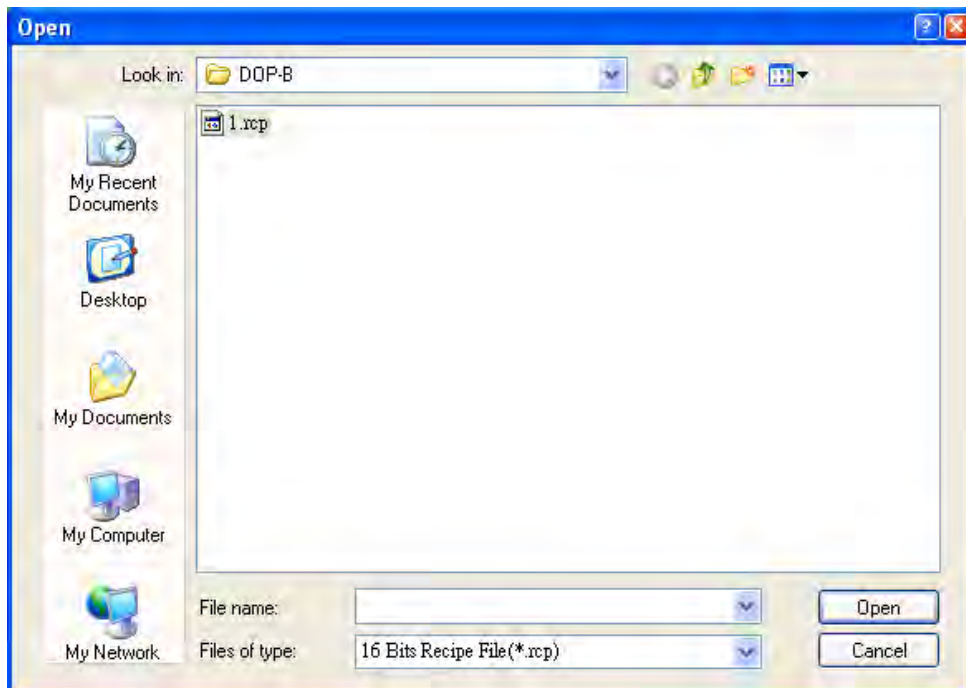
Fig. 3-10-9 Download the designated recipe data

3.10.7   On Line Simulation

This command simulates DOP-B series HMI by computer but HMI should also connect to PLC first to drive PLC by PC simulation through PC communication port. Therefore, the user cannot execute the function of On Line Simulation without connecting PLC. But the user can execute the function of Off Line Simulation without connecting PLC. On Line Simulation function can execute by clicking **Tools > On Line Simulation** or clicking icon directly or pressing **Ctrl + F4**. Before executing On Line Simulation, the system will ask the user to set the communication port for connecting to PLC first (Fig. 3-10-10). For On Line Simulation Screen, the user can refer to Fig. 3-10-11.
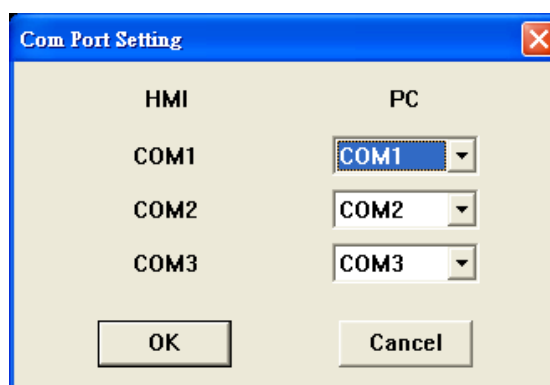
Fig. 3-10-10 COM Settings

Fig, 3-10-11 On Line / Off Line Simulation Screen

3.10.8   Off Line Simulation

To test the editing screen, the read/write addresses and the macro command to see if they are correct, the user can run an off-line simulation. To enable the off line simulation, select **Tools > Off Line Simulation** or click [icon] icon directly or press **Ctrl + F5** (Fig. 3-10-11).

3.10.9   Upgrade Firmware

This option is for upgrading HMI firmware or adding function for HMI. Keeping HMI firmware version to be the most updated version can optimize HMI operation. Ensure that the software version of ScrEdit matches the firmware version. The user can get the firmware information by clicking **Tools > Get Firmware Information** (Fig. 3-10-12). Regarding the software version of ScrEdit, the user can find it by clicking **Help > Help** (Fig. 3-10-13). For the screen of upgrading the firmware please refer to Fig. 3-10-14.

Fig. 3-10-12 Get Firmware Information

Fig. 3-10-13 About Screen Editor
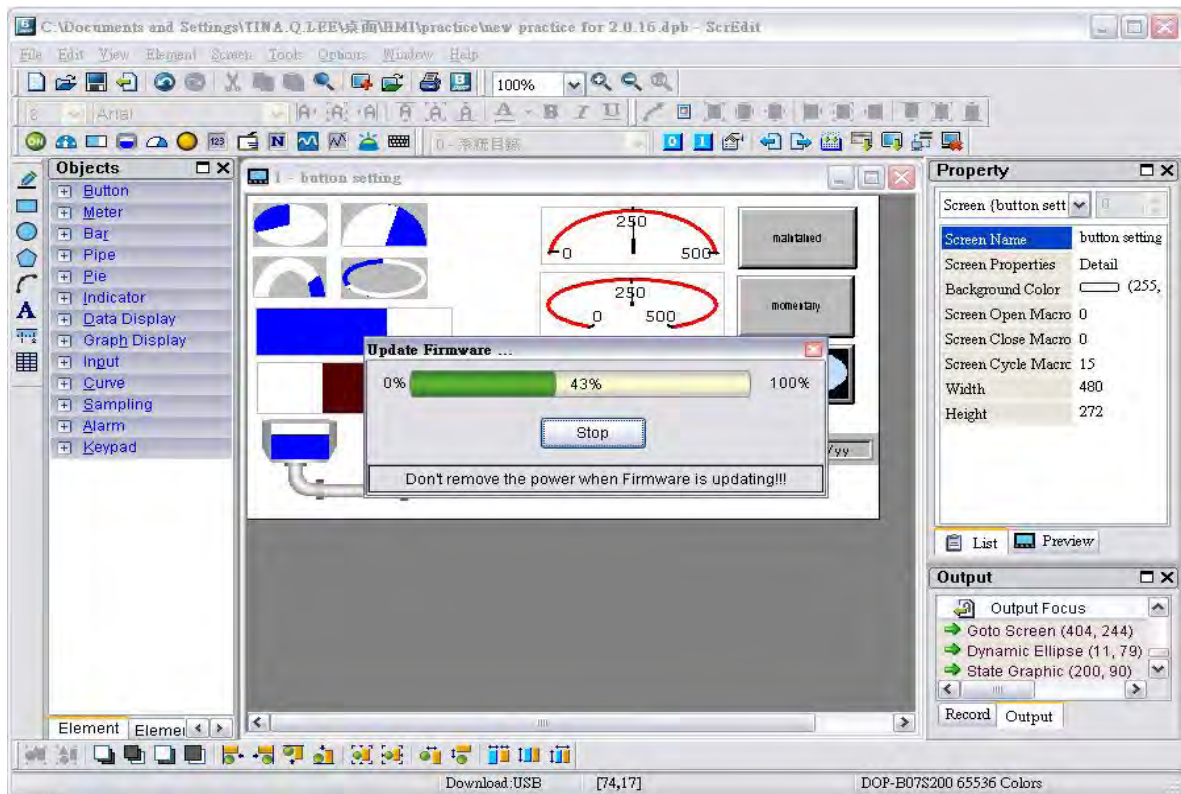
Fig. 3-10-14 Upgrade Firmware

3.10.10   Get Firmware Information

Connects to the HMI over the USB connection or via the communication (COM port) and provides the current firmware version.

Fig. 3-10-15 Get Firmware Information screen
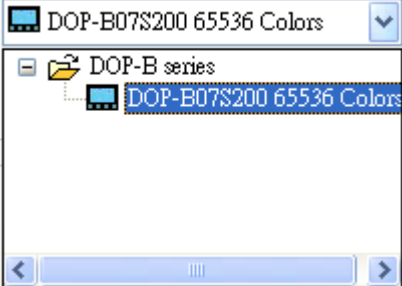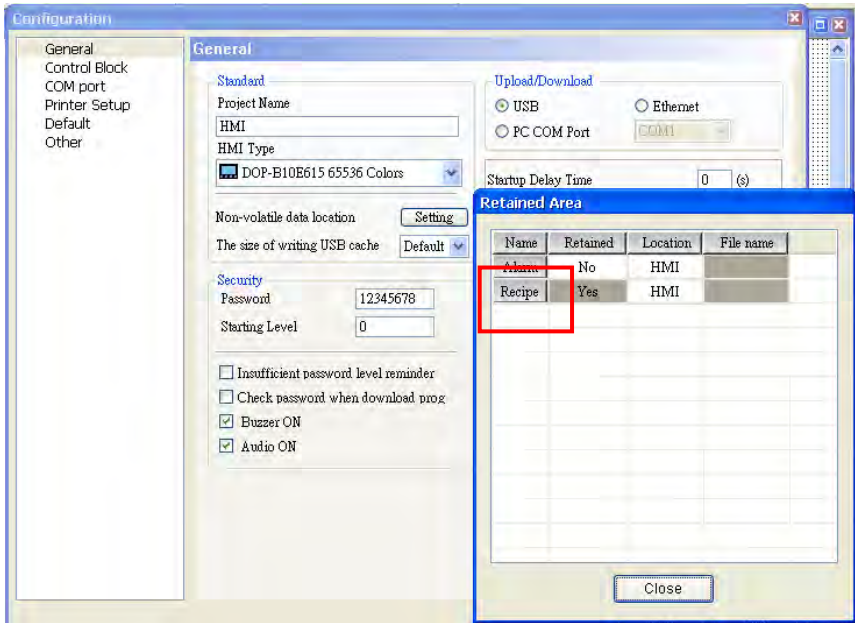
3.11   Menu Bar and Toolbar (Options)
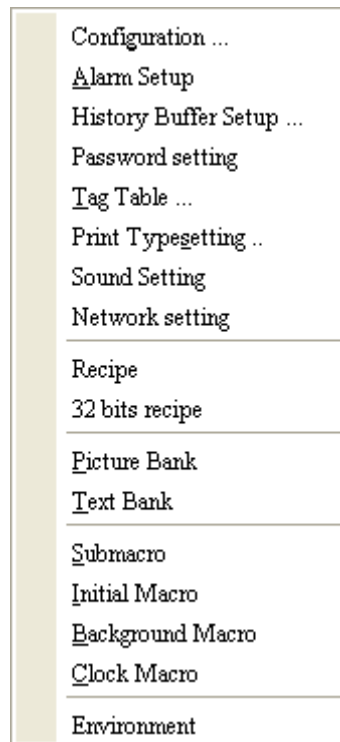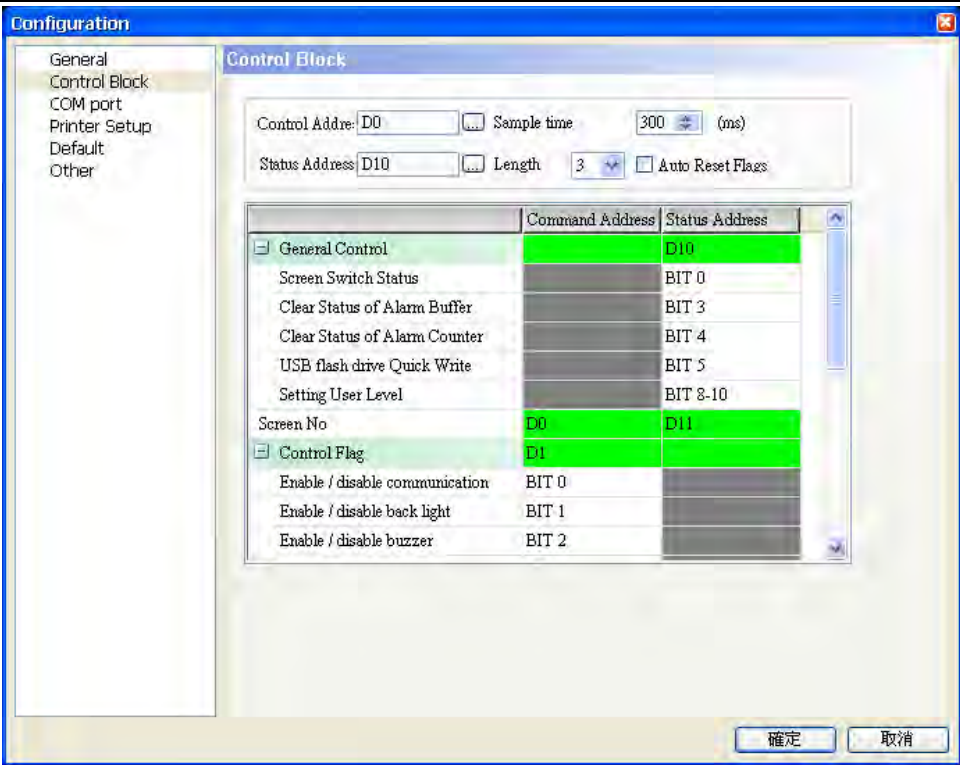
3.11.1   Configuration

To access the configuration options, select **Options > Configuration**. This dialog box is divided into six tabs: General, Control Block, COM Port, Printer Setup, Default and Other. These tabs are covered in detail in the following sections.

General tab in Configuration option

General tab in Configuration option	
Project Name	Enter the name of the file for the project.
HMI Type	Select DOP-B series HMI type for different functions and requirements
Non-volatile data location	The backup memory data (non-volatile data) can be saved in HMI and USB disk. The user can select one of them from the Location drop-down list. However, USB disk selection is available in some HMI types. Therefore, it depends on which HMI the user select. The setting of non-volatile data location is shown as the figure below. After pressing Setting button, Retained Area dialog box will pop up and the user can set the storage location of alarm, recipe and history data in this dialog.
Password	Used to set the highest priority password. There are 8 levels for the password. Meanwhile, this password is also the protection password for the file (project). Please note that the password format is in hexadecimal (0 ~ F).
Starting Level	Used to set start-up priority. The highest level is 7 and the lowest level is 0. 。
Insufficient password level reminder	When this check box is checked, if the priority for the element that is not equal to or higher than the current setting, 🔒 will display to remind the user.
Buzzer ON	When this check box is checked, the function of Buzzer is enabled.

General tab in Configuration option	
Upload/Download	The user can select USB or PC communication port (i.e. RS-232) or Ethernet to upload and download.
Startup Delay Time	Use to set delay time for waiting the startup of external controller (i.e. PLC). The range is between 0 ~ 255 seconds.
Clock Macro Delay Time	Use to set interval time when executing clock macro. The range is 100 – 65535 ms.
Clock Macro Priority	Used to set the priority when executing clock macro. Setting this option can ensure the more correct clock macro delay time.
Background macro update cycle	Used to set the executing lines when executing background macro for one cycle. The range is 1~512 lines.
Show disk access error message	When this option is set, if an error occurred when accessing the alarm, history buffer, and recipe data via USB disk, an error message will show up on the screen to alert the user.

Control Block tab in Configuration option	
Control Address	Use to set the starting address of system control block.
Length	The length of control block will be different depending on different function. (For example, the length should be at least 8 Words when using multi-language function.) For more detailed information of system control block, refer to section 3.4. **Please note that the when the control block size is set to 0, the control block function is disabled.**
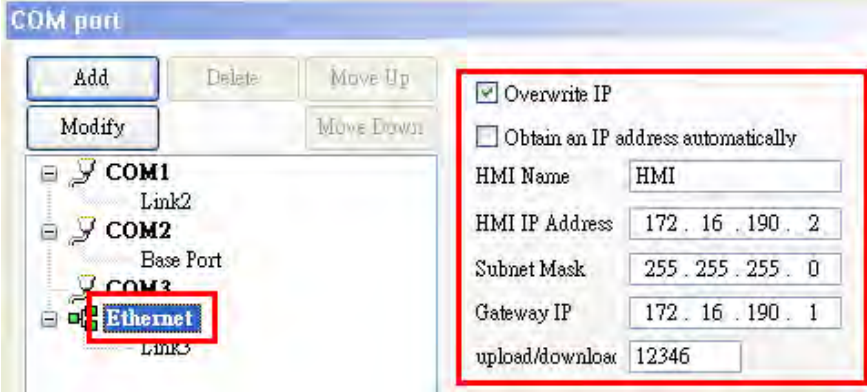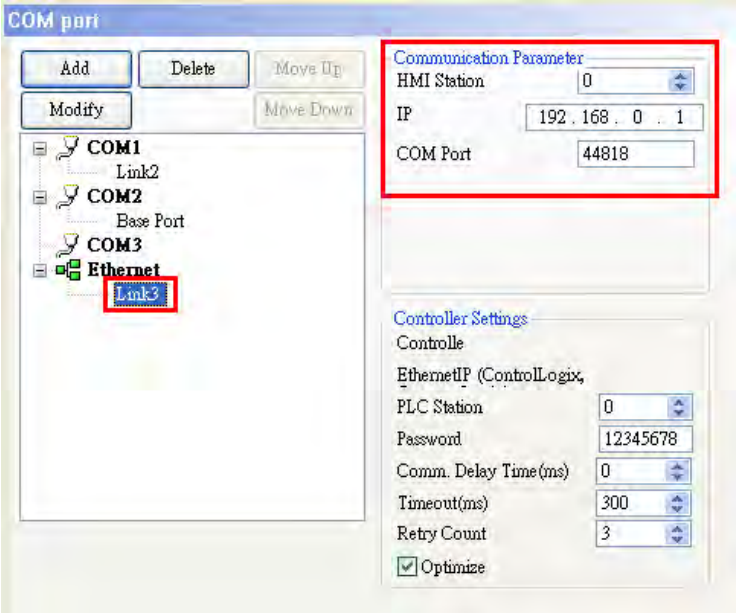
Control Block tab in Configuration option	
Auto Reset Flag	If the Auto Reset Flag box is checked, the register in the control block is cleared to 0 when any operation is finished in the control block.
Status Address	Use to set the starting address of system status block. The length is constant 8 words. Each word indicates the different status value of HMI system. For more detailed information of system status block, refer to section 3.4.

COM Port tab in Configuration option
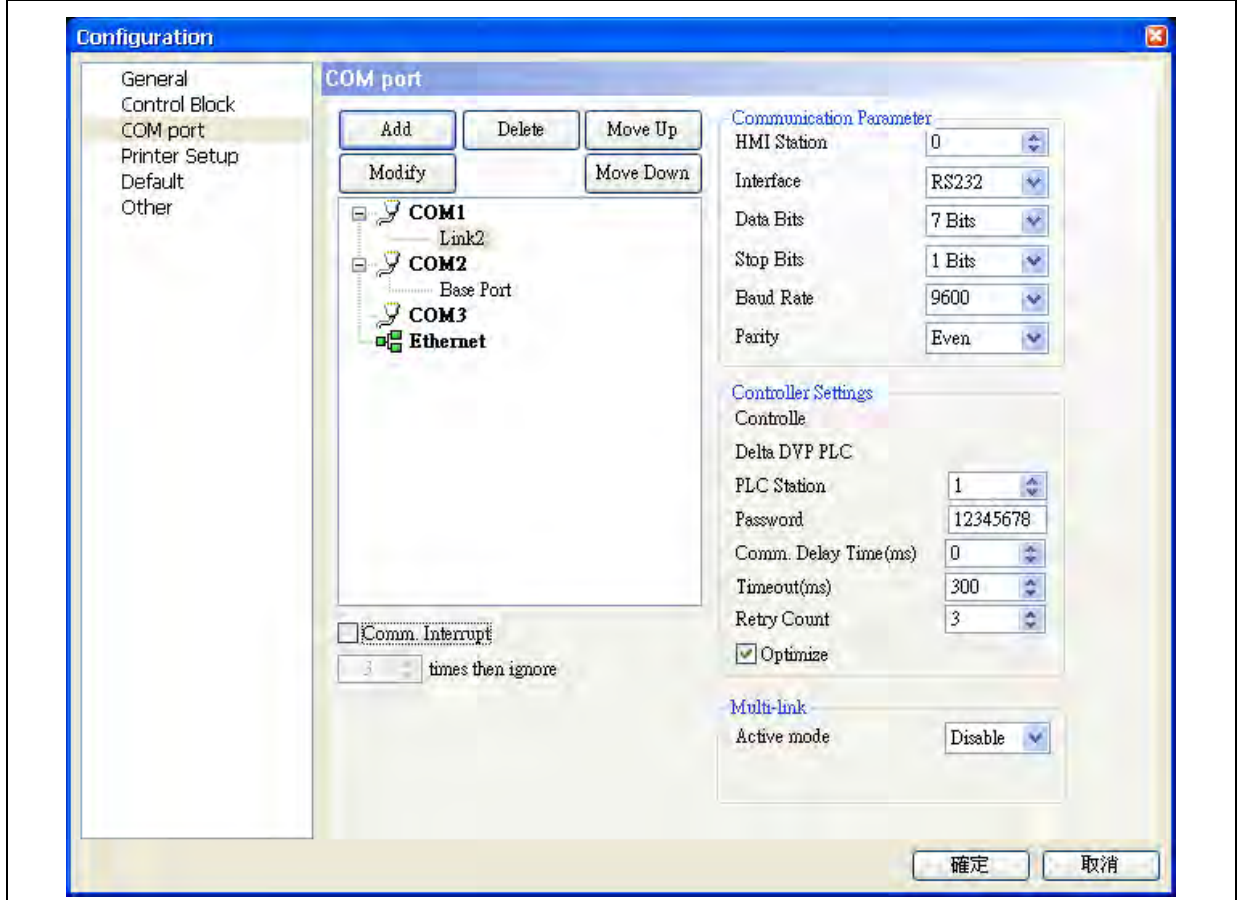
Add/ Delete/ Modify	Add	Press Add button to determine the connecting device name and the controller. Please refer to the figure below: Available connecting PLC will be different depending on HMI type. (DOP-B series HMI can support up to three different controllers simultaneously.)

COM Port tab in Configuration option		
Add/ Delete/ Modify	Delete	Delete the existed connecting controller (one application needs to connect at least one controller).
	Modify	Modify the connecting controller or change the controller name.
Controller Settings	COM Port	Set the COM port that communicates with HMI
	PLC Station	Set PLC station number. If PLC does not set station number, it will use this default setting. The range is between 0 ~ 255.
	Password	Passwords are necessary for some connecting controllers before communication.
	Comm. Delay Time	Set delay time for waiting the startup of external controller (i.e. PLC). The range is between 0 ~ 255 ms.
	Timeout	Set communication time out time when communicating with the external controller. The range is between 10 ~ 65535ms. .
	Retry Count	HMI will try to send a communication command to the external controller repeatedly if the external controller does not respond during communication. This option is used to set the number of retry count times. A communication error dialog box will not appear unless the number of retry count times is reached. The range is between 0 ~ 255 times.
	Optimize	When Optimize box is checked, optimization function is enabled. If optimization function is enabled, all read addresses of all related elements will be optimized.

When **Communication Interrupt times then ignore** box is checked, HMI stops communicating with the PLCs after the communication interrupt time is reached. The purpose of this function is to avoid the communication error dialog box will always show on the HMI screen when the communication error occurs after HMI has retried. The range is between 1 ~ 255 times.

If the user wants to recover the communication between HMI and PLCs again when HMI stop communicating with the PLCs after the communication interrupt times are reached, the user can use Bit 0 of the control block D1 (suppose that the stating address is D0) to control HMI communication. When Bit 1 is set to ON, it will disable HMI communication. When Bit 1 is set to OFF, it will enable HMI communication.

Comm. Parameter	HMI Station	Set HMI station number. The range is between 0 ~ 255.
	Interface	Set communication interface. There are three options RS232, RS422 and RS485.
	Data Bits	There are two options 7 Bits and 8 Bits.
	Stop Bits	There are two options 1 Bits and 2 Bits.

COM Port tab in Configuration option		
Comm. Parameter	Baud Rate	Communication baud rate. There are 4800, 9600, 19200, 38400, 57600 and 115200 these options. The users can enter the setting value directly also but the maximum. setting value can not exceed 187500.
	Parity	There are three options: None, Odd and Even.
Ethernet Setting	HMI	 1. Choose Ethernet and the user can set the Ethernet setting. 2. If Overwrite IP function is enabled, HMI will update the Ethernet setting after the screen data is download. 3. If Obtain IP address automatically box is checked, HMI will get the IP address automatically. But before enabling this function, ensure that DHCP server is connected. 4. If Obtain IP address automatically box is not checked, the user must set Ethernet setting, i.e. HMI IP address, Subnet Mask, Gateway IP, etc. manually.
	PLC	 Click the node under Etherent option and the communication parameter setting will display. Each external controller, i.e. PLC has its own communication parameter setting.

Printer Setup tab in Configuration option
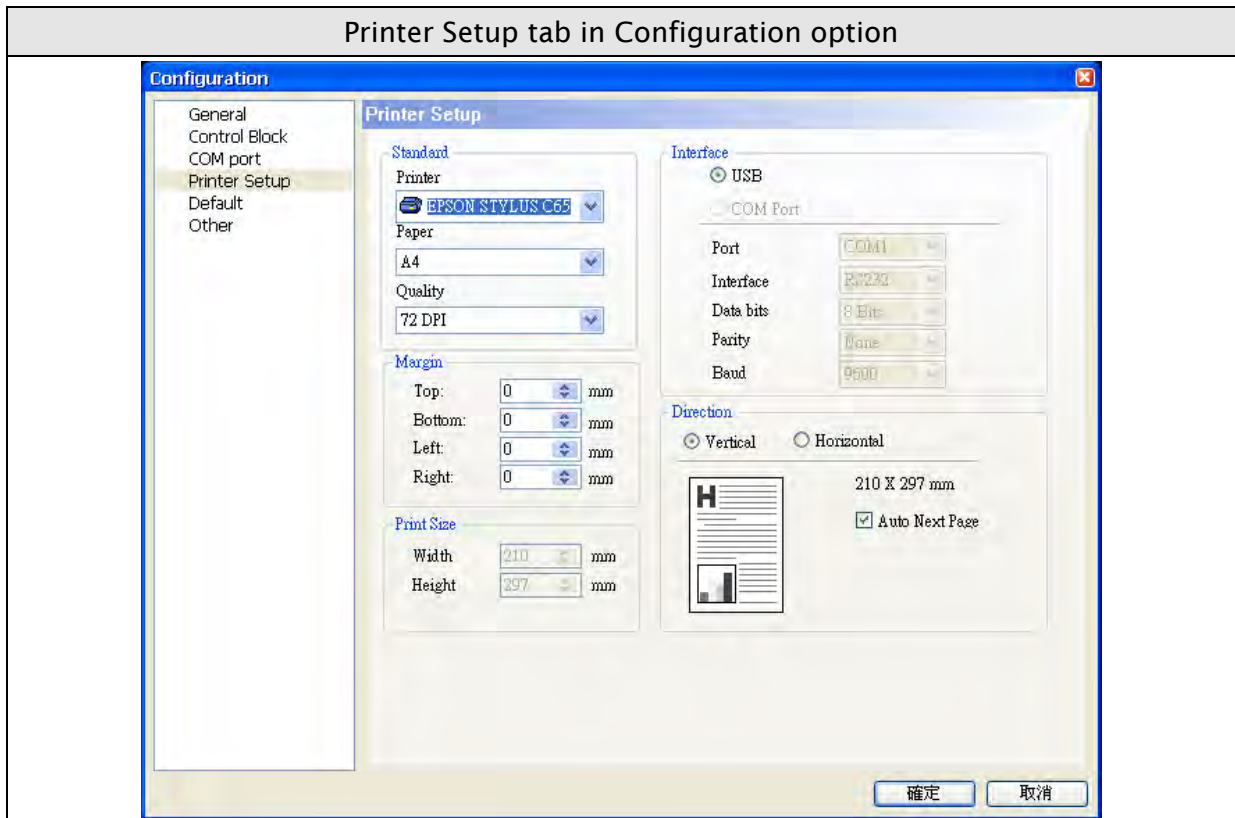
HMI provides two print options, one is Hard Copy function, which can print the current screen and print one page one time. The other is Print Typesetting function. If Print Typesetting function is selected, no only the screen data but also all history data can be output to the printer directly. For more description of print setting method, please refer to the introduction of P**rint Typesetting** function.
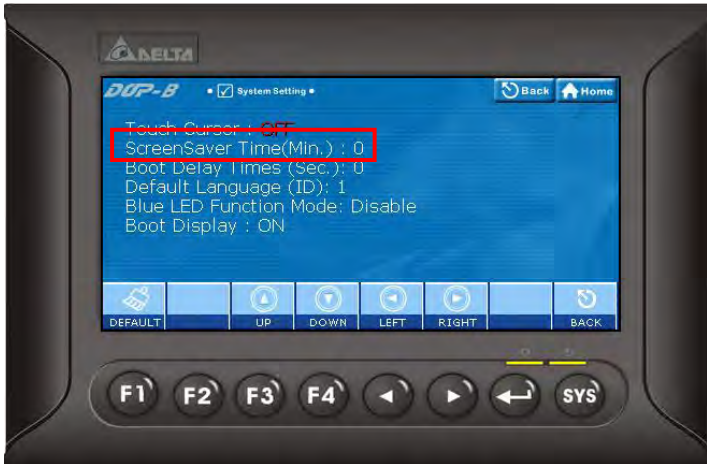
Standard	Printer	Set the connecting printer. The users can use the drop-down list to specify the printer. The printers in the list are sorted by manufacturer and the users can find the printer easily.
	Paper	The users can use the Paper drop-down list to select the paper size. The only predefined paper sizes in the list are A4, Letter and Custom.
	Quality	Only 72 DPI option is provided.
Margin		The users can determine the blank space (margins). Users can specify the top, bottom, left and right margins and the unit is mm.
Print Size		When Custom is selected, Print Size option is enabled and the user can determine the paper size manually. The unit is mm.
Interface		Interface is used to set the printer interface. The users can specify the communication port of the printer. There are COM Port and two USB options. 。
Auto Next Page		When the "Auto Next Page" option is selected, the printer will print the next page automatically. If the checkbox next to "Auto Next Page" is not checked, the printer will print continuously without breaking for different pages.
Direction		Direction is used to set printing orientation. There are two options: Vertical (Portrait) and Horizontal (Landscape).

Default tab in Configuration option
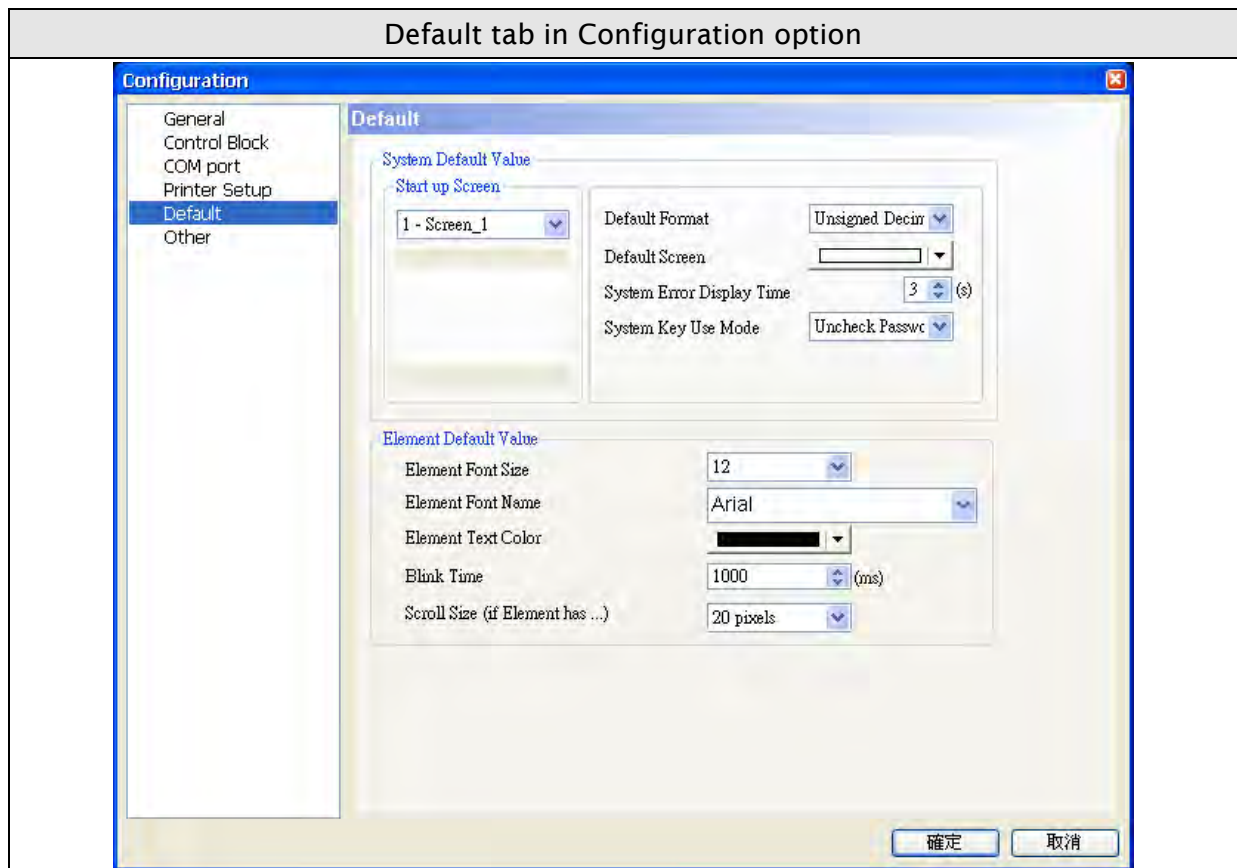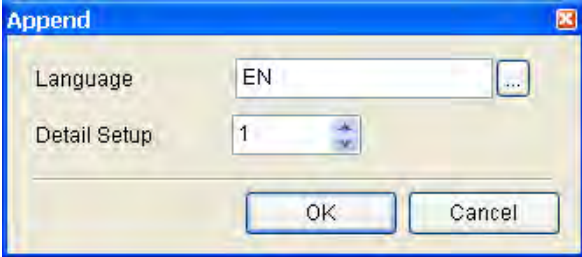
	Start up Screen	Set the first display screen when HMI is powered on and started up.
	Default Format	Set the default value format when creating elements.
	Default Screen	When a new editing screen is created, the users can use this option to set the default screen background color.
System Default Value	System Error Display Time	Set the display time of system error message dialog box. The range is 0 ~ 5 seconds. **Please note that if the setting value is set to 0, the system error message dialog box will not display on the screen.**
	System Key Use Mode	Set the system key action when the users press the key. There are three options: **Disable**, **Check Password** and **Unchecked Password**.
	Element Font Size	Specify the default element font size when creating an element.
Element Default Value	Element Font Name	Specify the default element font name when creating an element.
	Element Font Color	Specify the default element font color when creating an element.

Default tab in Configuration option		
Element Default Value	Blink Time	Specify the default element blink rate when creating an element. The range is between 00 ~ 5000ms。
	Scroll Size (if element has Scroll Size)	(Customer will enter text here) This option is available for the element that has scroll function, e.g. Alarm History Table, etc. There are 20 pixels, 30 pixels and 40 pixels three options. The default setting is 20 pixels.

Other tab in Configuration option		
General Setting	Enable touch cursor	When this option is enabled, the HMI mouse function is activated. When touching HMI screen, a mouse will display on the screen for the user to use.
	It will display initial screen at start	When this option is enabled, the default startup screen will display when HMI is powered on and started up.
	Blue Led mode	This option determines when the blue LED indicator will be lit. There are three options: **none (not be lit)**, **COM (during communication)**, **Access data (when accessing data)** and **Ethernet (communicating via Etherent)**.

	Other tab in Configuration option	
General Setting	Blue Led mode	
Screen Saver	In **Screen Management** option (**Screen > Screen Management**), there is a more detailed description for introducing how to drag the mouse to determine the screen saver display.	
	Enable Screen Saver	This option should be selected when the users want to use **Edit Save Screen** function in **Screen Management** option. If this option is not selected, even though the users have chosen the Edit Save Screen function, the screen saver will not be started.
	Read Controller Address	1. The users can use this option to enable the screen saver. When the setting value is 0, it indicates that the screen saver function is disabled. If the setting value is a non-zero value, it indicates that the screen saver function is enabled. When the users touch the screen, the screen saver function is ineffective. 2. If this option is not selected, the screen saver will be enabled automatically when the Screen Saver Time set in HMI is reached. If the screen saver function is enabled, the users can touch the screen to disable it.

Other tab in Configuration option		
Screen Saver	Transition Time	Set the interval time between two screen savers. The range is between 1 – 255 seconds.
	After screen saver program ends	1. Return to Original: Return to the original screen at that time when the screen saver is enabled 2. Choose screen: Specify the screen that will show after the screen saver program ends.
Multi-Language	Insert	Press the Insert button to add a language option. As shown as the figure above, the users have to enter the language name and setting value. The setting value will be referred by the system when setting multi-language. The range of the setting value is between 0 ~ 255. Setting language name is easy for text editing. The user can press button to change the flag color on the language name tab.
	Enable/Disable	Delta DOP-B series HMI allows the user to edit multi-language screen, however the user can use this option to determine which languages are supported (enabled) or not supported (disabled) when downloading data to HMI.
	Delete	Delete the existing language. HMI requires at least one language for one project.
	Modify	Modify the existing language name and setting value.
	Default	Set to the default language setting.
	Enable Edit Multi-Language User Interface	Use this option to enable multi-language user interface. The user can view the multi-language display in the property table. The editing interface is displayed in the figure below:

3.11.2 Alarm Setup

The user can set alarm by clicking **Options > Alarm Setup**. The alarm setup should set with the alarm function in element settings. HMI will execute alarm function automatically if both settings are all set. When the specified conditions are matched (If condition occurs in specific address, ON enabled or OFF enabled) after setting, HMI will display an Alarm Setup warning dialog box automatically. In this dialog box (Fig. 3-11-1), there are Delete, Modify, Import, Export and OK buttons for the user to use.
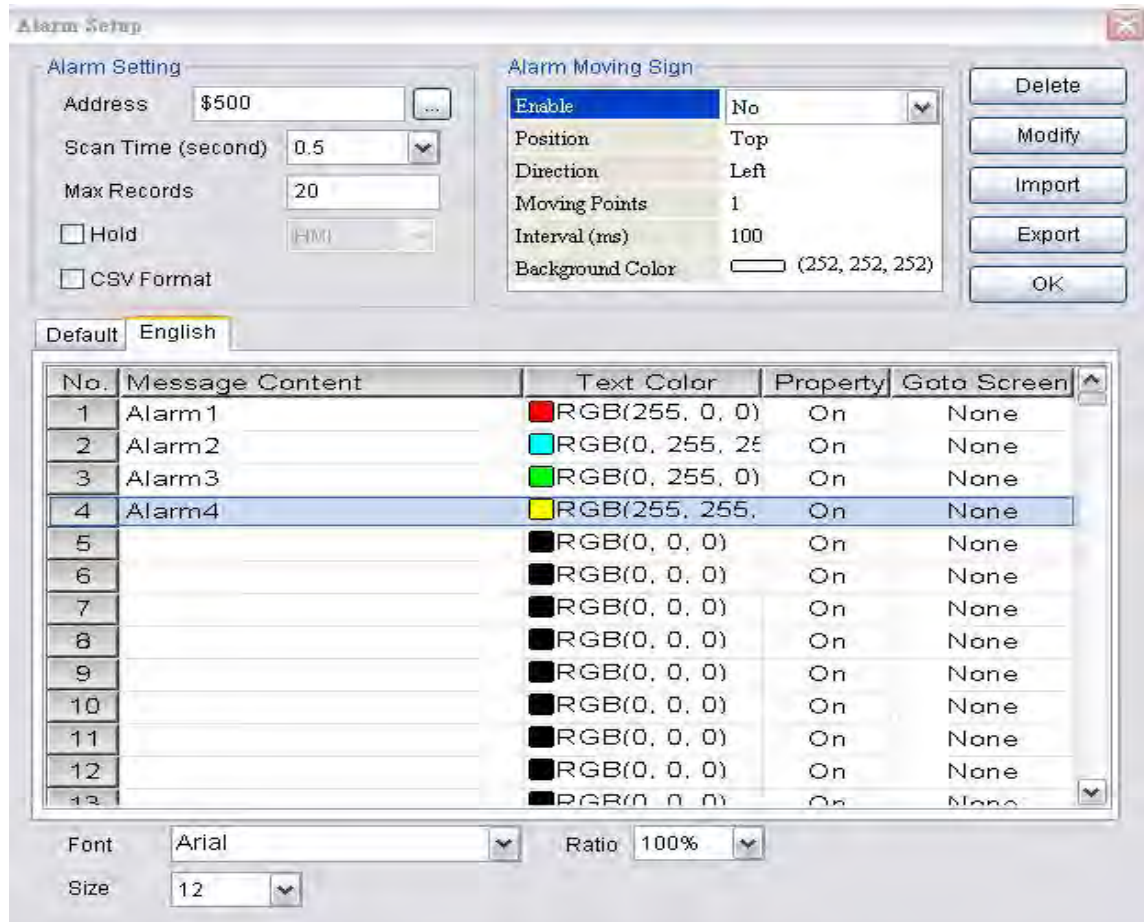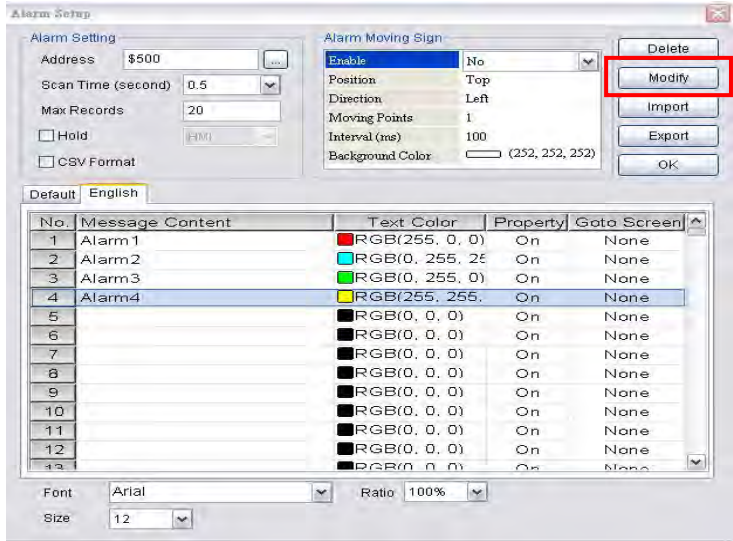
Fig. 3-11-1 Alarm Setup dialog box

Alarm Setup Dialog Box		
Alarm Setting	Address	Use this option to set the alarm starting address. It provides 512 alarms, 32 Words. Please note that the unit of this address is Word. If the connecting controller is Delta PLC, when the register type is M or S, the address must be 0 or the multiple of 16, i.e. M0 and M16. If the address is M1, system will determine it is an invalid address.
	Scan Time (second)（秒）	Set how long it takes for the HMI to scan one time. The unit is seconds.

Alarm Setup Dialog Box		
Alarm Setting	Max. Records	Use this option to retain a specific number of records. When the number of records exceeds this setting value, HMI will delete the first record and insert the new record into the last address. For example, if the setting value is set to 100 and the number of records in history exceeds 100, the first record is deleted and the second record will become to the third record, the third record will become to the forth record…and the 100th record will become to 99th record. The new record (101st record) becomes the 100th record.
	Hold (Non-volatile)	Using this option saves data in SRAM when the power is turned off. The capacity for saving alarm data of DOP-B series is 4Kbytes. The battery of the SRAM provides power when the power is turned off. (In some DOP-B series models, the user can save data in USB disk or CF card when the power is turned off and the capacity for saving alarm data depends on the capacity of the USB disk or CF card.)
	CSV Format	Using this option saves data in CSV format.
	Alarm Property Setup	The user can double click a row of the alarm message contents table to edit the alarm property and press Modify button to change it. (Please note that there are three languages tabs in Alarm Setup dialog box as the multi-language function is also supported here. The user can click the tab to edit the alarm message contents according to the user's requirement.)

Alarm Setup Dialog Box			
Alarm Setting	Alarm Property Setup	The following Alarm Property Setup dialog box will display after double clicking the row.	
		Message	Display message when an alarm occurs.
		Color	Display message color when an alarm occurs.
		Alarm Property Setup	Use this option to determine if the Bit is On or Off when an alarm occurs.
		Goto Screen	Display screen when an alarm occurs.
	Delete	Delete the alarm message contents.	
	Modify	Modify the alarm message contents. The user also can double click the mouse to perform this function.	
	Import	Import the Alarm Describe File into the alarm message contents table.	
	Export	Export the alarm message contents from HMI and convert them to be Alarm Describe File.	
	OK	End the editing of alarm message contents.	
		The calculation method of the size of the alarm history file is as follows: $$\{[6\,Bytes(a) + 2\,Bytes(b)] \times N(c)\} + 6\,Bytes(d) = \mathbf{Actual\,File\,Size}\ Bytes$$	
			a	Time and Date Data				b	Alarm Data				c	Sampling Points				d	Data File Symbol		Example: If **Max. Records** is set to 100, and the time and date is recorded, the required capacity for saving alarm data is: [(6 Bytes + 2 Bytes) × 100] + 6 Bytes= 806 Bytes If **Max. Records** is set to 100, and the time and date is not recorded, the required capacity for saving alarm data is: (2 Bytes × 100) + 6 Bytes = 206 Bytes	

Alarm Setup Dialog Box			
Alarm Setting	The calculation method of the size of the alarm frequency table is as follows: $$2Bytes(a) \times N(b) = \textbf{Actual File Size } Bytes$$ 	a	Alarm Frequency Data
		b	Alarm Type
	Example: If there are five alarm types, the required capacity for saving alarm data is: 2 Bytes × 5 = 10 Bytes		
Alarm Moving Sign	When Alarm Moving Sign is enabled, if a fault message is detected by HMI, an alarm moving sign will show and run on the HMI.		
	Enable	Enable the alarm moving sign.	
	Position	Determine the display position of alarm moving sign. It can be Top or Bottom.	
	Direction	Left	Alarm message will move from right to left (Move to left).
		Right	Alarm message will move from left to right (Move to right).
		Up	Alarm message will move from bottom to top (Move to Up).
		Down	Alarm message will move from top to bottom (Move to Down).
	Moving Points	Set the moving points every time for the alarm moving sign. The unit is Pixel and the range is between 1 ~ 50 points.	
	Interval (ms)	Set the interval time every time for the alarm moving sign. The unit is ms and the range is between 50 – 3000 ms.	
	Background Color	Set the background color of the alarm moving sign.	

3.11.3   History Buffer Setup
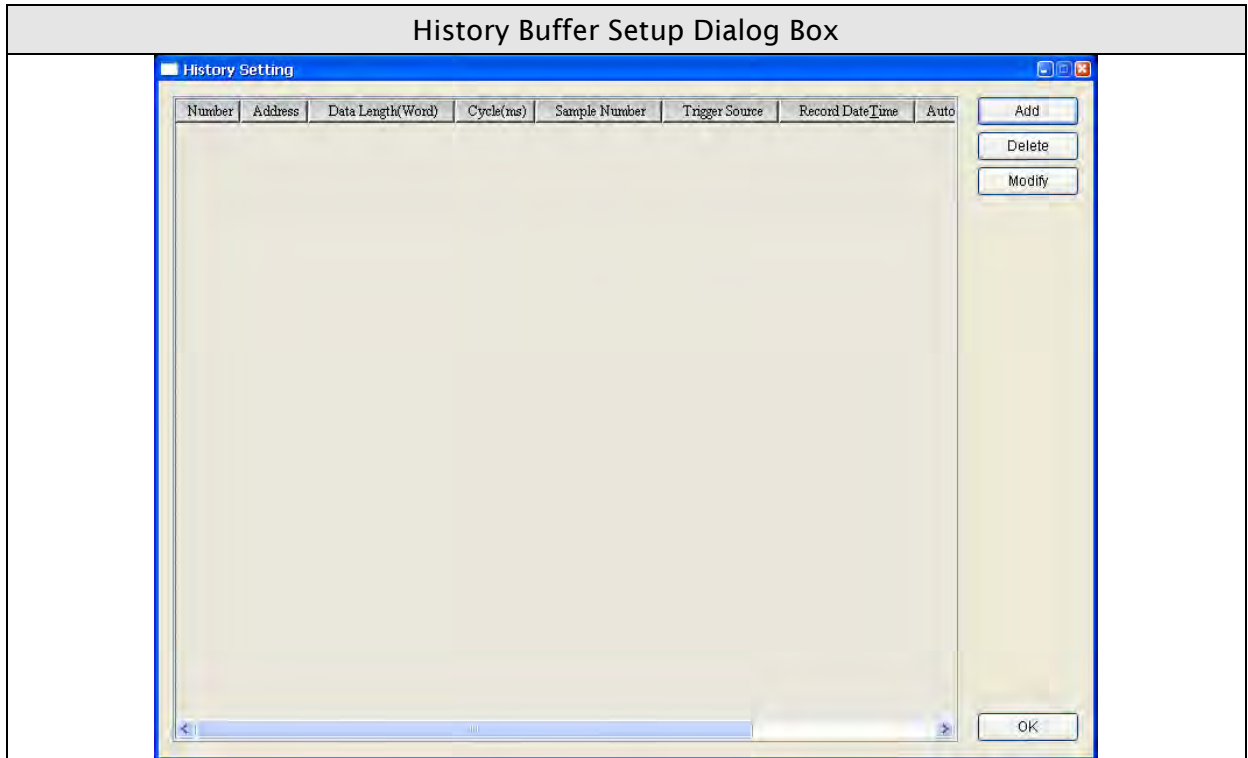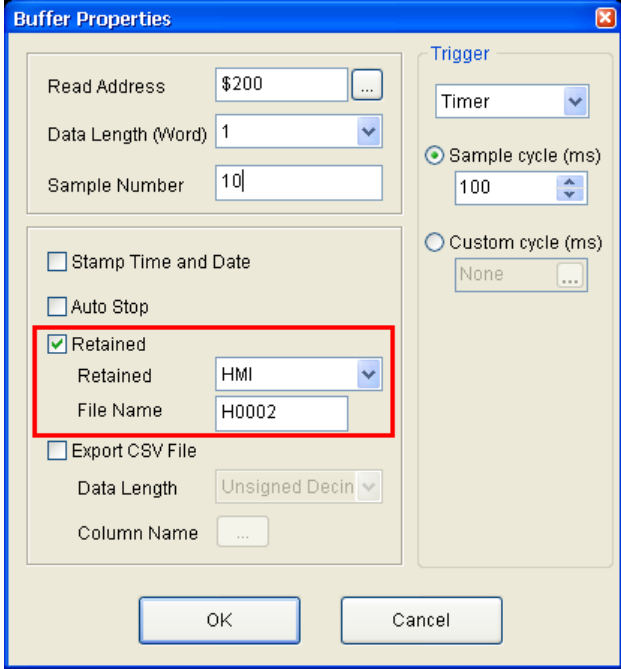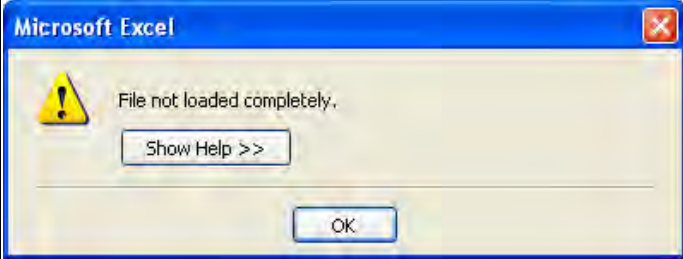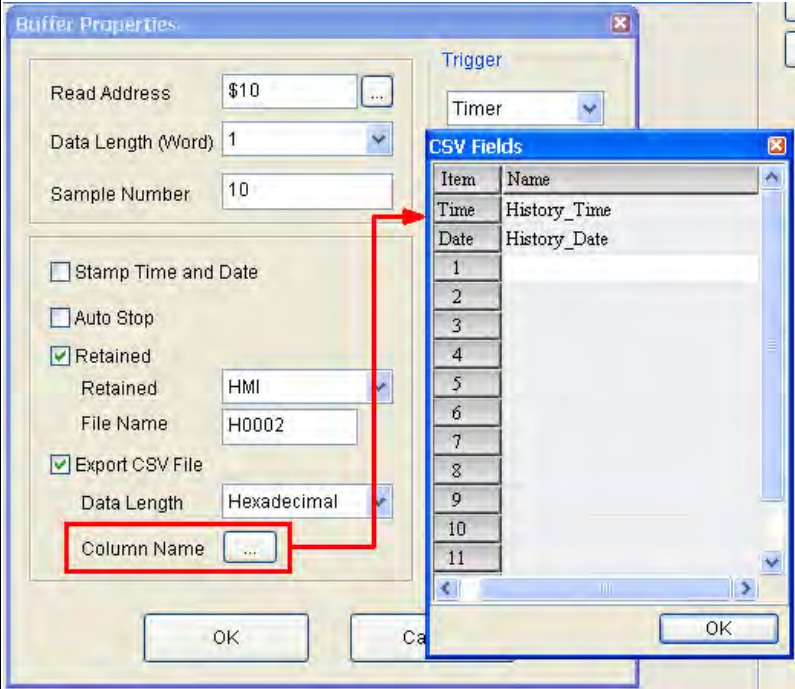
<table>
<tr><th colspan="2">History Buffer Setup Dialog Box</th></tr>
<tr><td></td><td>

</td></tr>
<tr><td>Add</td><td>

Pressing Add button can add a history data. A maximum of 12 history data can be added. After an internal memory address is entered, the following Buffer Properties dialog box is displayed.

</td></tr>
<tr><td rowspan="2">Buffer Properties</td><td>

Read Address — Set the starting address for sampling the history data.
</td></tr>
<tr><td>

Data Length (Word) — Set the length of the Word the user wants to sample. The range is between 1 ~ 13 continuous words. It indicates that a maximum of 13 continuous words can be sampled.
</td></tr>
</table>
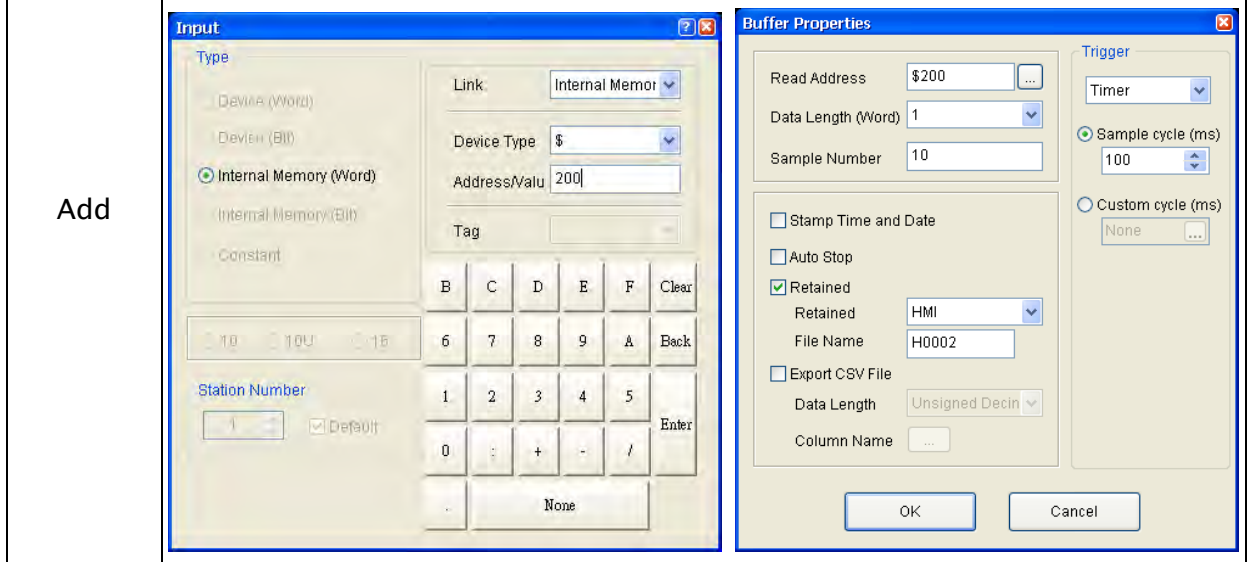
History Buffer Setup Dialog Box		
Buffer Properties	Sample Cycle (ms)	Set the sampling cycle time for reading the address (how long it takes to read the address one time). If the Trigger option is PLC, this option will be unavailable. The range of the sampling cycle time for one day is 0 – 86400000 ms.
	Sample Number	This option is used with the Auto Stop option. If the Auto Stop option is selected, HMI stops recording the data after the numbers of records have reached the setting value of Sample Number option. If the Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the first record and insert the new record into the last address. For example, if the setting value is set to 100 and the number of records in history exceeds 100, the first record will be deleted and the second record will become the third record, the third record will become the forth record...and the 100th record will become the 99th record. Therefore, the new record (101st record) will become the 100th record. The record data will be name as "History.dat" and the user needs to use the software, FlashTransfer which is attached in the HMI editing software, to open this file. FlashTransfer will sort and list the history data by record time automatically.
	Stamp Time and Date	When this option is enabled, the time and date are also recorded during sampling operation.
	Auto Stop	When this option is enabled, HMI stops recording when the maximum number of record data is reached.
	Retained (Non-Volatile)	Using this option can enable HMI to save sampling data in SRAM. The capacity for saving history data of DOP-B series is **240 Kbytes.** The battery of the SRAM provides power when the power is turned off. (In some DOP-B series models, the user can save data in USB disk or CF card when the power is turned off and the capacity for saving alarm data depends on the capacity of the USB disk or CF card.) In addition, the file name can also be user-defined.

History Buffer Setup Dialog Box		
Buffer Properties	Retained (Non-Volatile)	
	Export CSV File	The data can be exported to Windows Excel CSV files. The system allows the user to read max. 65536 rows and 256 columns of data in the Windows Excel environment. If the sample number of the sampling data exceeds 65536, when the user opens Windows Excel CSV file, an error message will display. At this time, the user can use Notepad or other text editing tool to open the CSV file. This option is used with the Auto Stop option. If the Auto Stop option is selected, HMI stops recording the data after the numbers of records have reached the setting value of Sample Number option. If the Auto Stop option is not selected, when record number of data exceeds the setting value of Sample Number option, it will delete the first record and insert the new record into the last address. Then, the exported Windows Excel CSV file will not be sorted and listed by the record time.

History Buffer Setup Dialog Box		
Buffer Properties	Export CSV File	The column name, i.e. Time, Date, Value 1 ~13 can be user-defined. Please refer to the following figure:
	Trigger	There are two options: Timer and PLC. The sampling action is controlled by the Timer of the HMI or the external controller, i.e. PLC. When PLC option is selected, it indicates that the trigger bit designated by the register for sampling history buffer in the control block control the sampling action. Regarding the settings of the control block, please refer to section 3.4.
	OK / Cancel	Press OK button to save the data and exit. Press Cancel to exit without saving data.
Delete		Press Delete button to delete the history data.
Modify		Press Modify button to modify the history data.
History Buffer Setup		The calculation method of the size of the history data file is as follows: 1. dat file Each history data will be saved as Hxxxx.dat. xxxx indicates that it is the xxxxth history data. $$\frac{\{[6Bytes(a) + 2Bytes(b)] \times N(c)\}}{1024 \times 1024} = Actual\,File\,Size\;MBytes$$ <table><tr><td>a</td><td>Time and Date Data</td></tr><tr><td>b</td><td>History Data Length</td></tr><tr><td>c</td><td>Sampling Points</td></tr></table>

History Buffer Setup Dialog Box

	Extra history data will occupy the data file symbol.
	$$\{[8Bytes(a)] \times N(b)\} = \textbf{Actual File Size } Bytes$$
	<table><tr><td>a</td><td>Data File Symbol</td></tr><tr><td>b</td><td>Sampling Points</td></tr></table>
	Example:
	Suppose that the user adds two history data. The data length of the fist history data is set to 1 and the sample number of the first history data is set to 10000. The data length of the second history data is set to 2 and the sample number of the second history data is set to 20000. Both these two history data all have the time and date recorded, so the required dat file capacity for these two history data are:
	The file capacity of the first history data = [(6Bytes + 2Bytes) × 10000] = 80000Bytes.
	The file capacity of the second history data = [(6Bytes + 2 × 2Bytes) × 20000] = 200000Bytes.
History Buffer Setup	The capacity of Data File Symbol = 8Bytes × 2 = 16 Bytes
	Total require: 80000Bytes + 200000Bytes + 16Bytes = 280016Bytes = Approx. 0.268Mbytes.
	2. csv file
	$$\frac{N(a) \times 240Bytes}{1024 \times 1024} = \textbf{Actual File Size } MBytes$$
	<table><tr><td>a</td><td>Sampling Points</td></tr></table>
	Example:
	Suppose that the user adds two history data. The data length of the fist history data is set to 1 and the sample number of the first history data is set to 10000. The data length of the second history data is set to 2 and the sample number of the second history data is set to 20000. Both these two history data all have the time and date recorded, so the required csv file capacity for these two history data are:
	The file capacity of the first history data = 10000 × 240Bytes = 2400000Bytes.
	The file capacity of the second history data = 20000 × 240Bytes = 4800000Bytes.
	Total require: 2400000Bytes + 4800000Bytes = 7200000Bytes = Approx. 6.8Mbytes.

3.11.4 Password Setting

This function sets the password table and determines the security access level that can change users passwords.. There are 1 ~ 7 password security levels:

Level 0: No security. No protection. Everyone can use this element.

Level 1: Low security level. The user whose security level is equal to and higher than Level 1 can use this element.

Level 4: Medium security level. The user whose security level is equal to and higher than Level 4 can use this element.

Level 7: High security level. The user whose security level is equal to and higher than Level 7 can use this element.

The user's highest security level, i.e. the password protection for the file (project) can not be set here. To set the highest priority password, click **Options > Configuration > General > Security** option.

The password setting table can also be defined by using Screen Editor software program. The user can create a keypad element to edit and modify the password table.
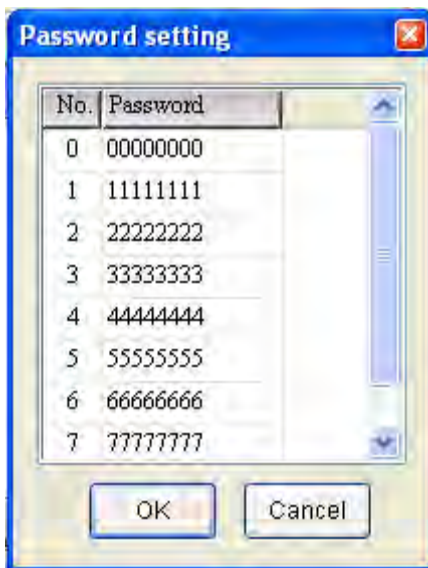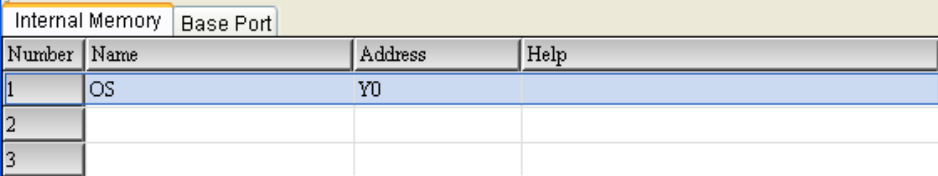
The password can be a 8-digit password that contains 0 ~ F characters regardless of uppercase/lowercase.

3.11.5 Tag Table

Tag table is used to replace the specific address with the user-defined words or characters. For example, if the user wants to replace PLC address 1@Y0 with the word "OS", just define it in Tag Table option in advance.

Tag Table Dialog Box

Open	Click to open a Tag file and import it into HMI.
Save	Click to save the settings and changes made in Tag Table dialog box as Tag file.
Add	Select the Tag type first, Internal Memory and Base Port (If the user has three or above communication ports, the user will see Link2, Link3 …and vise versa). Then, click Add icon to add and define Tag data.
Delete	The user can use the mouse to select one row of the Tag table, and then click Delete icon button to delete it.
OK	Press OK button to save the settings and exit.

3.11.6 Print Typesetting

This function provides more efficient print layout management function. Please refer to the descriptions and examples on the following pages.

Print Function

■ Printer setup

1. DOP-B series HMI supports the printer function via USB interface.

2. Select the connecting printer.

   The user can click **File > New** to get into the New Project dialog box and select the printer using the **Printer** drop-down list in New Project dialog box. Or click **Options > Configuration > Printer Setup** to select a printer.
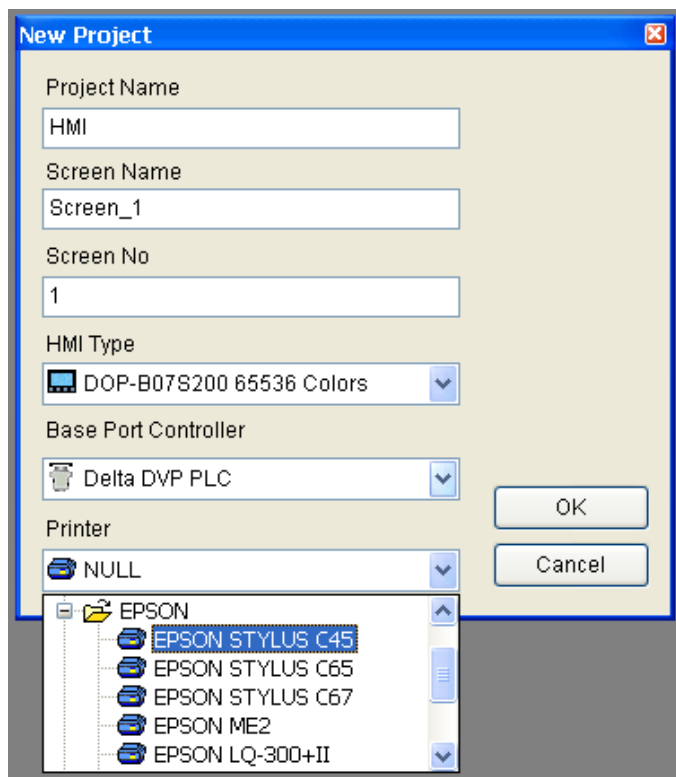
3. Printer Setup Configuration

   Select **Options > Configuration > Printer Setup** to open the **Printer Setup** tab. Use **Printer Setup** tab to configure the settings of printer, paper, quality and margin, etc.
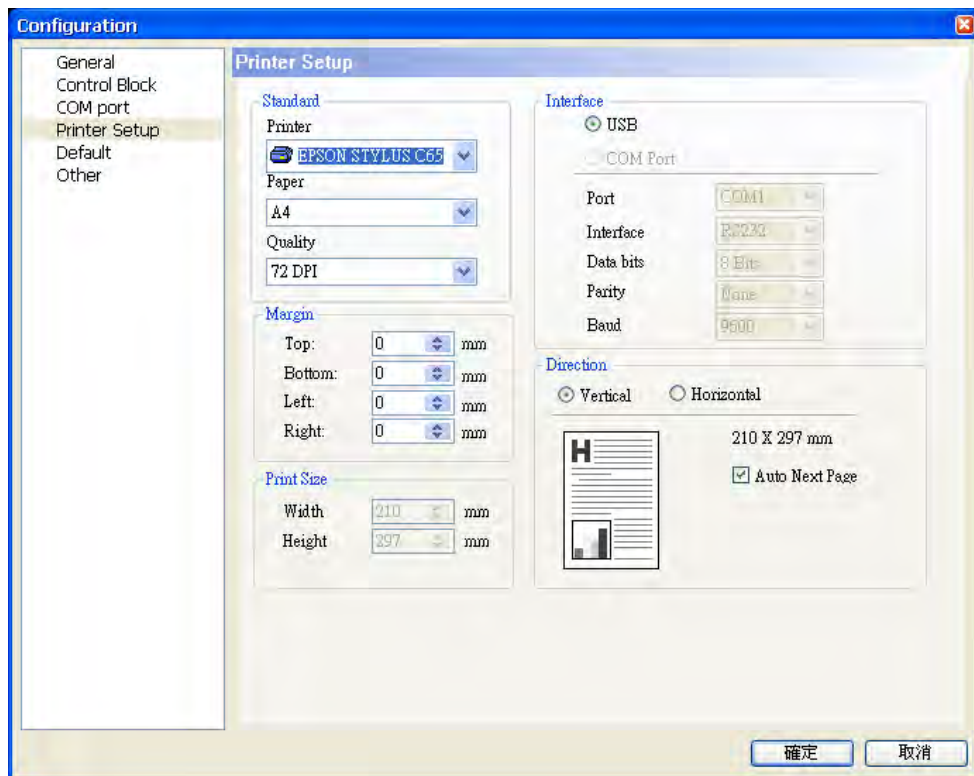
Print Typesetting Function

The user can print many pages one time and arrange the layout of the print screen by using **Print Typesetting** function. The history data also can be printed at the same time. Please pay particular attention to the following notes when using **Print Typesetting** function.

1. The screen cannot be designated to print typesetting screen when switching HMI screen.

2. Print typesetting screen cannot be the default HMI screen.

3. Print typesetting screen cannot be the base screen.

4. Print typesetting screen cannot be the screen saver.

5. Print typesetting screen cannot be the sub-screen.

■   **Create a Printed Report**

Step 1. Create a new screen by selecting **Screen > New Screen** and set it as **Apply Print Screen** in Screen Properties tab (**Screen > Screen Properties**). Then, click **Options > Print Typesetting** and drag the mouse to decide which screen needs to be typeset. The selected screens will become the print screen automatically.
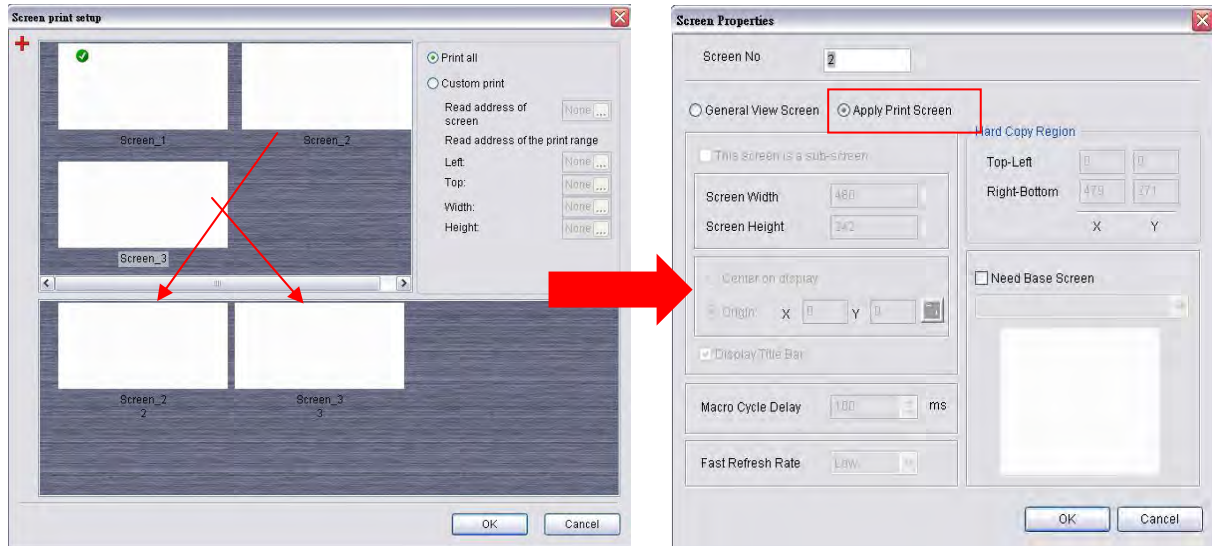
Step 2. Create the element that the user wants to print. For example, if the user wants to print a Historical Trend Graph and a X-Y Chart, the user needs to create a Historical Trend Graph (**Element > Sampling > Historical Trend Graph**) and a X-Y Chart (**Element > Curve > X-Y Chart**) first and then set their properties in the Property table. The Property table provides the element property setting for each element. For information about each element property settings, refer to section 3.8.
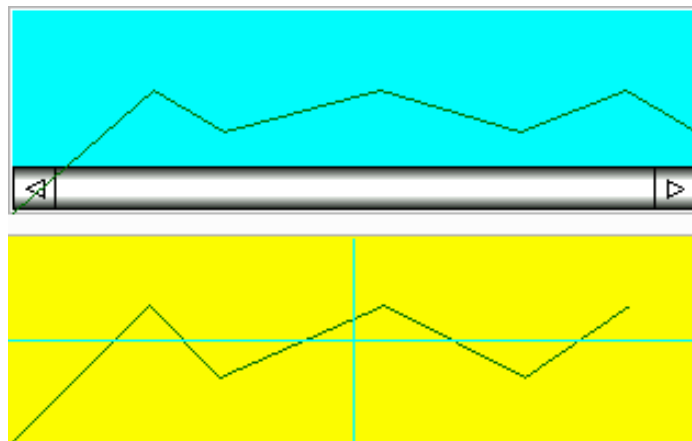
Step 3. Choose **Yes** or **No** using the **Print Successive Data** drop-down list to determine whether the Print Successive Data function is selected or not. When **Yes** is selected, it indicates that Print Successive Data function is enabled, and all the sampling records and data for the element will be printed.
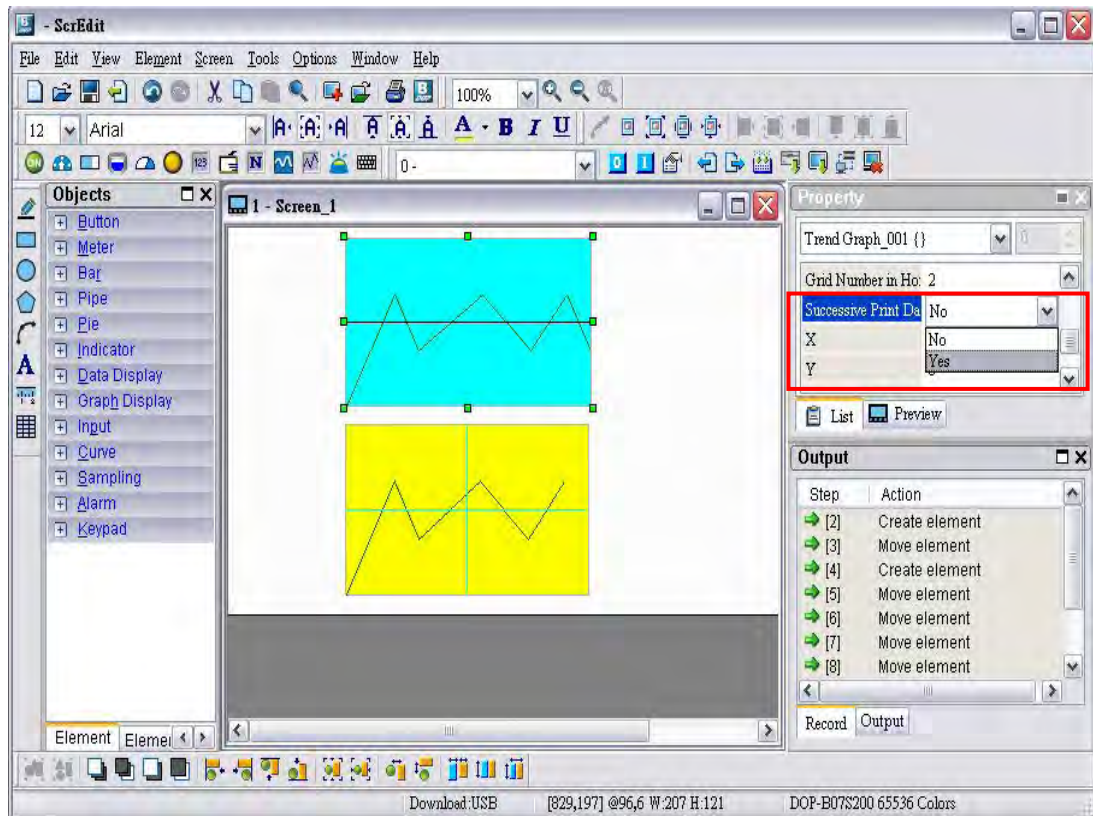
■ **Print Screen Layout and Output**

Step 1. Select **Options > Print Typesetting**. Drag the mouse to decide which screen needs to be typeset and printed. The screens on the left are all created screens and the screens on the right are the selected screens. If a **General View Screen** is dragged to the right, it will become **Apply Print Screen** (**Screen Properties**) automatically.
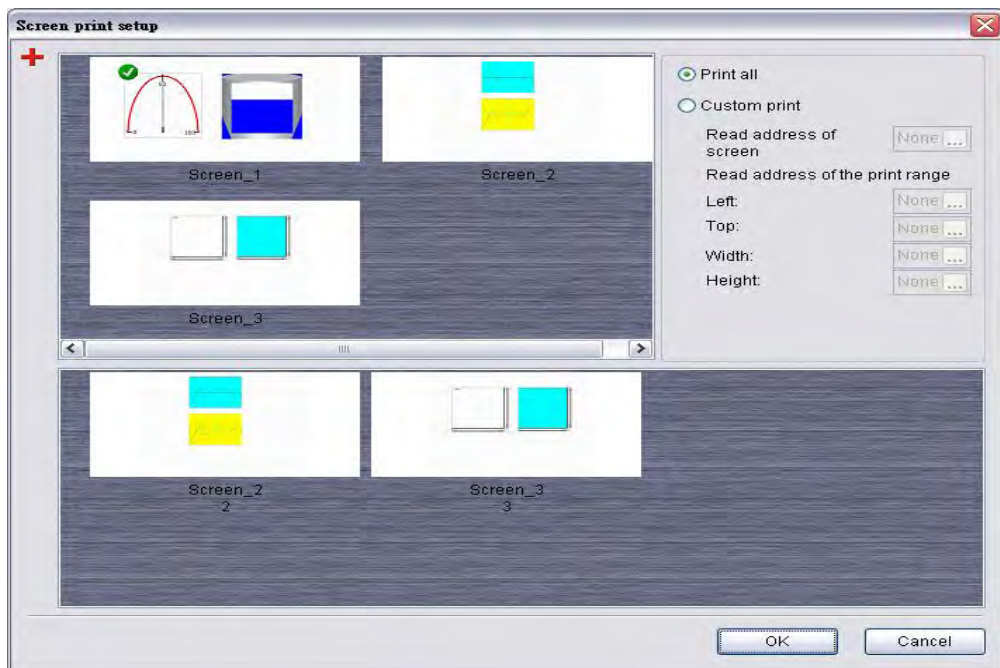
Step 2. Right click the mouse or use the function key to create a **Report List** button on a **General View Screen**. Use this **Report List** button to enable the print function.

Step 3. Set the properties of the **Report List** option. The Report Device can be USB disk or Printer. If the user select USB disk, the data will not be printed out, but the data will be saved in USB disk.
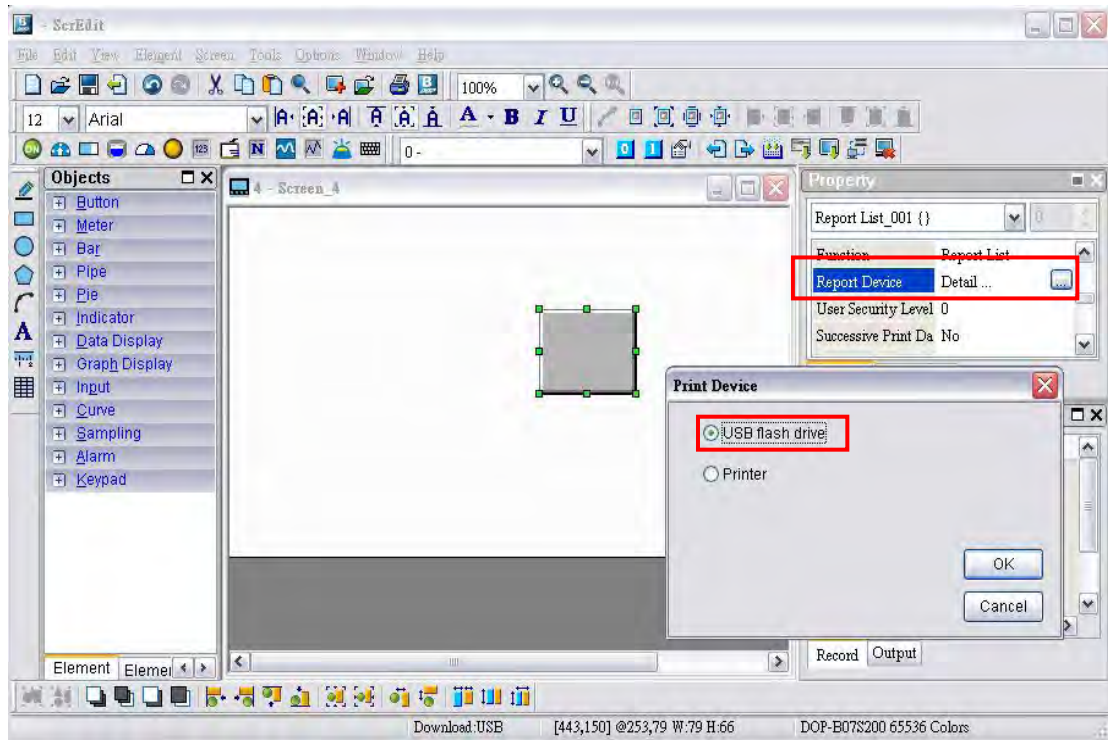
Step 4. Connect HMI to the printer and press **Report List** button, and the data will be printed out.

Hard Copy Function

This function is available only when the screen is a **General View Screen**. If HMI detects the **Print Typesetting** function is already set for the editing screen, the **Hard Copy** function will be ineffective.

Step 1. Set the Hard Copy Region in **Screen Properties** dialog box.
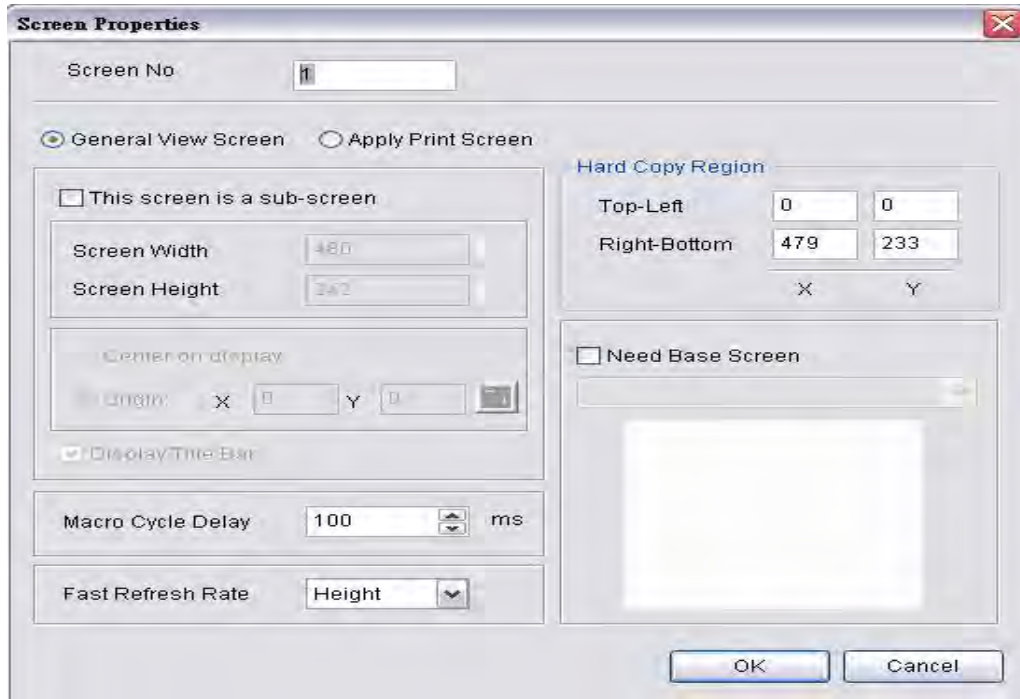
Step 2. Enable Print Function

> Create a **Report List** button on a **General View Screen**. Use this **Report List** button to enable the print function.

Step 3. Connect HMI to the printer and press Report List button, and the printer will start to print data out.

3.11.7 Recipe

The Recipe function provides the controller a convenient parameter input method. The user can transmit the designated parameter to the controller by using HMI recipe after finishing editing recipe. Bread making is an example. When making different bread, baking time control is very important. The user can use Recipe function to meet the different time requirements for making different bread. The purpose of this function is to reduce the loading of the controller and make the register of the controller to be more flexible in use.

Recipe function provides an easy and quick parameter input method for the connected controller. When completing the recipe editing, the user just needs to use the recipe register in control block and the designated corresponding parameters can be transmitted into the internal memory addresses of the controller.

The recipe can be set and modified through the recipe dialog box and can be saved and used independently without the project, allowing recipes to be used for all brands of models. In addition, the recipes can be saved in Windows Excel CSV file for the user to edit recipes more quickly. Before using a recipe, the user should enable the recipe function first by selecting **Options > Recipe**. After the recipe function is enabled, the **Recipe Setup** dialog box pops up and the user can start to edit the recipe.
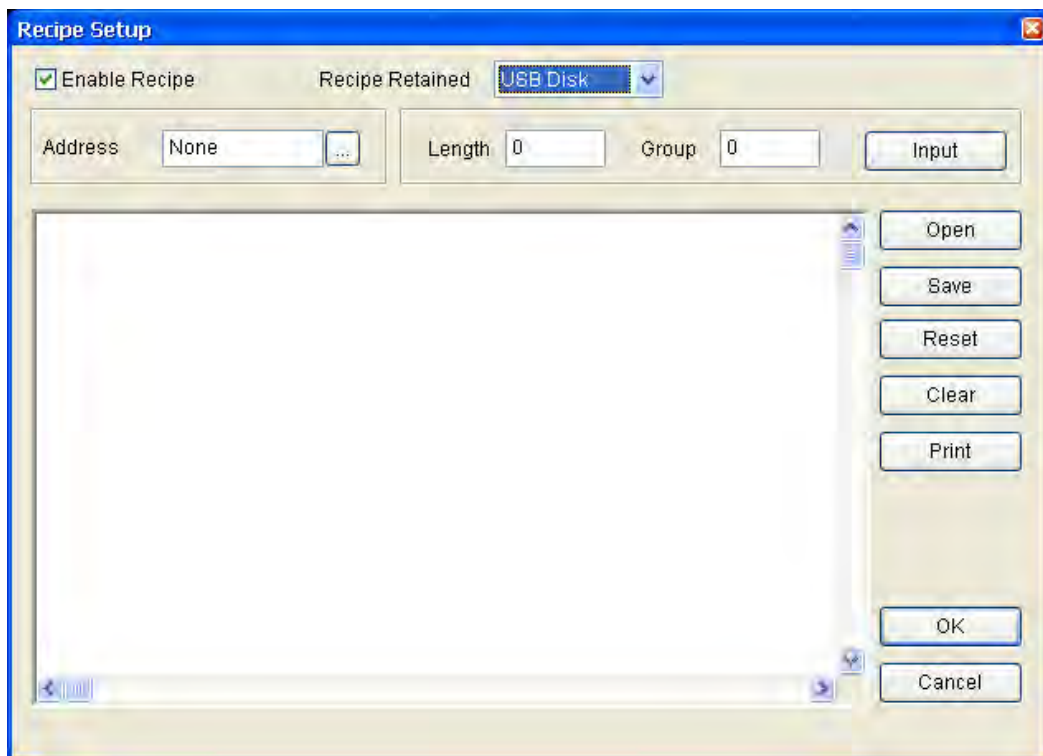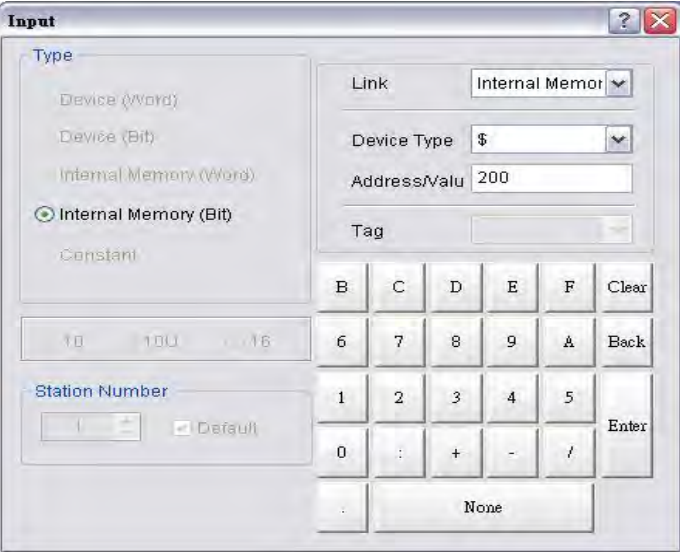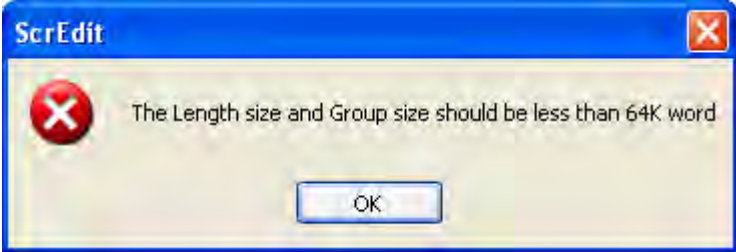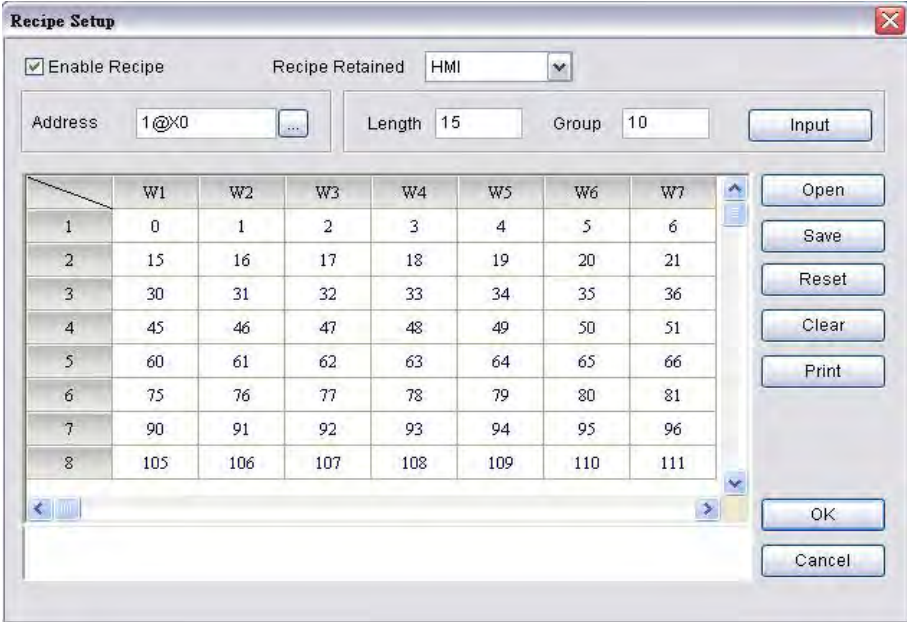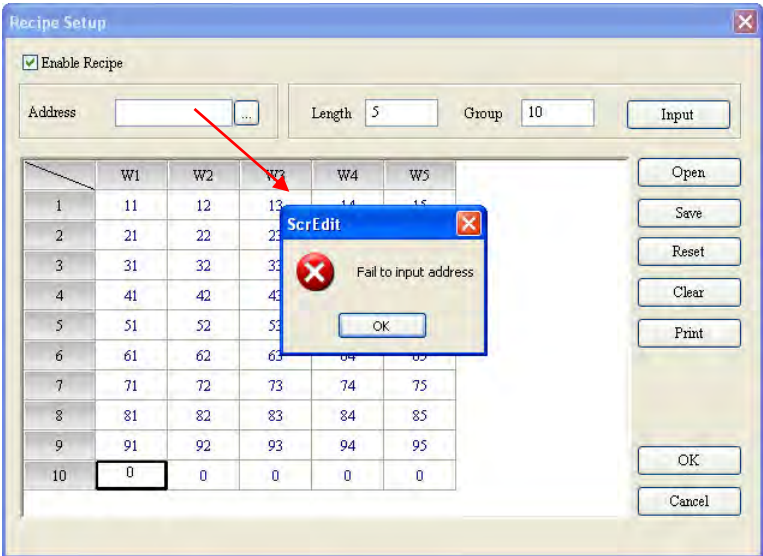
Fig. 3-11-2 Recipe Setup dialog box

Recipe Setup dialog box	
Enable Recipe	When the check box next to **Enable Recipe** is checked, the recipe function is enabled. If the users do not enable this function, the users cannot do this function even if the users have downloaded recipe data.

Recipe Setup dialog box	
Recipe Retained (Non-volatile)	Using this option can enable HMI to save recipe data in SRAM when the power is turned off.
Address	The user can input the starting address of recipe data here. It can accept the address in PLC input format and internal memory format. (Please note that if the recipe address is set to D4095, the recipe address plus the data length cannot exceed D4095.) The user also can click ⊡ button to get the following address input dialog box to input the starting address.
Length	Set the recipe length. The unit is Word and it should be set to more than 0. Otherwise, the following dialog box will display on the screen.
Grroup	Set group number of recipe. It is convenient for the user to use recipe by switching. The group number should be set to more than 0. Otherwise, the following dialog box shown as Fig. 2.8.14 will display on the screen.

Recipe Setup dialog box	
Input	After setting length and group number of recipe, the user can click **Input** button to edit the recipe data. The memory size for recipe is limited and the memory size for recipe is **64K**. It indicates that the total recipe size should be less than **64K** (The number of Length x Groups should be less than 65536). If the total recipe size exceeds the limit, the user will see a warning message displayed on the screen. The above-mentioned memory indicates the non-volatile memory of HMI, i.e. SRAM. Some DOP series HMI, which supports USB host function, allows the user to use more recipe data via this USB host interface. Supporting USB host function means it has a built-in USB host interface. The user can connect HMI to a USB disk via this USB host interface and input more recipe data. However, there is still a limit for the input value of recipe length and groups. When **Recipe Retained** (**non-volatile area**) is selected as **USB disk**, the length x groups should be less than 4096K (The number of Length x Groups should be less than 4194304). The user can change the **non-volatile data location** by clicking **Options > Configuration > General**.
Open	The user can load recipe data by clicking **Open** button. The loaded recipes do not contain the starting address of recipes. Therefore, regardless of which brand of the controller connecting to HMI, they all can use the same recipe file. There are two recipe file types provided in Delta DOP series HMI, one is 16bits recipe file (*.rcp) and the other is 32bits recipe file (*.csv) that can be opened in Windows® Excel environment. Please pay close attention to the format of recipe file and make sure that the recipe file is a 16bits data or a 32bits data. Do not select the incorrect data format; otherwise the program will not work normally.
Save	When **Save** button is pressed, HMI will save the editing recipe data as a file, click When saving the recipe file, the starting address will not be saved. This lets the user use the same recipe file in the different PLC brand. The user can save the recipe file as Windows Excel CSV file.
Reset	When **Reset** button is pressed, all related recipe settings and input recipe data are deleted. There is no other method to retrieve the recipe except for using Import function to import the saved recipe data again.

Recipe Setup dialog box	
Clear	When **Clear** button is pressed, all input recipe is cleared to 0 (zero).
Print	When Print button is pressed, all recipe data on the current screen will be printed out.
OK	After inputting the recipe data, the users can click **OK** button to save the recipe data for transmitting or modifying. At the same time, HMI will check the validity of all input recipe data. If there is invalid input recipe data value, the **OK** function is not executed successfully. For example, in the figure below, HMI found an error and a warning message dialog box displays on the screen as no input address was entered.
Cancel	When **Cancel** button is pressed, HMI will exit the Recipe Setup dialog box without saving.

3.11.8   32 bits Recipe

32 bits recipe function provides the user to save 32 bits data. The data format includes Signed Decimal, Unsigned Decimal and Floating (The total of Integral and fractional digits cannot exceed 7 digits). To enable this function, the user can click **Options > 32 bits recipe**.
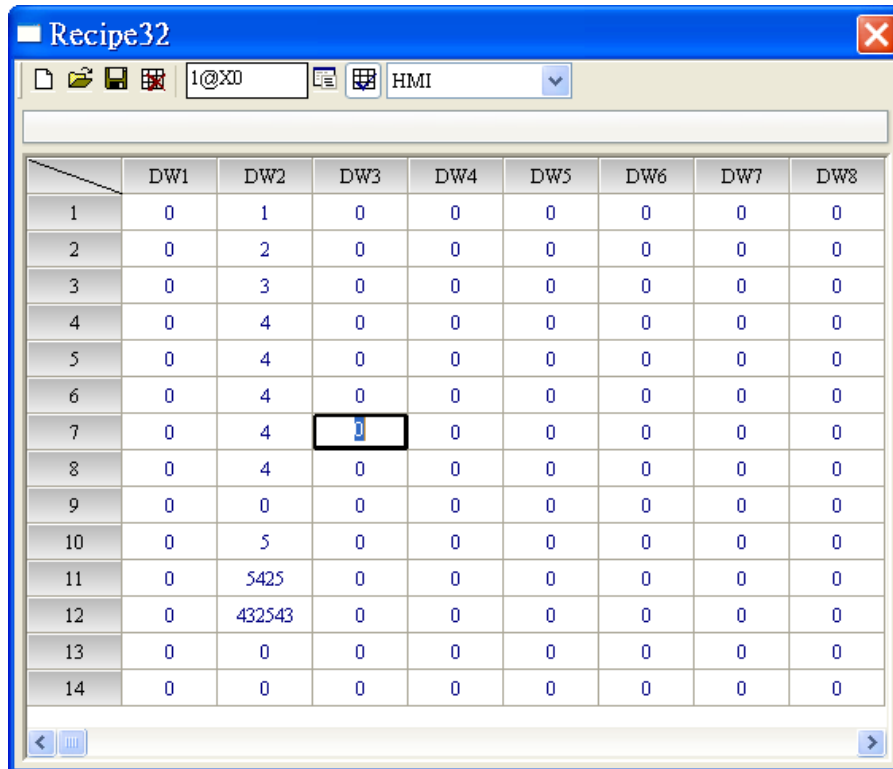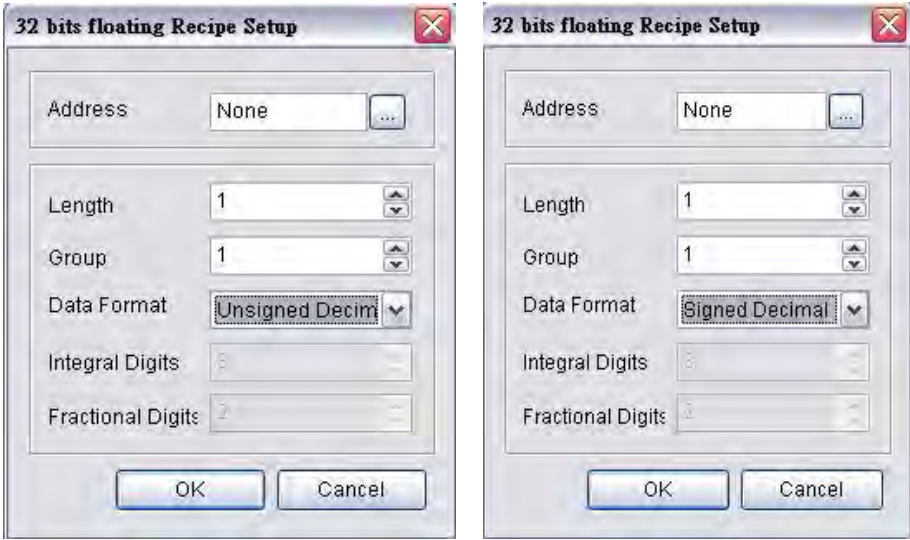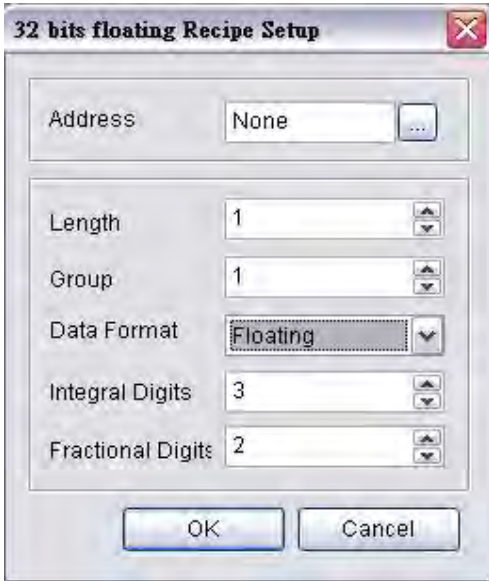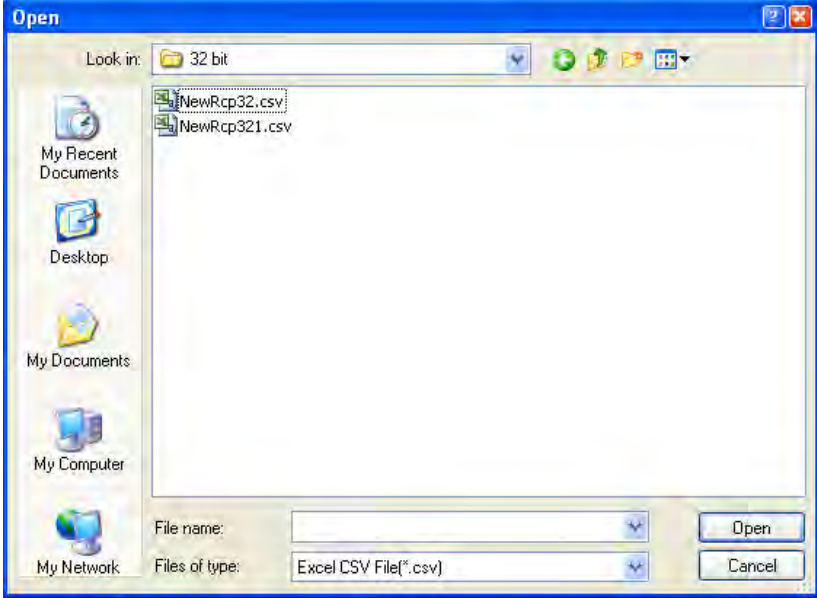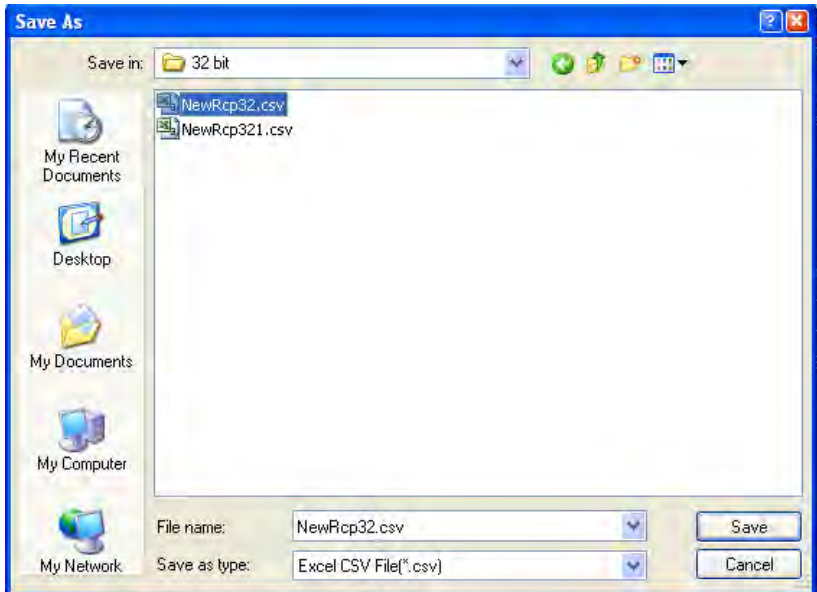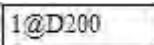
Fig. 3-11-3 32 bits recipe dialog box

32 bits recipe dialog box		
		New: Create a new 32 bits floating recipe file Press ⬜ to create a new 32 bits floating recipe. After clicking ⬜, a 32 bits recipe setup dialog box will display and the user can use it to set the settings of a 32 bits recipe. The user can determine the recipe storage address, the length and group number of the recipe, the memory format, and the integer & fractional digit number of the recipe data. There are three kinds of memory format provided, including Unsigned Decimal, Signed Decimal and Floating. Integer and fractional digit number cannot be selected when the memory format is set to Unsigned Decimal and Signed Decimal. These two options are only available when the memory format is set to Floating. But the total of the Integer and fractional digit number cannot exceed 7 digits. For the number of the 32 bits recipe, up to 255 recipes can be set in a 32 bits recipe file.

32 bits recipe dialog box

	Open: Open a 32 bits recipe file
	Press to open a 32 bits recipe file. The file format can be Recipe 32 bits File (*.rcp) and Windows Excel CSV File (*.csv). Please pay close attention to the format of recipe file and make sure that the recipe file is a 16bits data or a 32bits data. Do not select the incorrect data format; otherwise the program will not work normally.

32 bits recipe dialog box

	Save: Save a 32 bits recipe file Press to save a 32 bits recipe file. The default file format of a 32 bits recipe file is a Windows Excel CSV file (*.csv).
	Delete: Delete a 32 bits recipe Press to delete unnecessary 32 bits recipe.
1@D200	Recipe Storage Address : Display the storage address of a 32 bits recipe.
	Setup: 32 bits recipe setup When clicking , a 32 bits recipe setup dialog box will display and the user can use it to change the settings of a 32 bits recipe.

32 bits recipe dialog box

	Enable: Enable 32 bits recipe function
	This function should be selected when the user wants to use 32 bits recipe function. The non-volatile area location is the same as the location of 16 bits recipes.
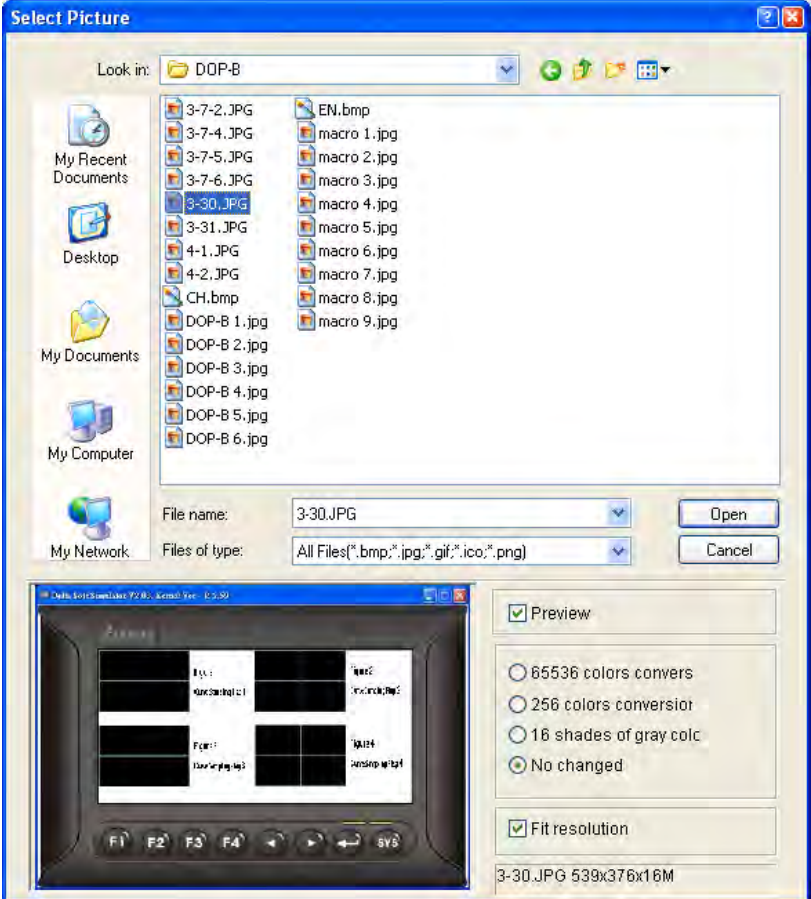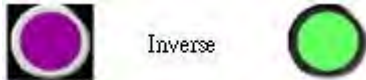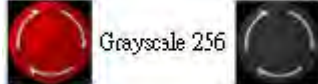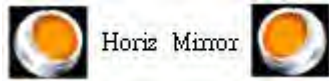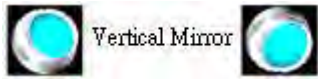
3.11.9　Picture Bank

The user can use this function to import various pictures to enrich the screens selection. Click **Options > Picture Bank** to execute this function.
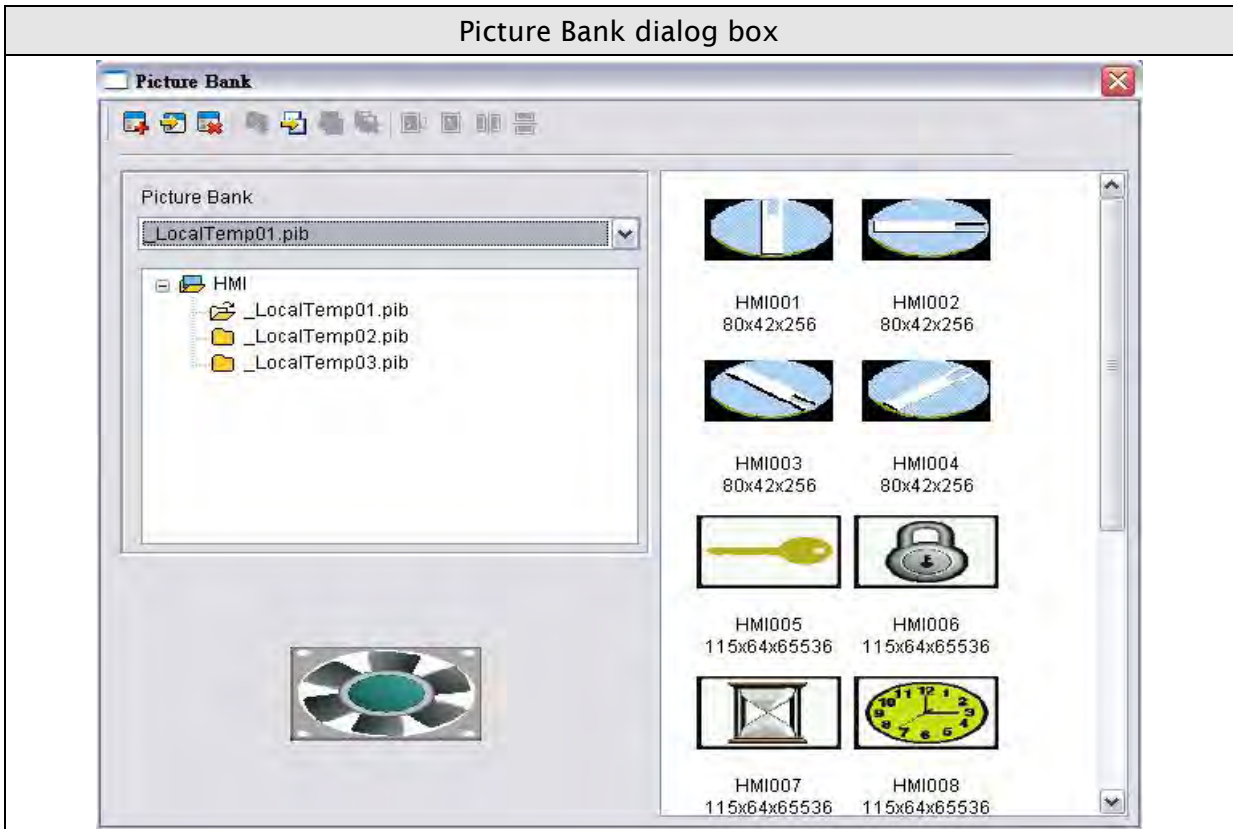
Picture Bank dialog box
Click the Picture Bank option to browse all pictures saved in Picture Bank. When one picture is selected, the user can see the picture in the preview window. Double left-clicking the mouse on the selected picture will display the picture in an actual size view.

New	Create a new picture bank. After clicking New icon, the New Picture Bank dialog box is displayed on the screen.
Install	Open a picture bank file (*.pib file).
Uninstall	Uninstall the selected picture bank. The uninstalled picture bank will be moved to Recycle Bin.
Import	Import pictures into the designated picture bank. The formats of the pictures in the picture bank can be BMP, JPG, GIF and ICON pictures. Please note that if the imported GIF file is an animation file, the imported animation files will be divided into several segments. When selecting this function, the dialog box shown will be displayed.

Picture Bank dialog box	
Import	The users can then convert the picture color in advance to speed the compile time or choose **No changed** option to retain the original color.
Update	After editing the picture every time (execute Inverse, Grayscale, etc. functions), the user needs to click **Update** button so that the the status of the picture can be changed and updated.
Export	Export pictures in BMP format from the picture bank.
Inverse	Inverse the picture color - negative effect
Grayscale	Convert the color picture to 256 color grayscale
Horizontal Mirror	Horizontal mirror effect
Vertical Mirror	Vertical mirror effect

Picture Bank dialog box	
Shortcut Menu	The users can right-click the mouse to display a shortcut menu shown on the figure below. This shortcut menu shows a list of commands relevant to the picture bank option. This allows the users to manage the pictures in the picture bank more quickly and efficiently. Cut Copy Paste Delete Rename Import ... Export ... Inverse Horiz. Mirror Vertical Mirror Grayscale 256

3.11.10   Text Bank

Input common or frequently used text and terms into Text Bank. The user can select the text from the Text Bank and enter them on the element more easily and quickly if necessary.
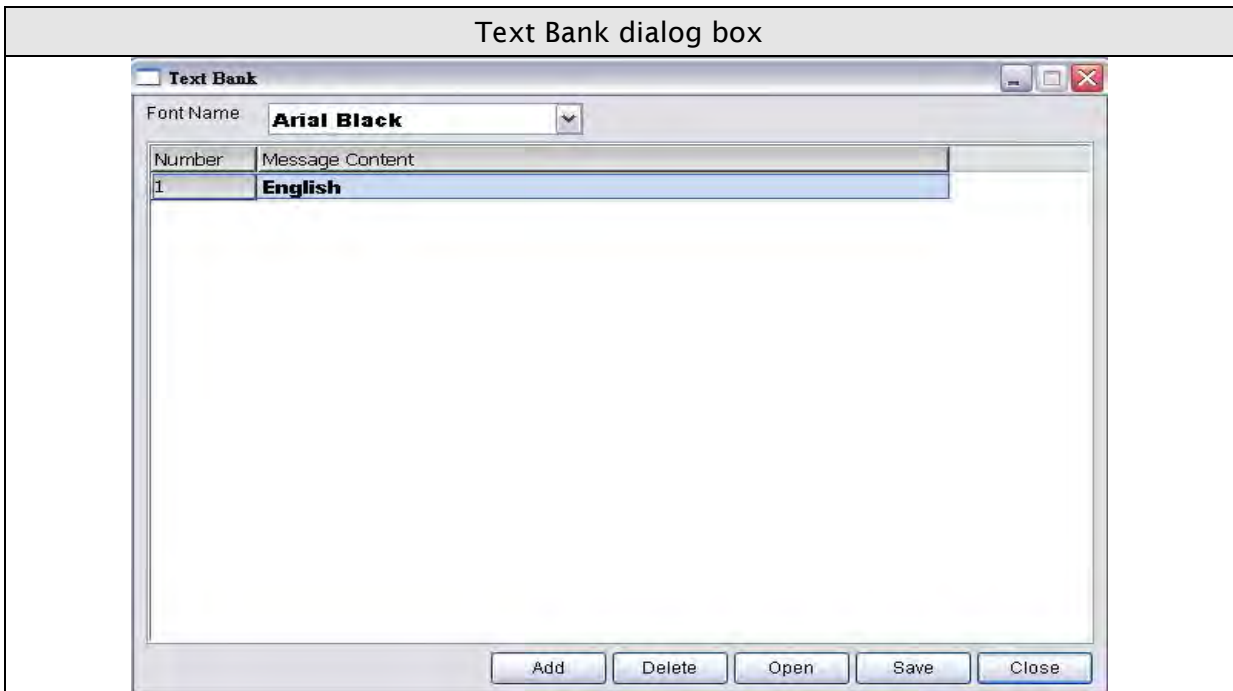
Text Bank dialog box	
Add	Press the **Add** button to add the text into the Text Bank. The multi-language editing is supported in the Text Bank option. The user can input the text or terms in different language and save them in the Text Bank. The multi-language font can also be set at the same time.
Delete	Press **Delete** button to remove the input text or terms in Text Bank.
Open	Press **Open** button to open and import the text or terms into Text Bank.
Save	Press **Save** button to save and export the text file.
Close	Press **Close** button to close and exit the text bank dialog box.

3.11.11　Submacro

Use this option to edit sub-macro and to be called by other Macros. For the Macro function, please refer to section 3.14.

3.11.12　Initial Macro

Use this option to edit initial macro. The initial macro will be executed automatically after the power is applied to HMI (power on). For the Macro function, please refer to section 3.14.

3.11.13　Background Macro

Use this option to edit background macro. For the Macro function, please refer to section 3.14.

3.11.14　Clock Macro
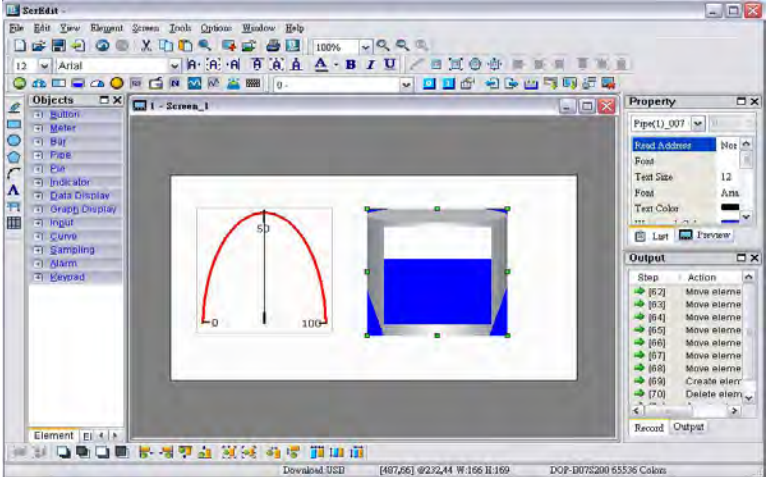
Use this option to edit clock macro. After HMI is turned on starting initial setup will run and the clock macro will be executed automatically by the clock setting time. For the Macro function, please refer to section 3.14.

3.11.15   Environment

Use this option to complete the environment settings of Screen Editor.

Environment Dialog Box

		Set the location where HMI saves the system files, including some system reference data and dynamic link library (*.dll) files. To avoid a system error and failure to find the file, we recommend the users not change this setting if it is not necessary. (This option is disabled by default.)
System Path		
Output Path		Set the location where HMI saves the output file after compile operation. Some functions, such as on-line simulation, off-line simulation, file download and upload all refer to the files in this location. To avoid a system error and failure to find the file, we recommend the users not change this setting if it is not necessary.
Options	Toolbars / Windows	Set the option to display or not display toolbars or docking windows.
	Language	Choose English, Turkish, Traditional Chinese or Simplified Chinese from the Language drop-down list.
	Upload / Download	Determines the communication interface for upload and download. It can be USB, Ethernet or PC COM Port.
	Auto Saving... Time Interval	When this option is selected, HMI will automatically save the file every specified number of minutes. The unit is M (minute) and the setting range is between 0M ~ 120M.

Environment Dialog Box		
Options	Auto open last file when starting ScrEditor	When this option is selected, HMI will automatically open the last saved file every time when the user starts HMI.
	Center Drawing Area	When this option is selected, the editing screen will be placed in the center position.
	Include picture data for uploading	If this option is selected, all pictures are also uploaded when the HMI upload function is enabled. All uploaded pictures are saved in a file named as **_LocalTemp01.pib**. The "Picture Bank Name" and the "Picture Name" (set in Property docking window) of the editing elements will refer to and link to this file. If HMI ends the editing abnormally, the file name will be named as **_LocalTemp02.pib**, **_LocalTemp03.pib** …, and vise versa when uploading is executed the next time. The last two numbers at the end of the file name will increase progressively.
	Auto convert input address to tag name	For example, if the user wants to replace PLC address 1@Y0 with the word "OS", define it in Tag Table option in advance. When this option is selected, HMI will automatically convert input address 1@Y0 to the word "OS". 。
	Auto reboot after firmware upgrading	When this option is selected, HMI will automatically restart (power off and then on) after the firmware upgrading is completed.
Driver	Reinstall HMI USB Drive: Press it to reinstall the HMI USB driver Uninstall HMI USB Drive: Press it to uninstall the HMI USB driver	
OK	Press OK button to save the modified settings and exit the Environment dialog box.	
Cancel	Press Cancel button to exit the Environment dialog box without saving.	

3.12   Menu Bar and Toolbar (Window)
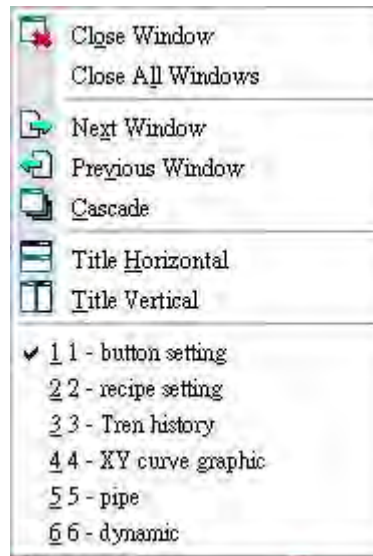
3.12.1   Close Window

It is used to hide the current window, NOT exit the current window. The users can execute this function by clicking **Window > Close Window**. If the user wants to display the hidden window, please click **Screen > Open Screen** to open an old screen.

3.12.2   Close All Windows

It is used to hide all windows, NOT exit all windows. The user can execute this function by clicking **Window > Close All Windows**. If the user wants to display the hidden window, please click **Screen > Open Screen** to open old screens.

3.12.3   Next Window

It is used to switch the current window to the next window. If the current window is the last window, the current window will not be changed even if this function is executed.

3.12.4   Previous Window

It is used to switch the current window to the previous window. If the current window is the first window, the current window will not be changed even if this function is executed.

3.12.5   Cascade

Cascade display. Display all editing windows so that they overlap. The title bar of each window is visible but only the top window is fully visible. The user can execute this function by clicking **Window > Cascade**. The opened windows are displayed in an overlapped pattern as shown as Fig. 3-12-1.
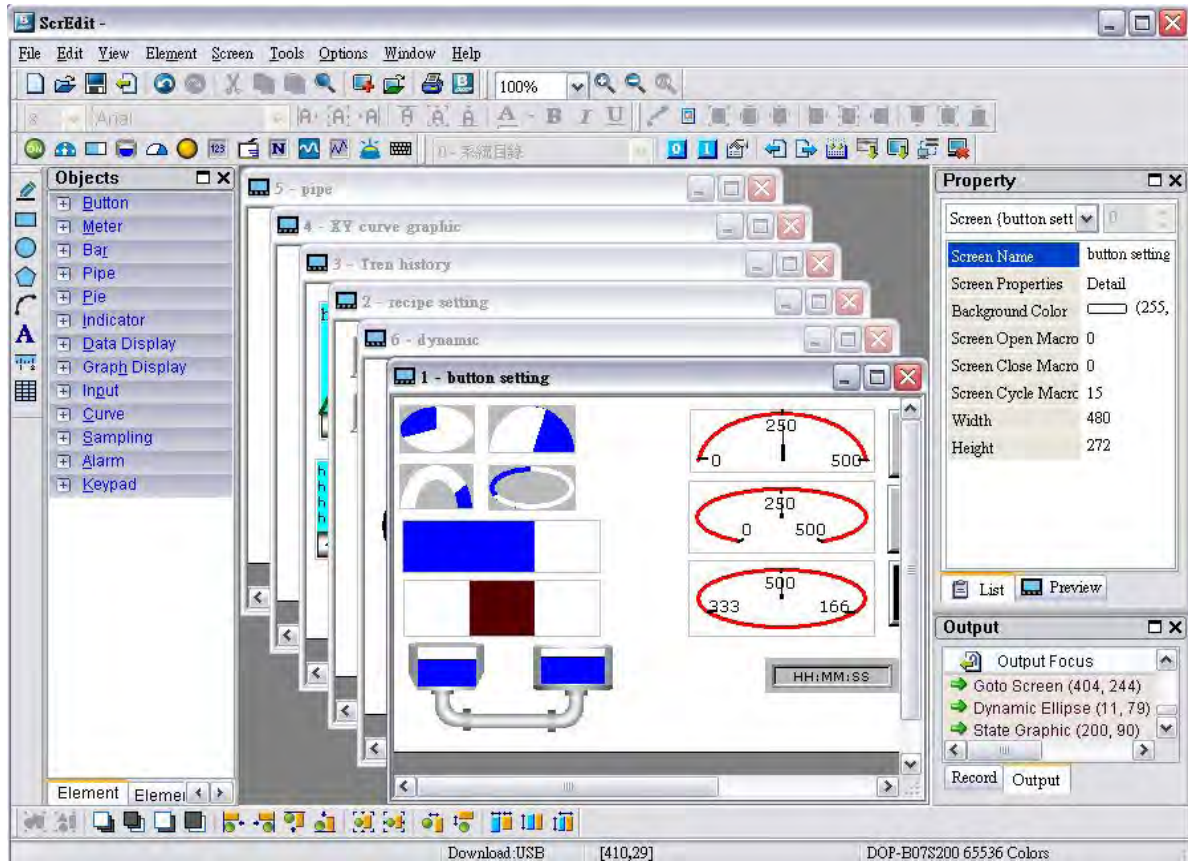
Fig. 3-12-1 Screen display after choosing Cascade command

3.12.6   Title Horizontal

Display all editing windows from top to bottom. The user can execute this function by clicking **Window > Title Horizontal**. The opened windows are displayed horizontally as shown as Fig. 3-12-2.
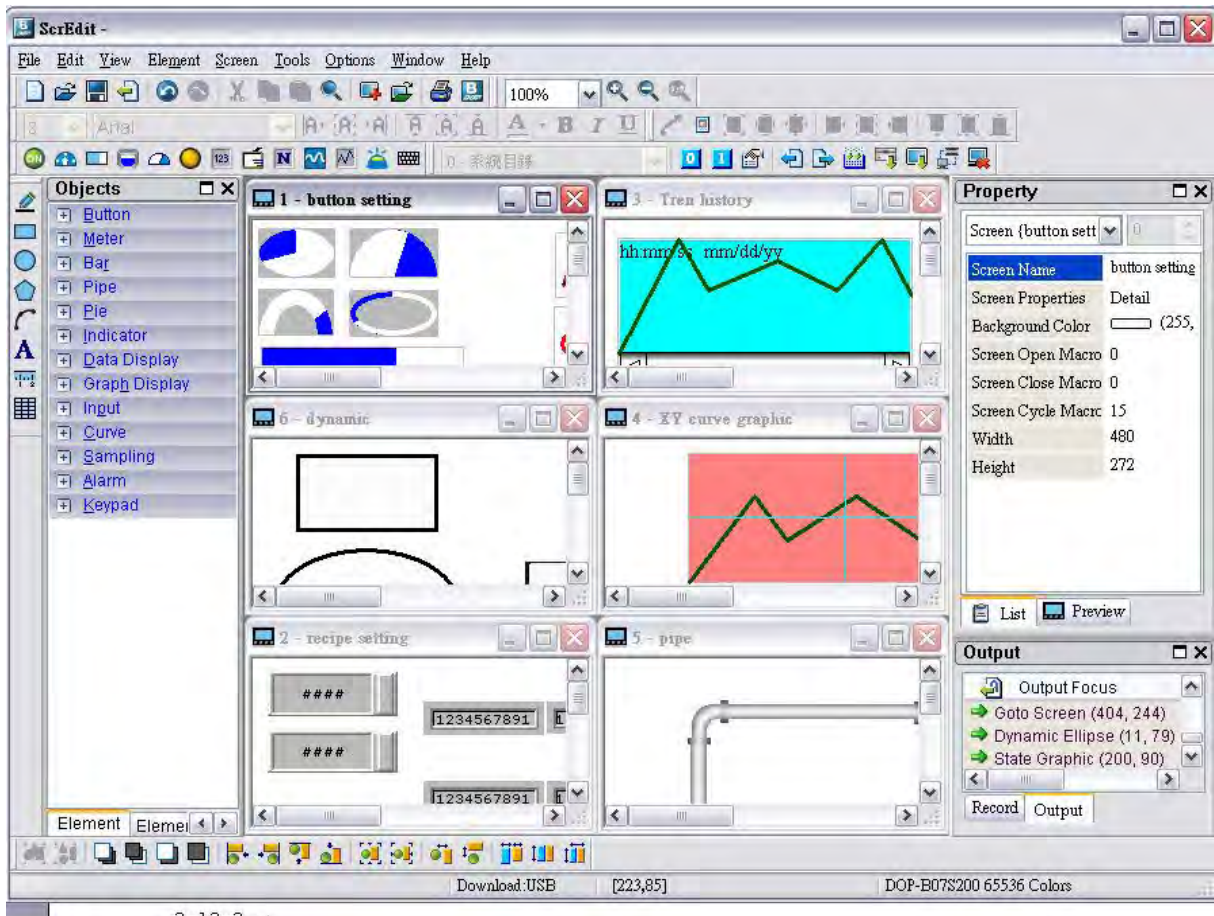
Fig. 3-12-2 Screen display after choosing Title Horizontal command

3.12.7 Title Vertical

Display all editing windows from left to right. The user can execute this function by clicking **Window > Title Vertical**. The opened windows are displayed vertically as shown as Fig. 3-12-3.
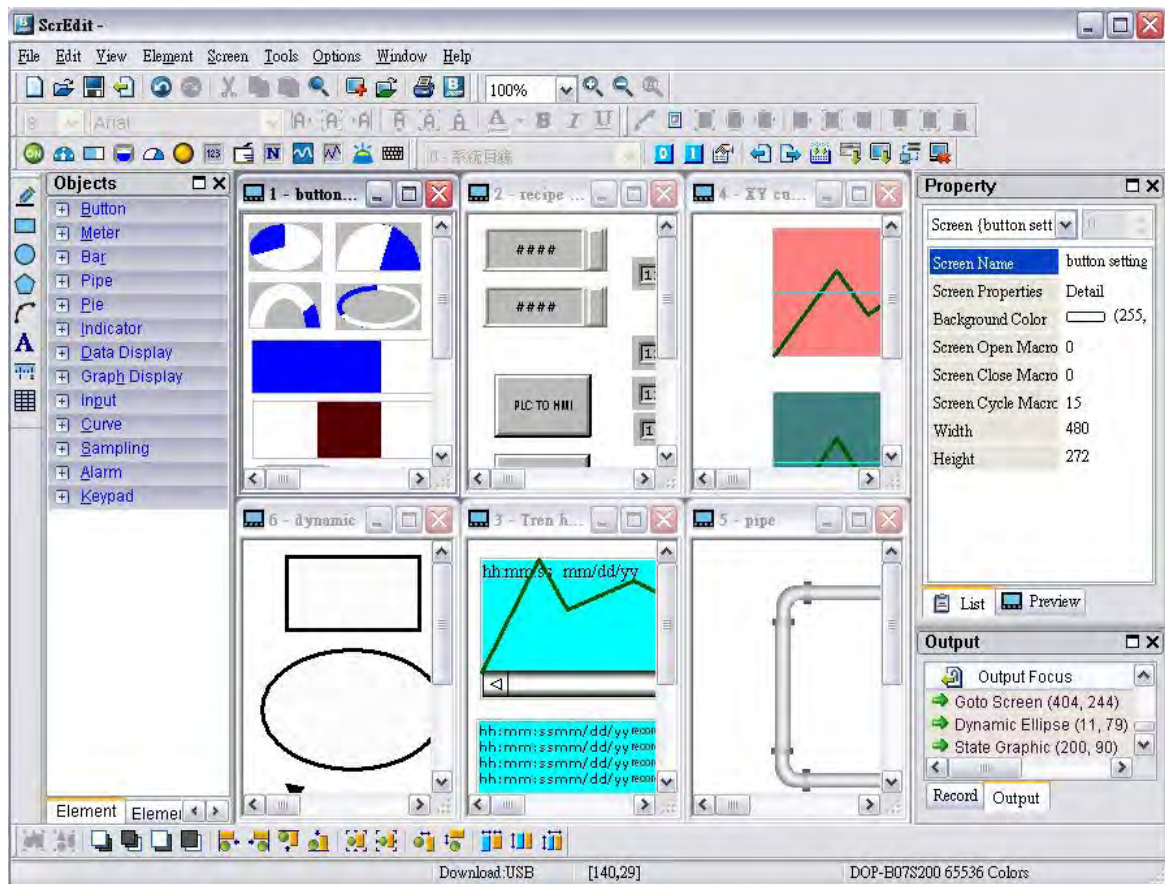
Fig. 3-12-3 Screen display after choosing Title Vertical command

3.12.8   Window Summary

ScrEdit shows a list of all opened screens at the bottom of "Window" pull-down menu for quick access. Just click the file name to open the file and view the screen directly (Fig. 3-12-4).
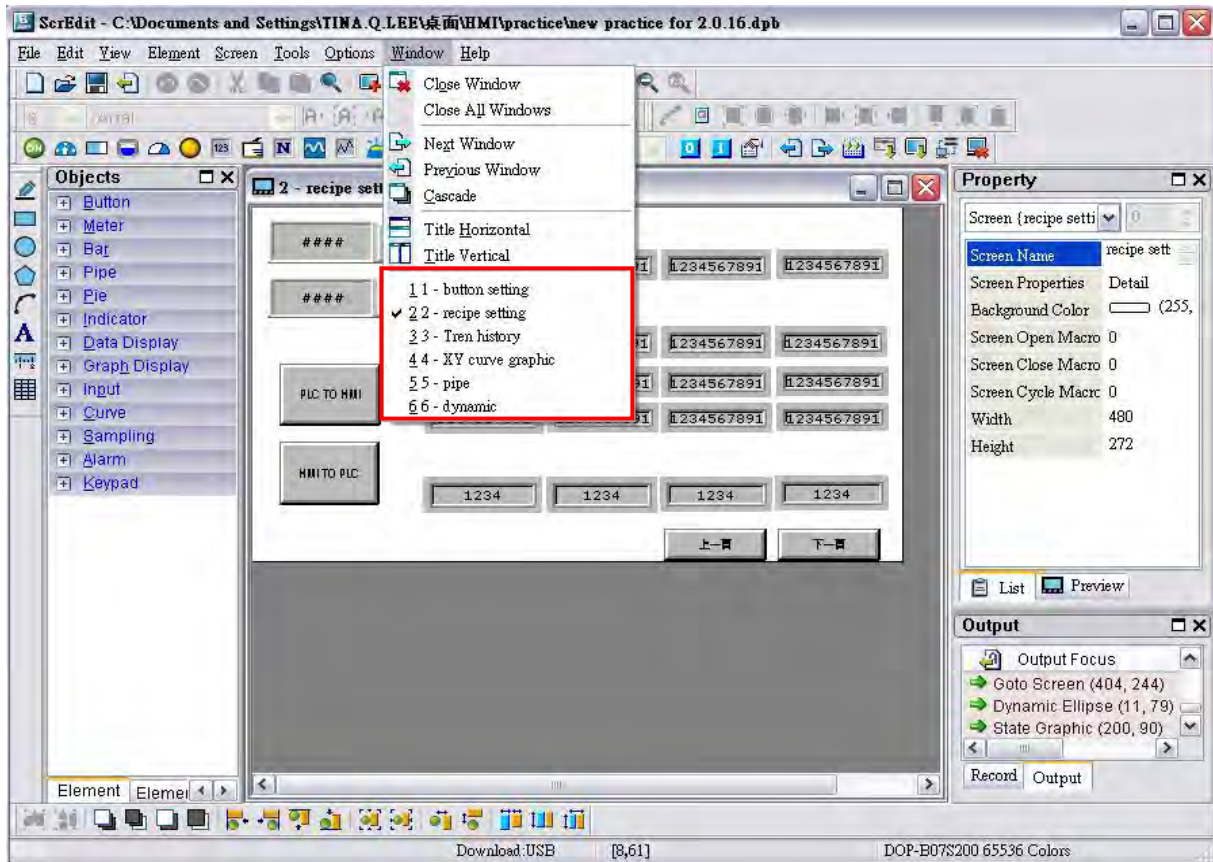
Fig. 3-12-4 Window Summary

3.13 Menu Bar and Toolbar (Help)

3.13.1 Help

Display the version information of Screen Editor and the firmware information of HMI (Fig. 3-13-5).

Fig. 3-13-1 Screen Editor Version

3.14   Macro Function

Delta DOP-B series HMI provides various kinds of macro commands, including Arithmetic, Logical, Data transfer, Data conversion, Comparison, Flow control, Bit setting, Communication (COM port) and drawing, etc. for user's selection (Fig. 3.14.1).
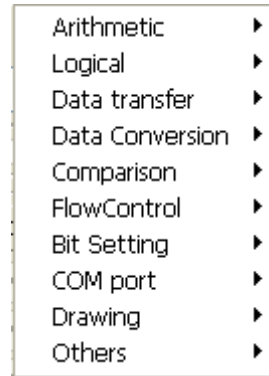
Fig. 3-14-1 Macro Commands

There are many advantages of using macro commands, such as:

1.   It can optimize the screen data.

2.   It can reduce the PLC program editing efficiently.

3.   It can overcome the limit on the hardware and software design.

Therefore, Macro is a very convenient function for the HMI user to use. After editing a Macro, you can test the Macro validity via either an on-line or off-line simulation on the PC before downloading the results to HMI.

3.14.1   Macro Type

There are eleven kinds of macro commands and they are divided into four categories. Please refer to the following:

1. On / Off Macro: It is provided for each Bit element that can be input, such as button element, i.e. Maintained and Momentary button.

2. Before / After Execute Macro: It is provided for all elements, such as numeric / character entry element and all button elements (including system button).

3. Screen Open / Screen Close / Cycle Macro: Use screen as a unit. Each screen has an individual screen macro.

4. Initial / Background / Clock / Sub Macro: Use system as a unit. Each project, i.e. each program, has its individual screen macro.

Table 3-14-1 Macro Command Table

Macro Name	Descriptions
On Macro	The user can use the On Macro for each specific button element (Bit). It is called the On Macro because the Macro is executed once upon the button element (Bit) changing from OFF to ON.
Off Macro	The user can use the Off Macro for each specific button element (Bit). It is called the Off Macro because the Macro is executed once upon the button element (Bit) changing from ON to OFF.
Before Execute Macro	The user can use the Before Execute Macro for all button elements and numeric / character entry element. One element has one Before Execute Macro.
After Execute Macro	The user can use the After Execute Macro for all button elements and numeric / character entry element. One element has one After Execute Macro.
Screen Open Macro	The Screen Open Macro will be executed only ONCE when the user open a screen (or switch to a new screen) and the screen elements will not be displayed until after the Screen Open Macro has completed execution. Therefore, it is important that the user pay close attention when designing the Screen Open Macro to avoid infinite loops (programs that cannot be ended) as it may cause a system delay or even prevent executing the screen's elements permanently. Writing long macros is not recommended and should be avoided if at all possible. Pay close attention on using loops and make sure to test the Macro with on-line/off-line simulation before downloading to HMI to ensure expected performance and operation.
Screen Close Macro	The Screen Close Macro will be executed only ONCE when the user close the screen and no other macros will be executed until the Screen Close Macro is completed. Therefore, it is important that the user pay close attention when designing the Screen Close Macro to avoid infinite loops (programs that cannot be ended) as it may cause a system delay.
Screen Cycle Macro	The macro will be executed continuously when the screen is open. Therefore, writing long macros is not recommended and should be avoided for this type of macro.
Initial Macro	There is only one Initial Macro in a program and it is executed just prior to the startup screen being displayed. This macro is very useful when setting initial values in the HMi or in a PLC.

Macro Name	Descriptions
Background Macro	The purpose of the Background Macro is to execute one or more commands simultaneously since it runs in a separate task. If another Macro is executed, such as the Cycle Macro, it will not have any influence on the Background Macro although they appear to be executed almost simultaneously. This type of macro does not require to be run in a loop since it will operate continuously.
Clock Macro	The Clock Macro will be executed continuously, finish the executed ONCE, and then will be executed again at the Clock cycle time set in the Standard tab of the Configuration window under Options. This type of macro is similar to a Cycle Macro therefore, writing long macros is not recommended and should be avoided.
Sub-macro	There are 512 sub-macros for editing that can be used to write repeated actions or functions to save macro editing time. To call a sub-macro simply, use a CALL command from within a macro; an example would be CALL 1 to call the first sub-macro.

3.14.1.1 On Macro

This macro is attached to a button element. The user can use On Macro for each specific button (Bit). It is called the On Macro because the Macro is executed once upon the button element (Bit) changing from OFF to ON. When the button is set to be ON, ON Macro will be executed ONCE. After execution, this macro will not be executed until the button is set to be ON again. However, On Macro only can be executed when the corresponding Bit for the button is triggered to be ON through the action of pressing the button, i.e. the Bit is set to be ON and the pressed button is ON also. ON Macro will not be executed if the Bit is set to be ON only.

If there is a Monmentary button created on the screen and On Macro is used, when the button is pressed, the procedure is as follows:
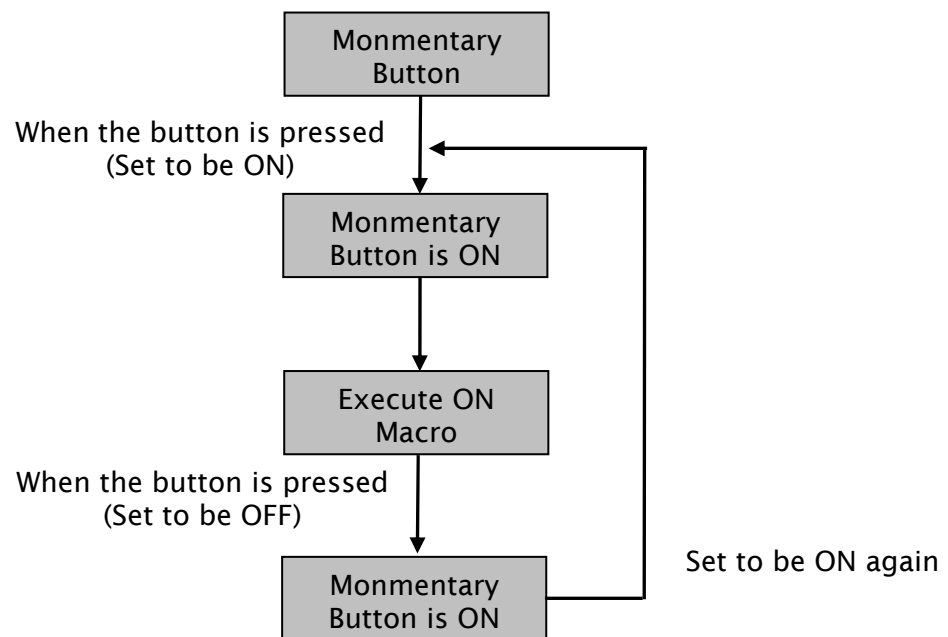
3.14.1.2 Off Macro

This macro is attached to a button element. The user can use Off Macro for each specific button (Bit). Same as ON Macro, Off Macro is started via setting this button. When the button is set to be OFF, Off macro will be executed ONCE. After execution, this macro will not be executed until the button is set to be OFF again. However, OFF Macro only can be executed when the corresponding Bit for the button is triggered to be OFF through the action of pressing the button, i.e. the Bit is set to be OFF and the pressed button is OFF also. OFF Macro will not be executed if the Bit is set to be OFF only.

If there is a Monmentary button created on the screen and On Macro is used, when the button is pressed, the procedure is as follows:
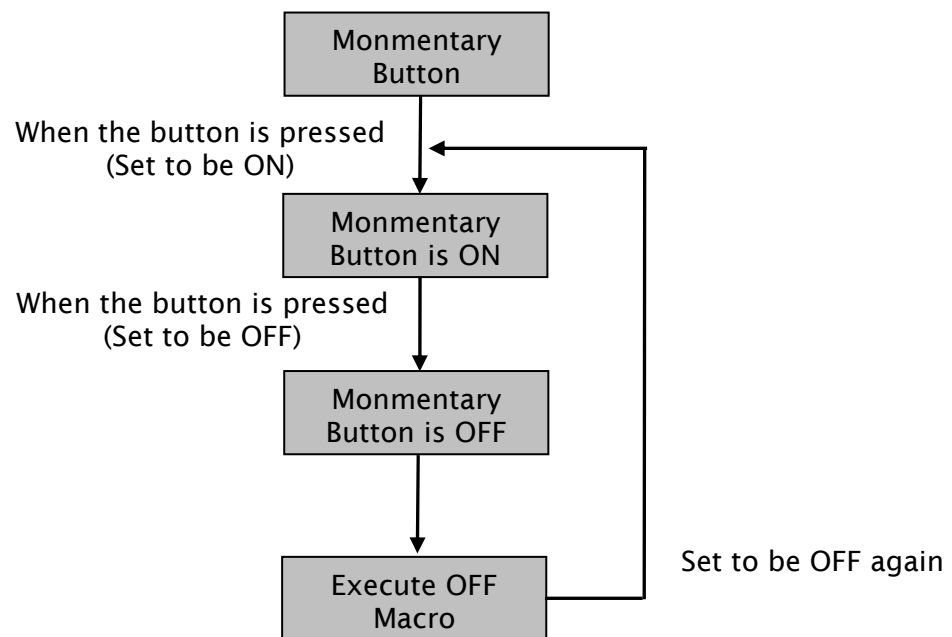
3.14.1.3 Before Execute Macro

This macro is attached to a button element or numeric / character entry element. One element has one Before Execute Macro. The operation is that when the button element is pressed, the sysem will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed.

If there is a Monmentary button or numeric entry element created on the screen and Before Execute Macro is used, when the button is pressed, the procedure is as follows:

Monmentary button or numeric entry element

When the button is pressed (Set to be ON) or when the value of the numeric entry element is entered

Perform Before Execute Macro

Monmentary button is ON or Numeric Entry Element is written

When the button is pressed (Set to be OFF) or when the value of the numeric entry element is entered

Perform Before Execute Macro

Monmentary button is OFF or Numeric Entry Element is written

Set to be ON or Enter the value again
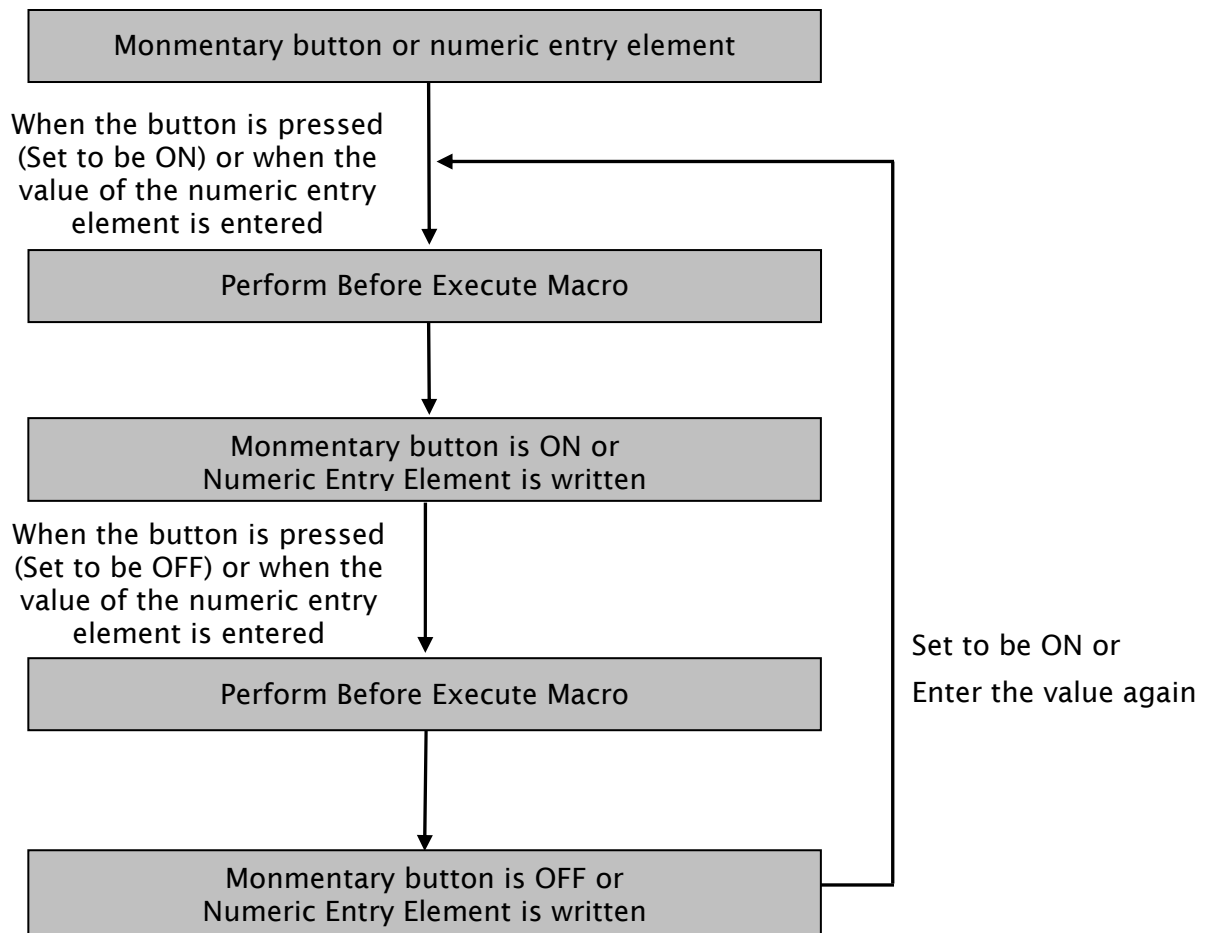
3.14.1.4 After Execute Macro

This macro is attached to a button element or numeric / character entry element. One element has one After Execute Macro. The operation is that when the button element is pressed, the sysem will execute the command of this macro first and then perform the operation of this button. But, if the state of the button is not triggered by pressing the button (via macro or external signal), the command of this macro will not be executed. If there is a Monmentary button or numeric entry element created on the screen and Before Execute Macro is used, when the button is pressed, the procedure is as follows:

```
              ┌─────────────────────────────────────────────┐
              │  Monmentary button or numeric entry element  │
              └─────────────────────────────────────────────┘
                                   │
When the button is pressed                              ◄──────────────┐
(Set to be ON) or when the                                             │
value of the numeric entry                                             │
element is entered                 ▼                                   │
              ┌─────────────────────────────────────────────┐         │
              │  Monmentary button is ON or                  │         │
              │  Numeric Entry Element is written            │         │
              └─────────────────────────────────────────────┘         │
                                   │                                   │
                                   ▼                                   │
              ┌─────────────────────────────────────────────┐         │
              │  Perform After Execute Macro                 │         │
              └─────────────────────────────────────────────┘         │
When the button is pressed                                            │
(Set to be OFF) or when the                                           │
value of the numeric entry                                            │
element is entered                 ▼                     Set to be ON or
              ┌─────────────────────────────────────────────┐    Enter the value again
              │  Monmentary button is OFF or                 │         │
              │  Numeric Entry Element is written            │         │
              └─────────────────────────────────────────────┘         │
                                   │                                   │
                                   ▼                                   │
              ┌─────────────────────────────────────────────┐         │
              │  Perform After Execute Macro                 │─────────┘
              └─────────────────────────────────────────────┘
```
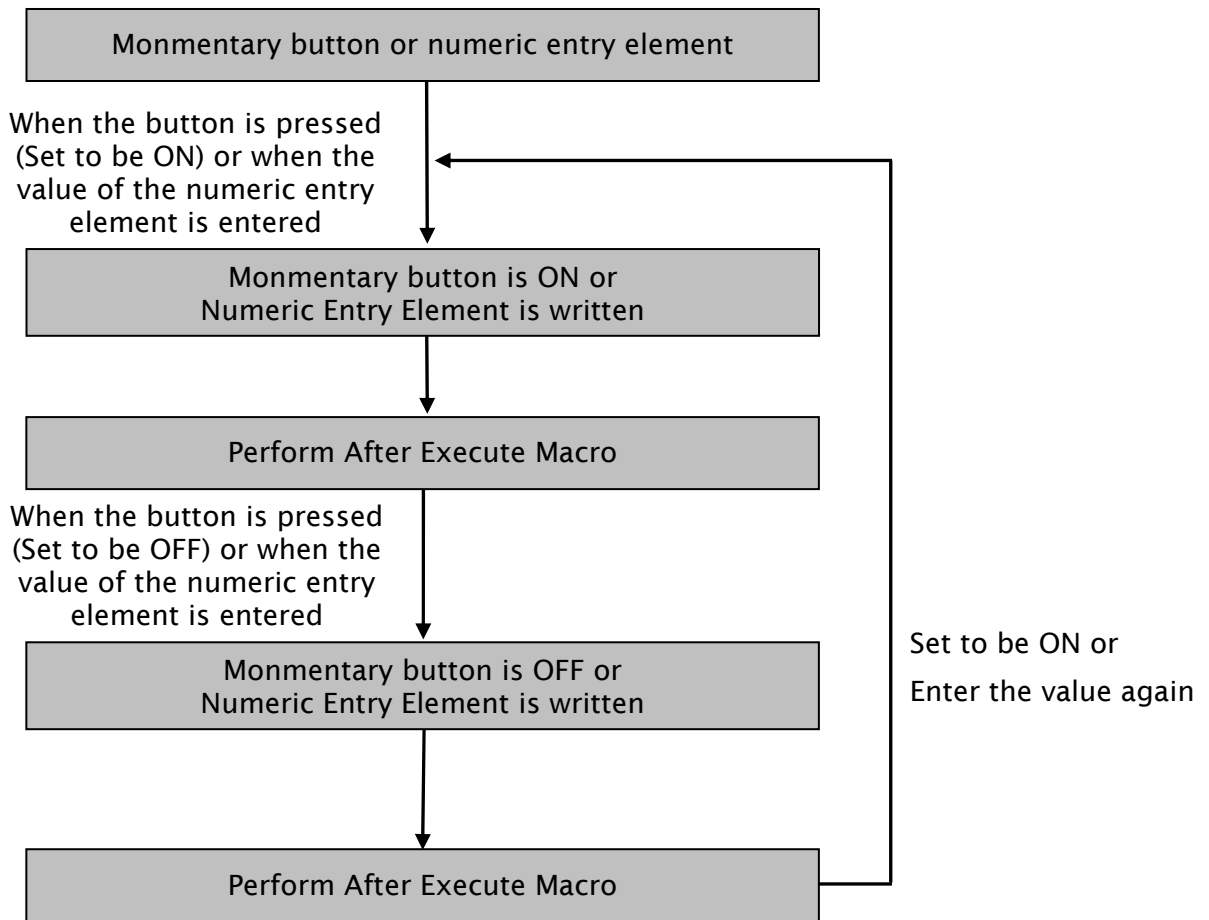
3.14.1.5 Screen Open Macro

The user can use Screen Open Macro to open each screen. Each screen has a Screen Open Macro. Screen Open Macro will only be executed ONCE when the user open a screen or switch to a new screen. The screen elements will be displayed and executed after finishing executing Screen Open Macro.

```
          ┌─────────────────────┐
          │      Execute        │◄──────────┐
          │  Screen Open Macro  │           │
          └─────────────────────┘           │
After Screen Open Macro    │                 │
   is executed.            ▼                 │
          ┌─────────────────────┐            │  Open a screen or
          │  Open a New Screen   │           │  switch to a new
          └─────────────────────┘            │     screen
                     │                        │
                     ▼                        │
          ┌─────────────────────┐            │
          │ Perform other ations on │────────┘
          │     the screen       │
          └─────────────────────┘
```
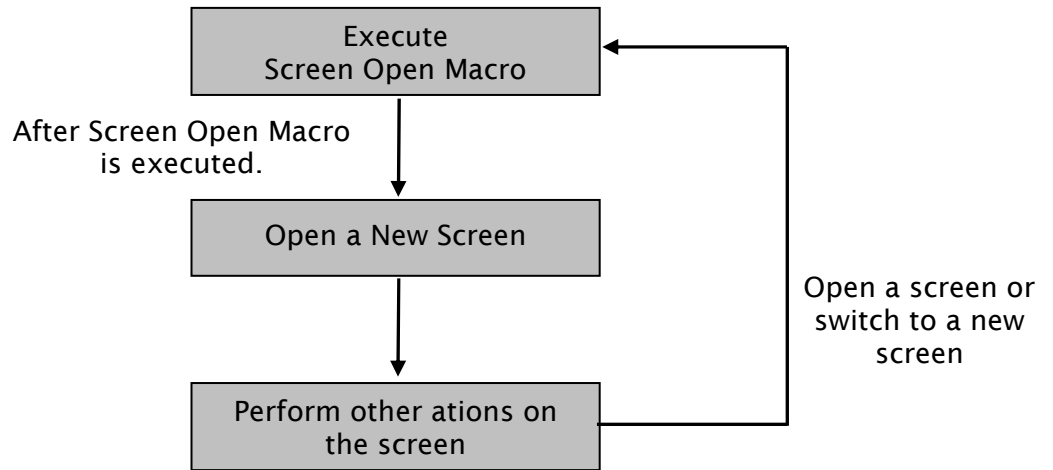
3.14.1.6 Screen Close Macro

The user can use Screen Close Macro to close each screen. Each screen has a Screen Close Macro. Screen Close Macro will only be executed ONCE when the user close a screen or switch to a new screen. The same as Screen Open Macro, the screen elements on new screen will be displayed and executed after finishing executing Screen Close Macro.

```
          ┌─────────────────────┐
          │   Close the screen   │◄──────────┐
          └─────────────────────┘            │
                     │                        │
                     ▼                        │
          ┌─────────────────────┐            │
          │      Execute        │            │
          │  Screen Close Macro  │           │
          └─────────────────────┘            │
After Screen Close         │                 │
Macro is executed          ▼                 │
          ┌─────────────────────┐            │
          │      Execute        │            │  Open a screen or
          │  Screen Open Macro  │            │  switch to a new
          └─────────────────────┘            │     screen
After Screen Open          │                 │
Macro is executed          ▼                 │
          ┌─────────────────────┐            │
          │  Open a New Screen   │           │
          └─────────────────────┘            │
                     │                        │
                     ▼                        │
          ┌─────────────────────┐            │
          │ Perform other ations on │────────┘
          │     the screen       │
          └─────────────────────┘
```
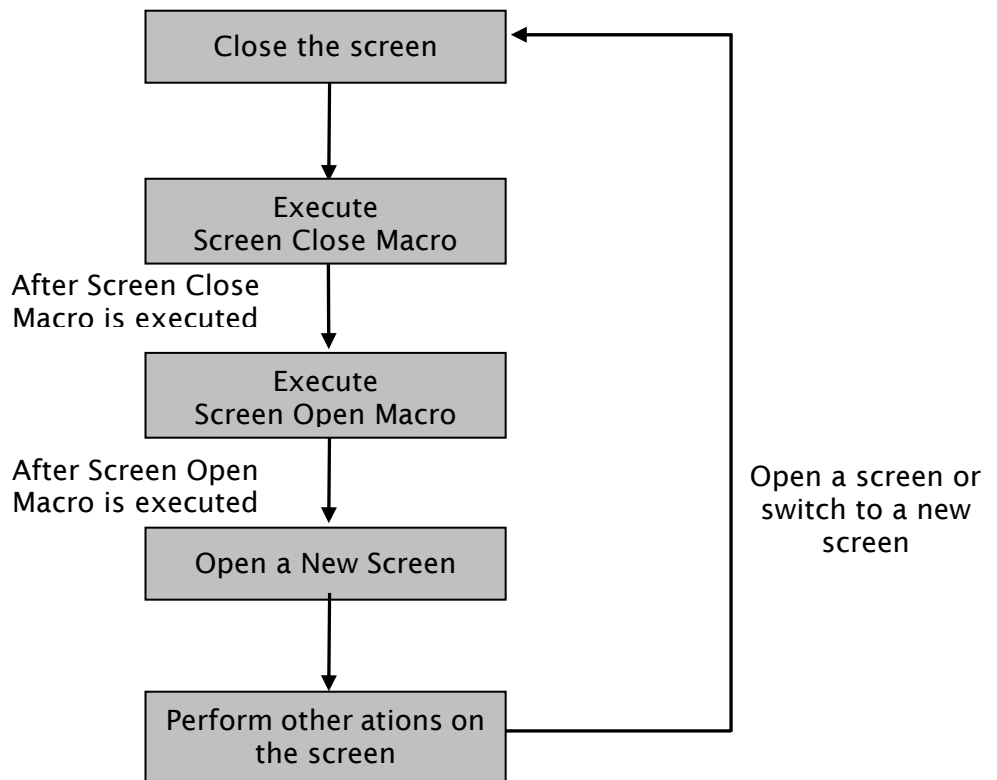
3.14.1.7 Screen Cycle Macro

The user can use Screen Cycle Macro to cycle each screen. Each screen has a Screen Cycle Macro and it can be executed repeatedly for a specified period of cycle time. The user can set the Macro Cycle Delay Time, i.e. the delay time every time between the end and restart of Screen Cycle Macro in Screen Properties dialog box (See Fig. 3-14-2). The system default setting is 100ms.
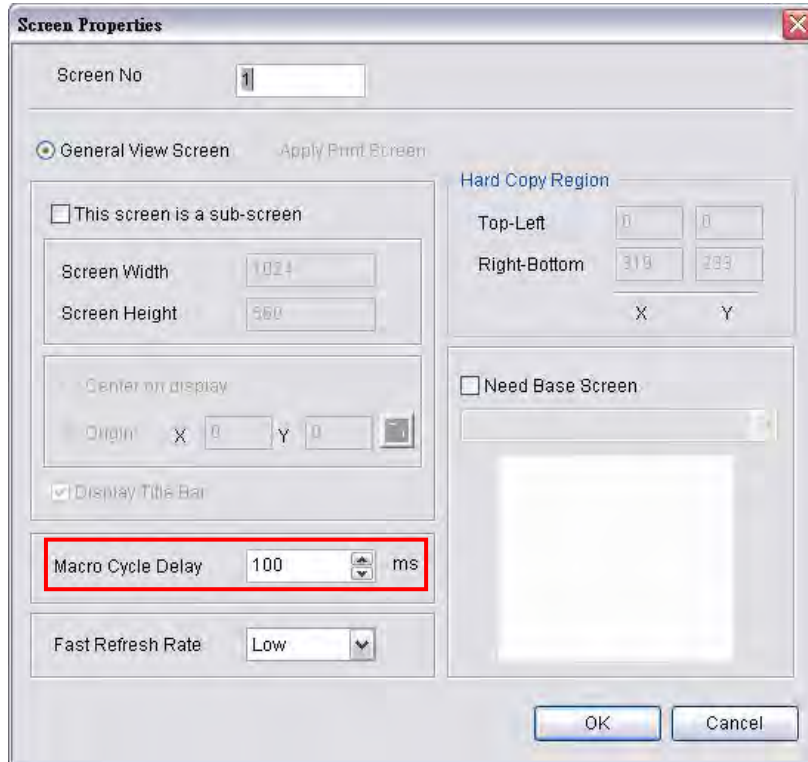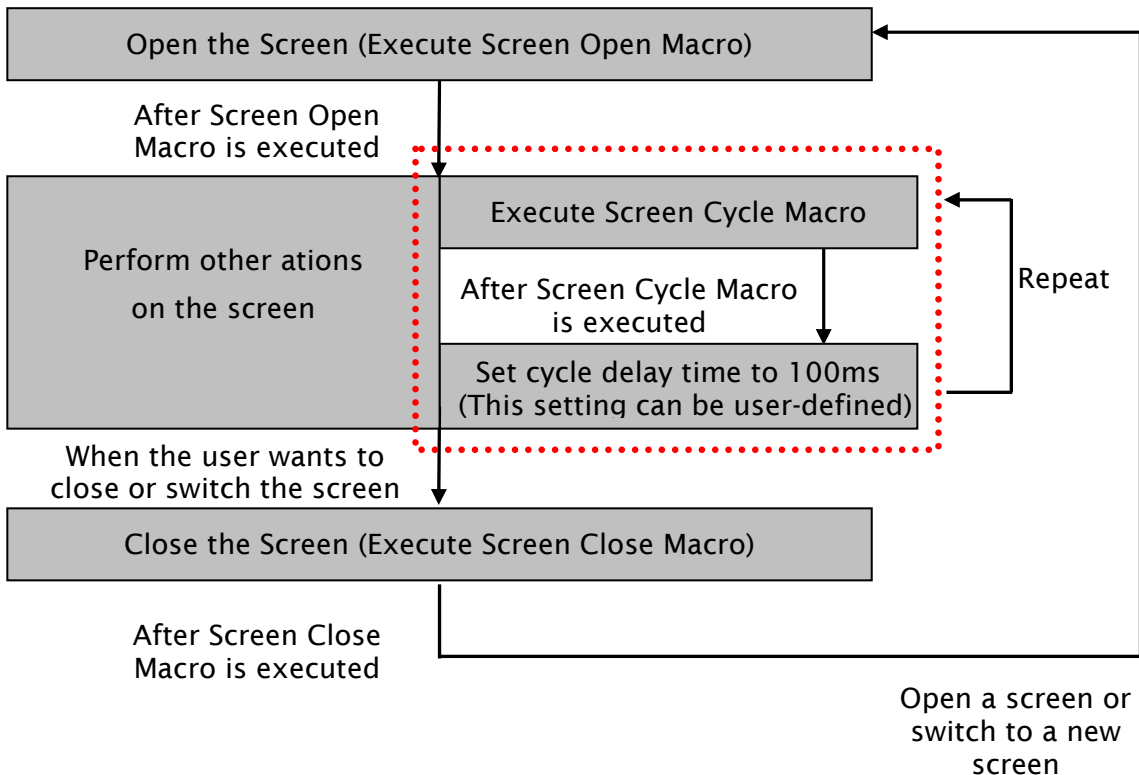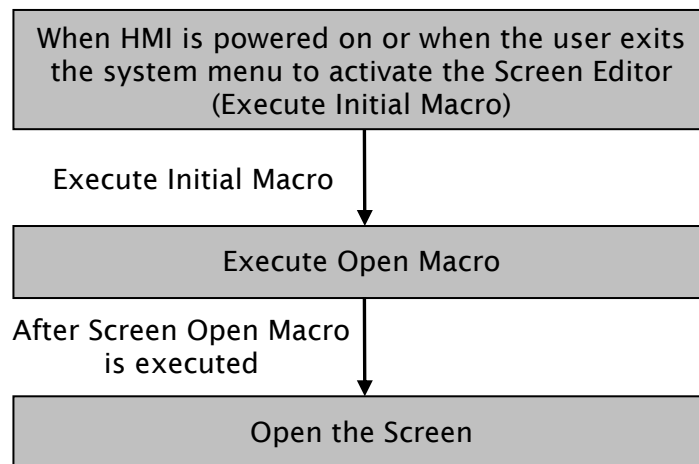

Fig. 3-14-2 Macro Cycle Delay Time

3.14.1.8 Initial Macro

There is only one initial Macro in a program. It is executed first at the beginning of a program. So, the user can preset some necessary initial values in this macro to omit step-by-step settings and also control initial settings to avoid unexpected problem by an unknown initial value. If the user needs to setup any special setting in the special address of the external controller, the user can use initial macro to set it. It saves time with a well-designed initial macro.

```
┌────────────────────────────────────────────┐
│  When HMI is powered on or when the user    │
│  exits the system menu to activate the      │
│  Screen Editor                              │
│         (Execute Initial Macro)             │
└────────────────────────────────────────────┘
        Execute Initial Macro    │
                                 ▼
┌────────────────────────────────────────────┐
│           Execute Open Macro                │
└────────────────────────────────────────────┘
   After Screen Open Macro       │
         is executed             ▼
┌────────────────────────────────────────────┐
│              Open the Screen                │
└────────────────────────────────────────────┘
```

3.14.1.9 Background Macro

There is only one background Macro in a program. It always exists in a program and is executed continuously like background during HMI operation. But the execution of a Background Macro is to execute one or more commands at a time, not finish the execution ONCE. After the last macro command is executed, the system will start to execute this macro again from the first macro command. The user can click **Options > Configuration > General** tab and use Background macro update cycle option to determine the lines of the background macro commands (see Figure 3-14-3)
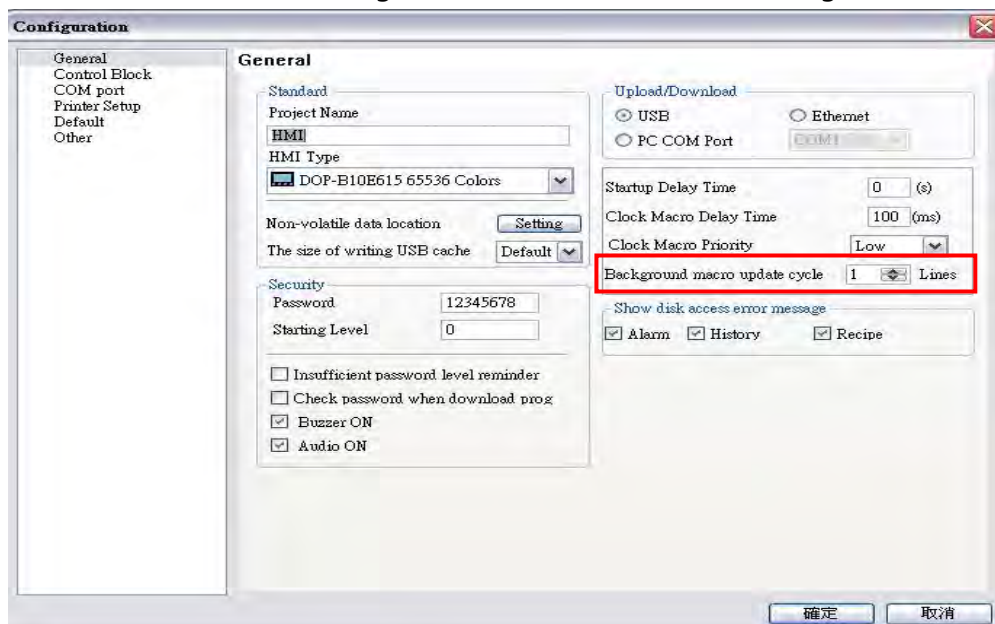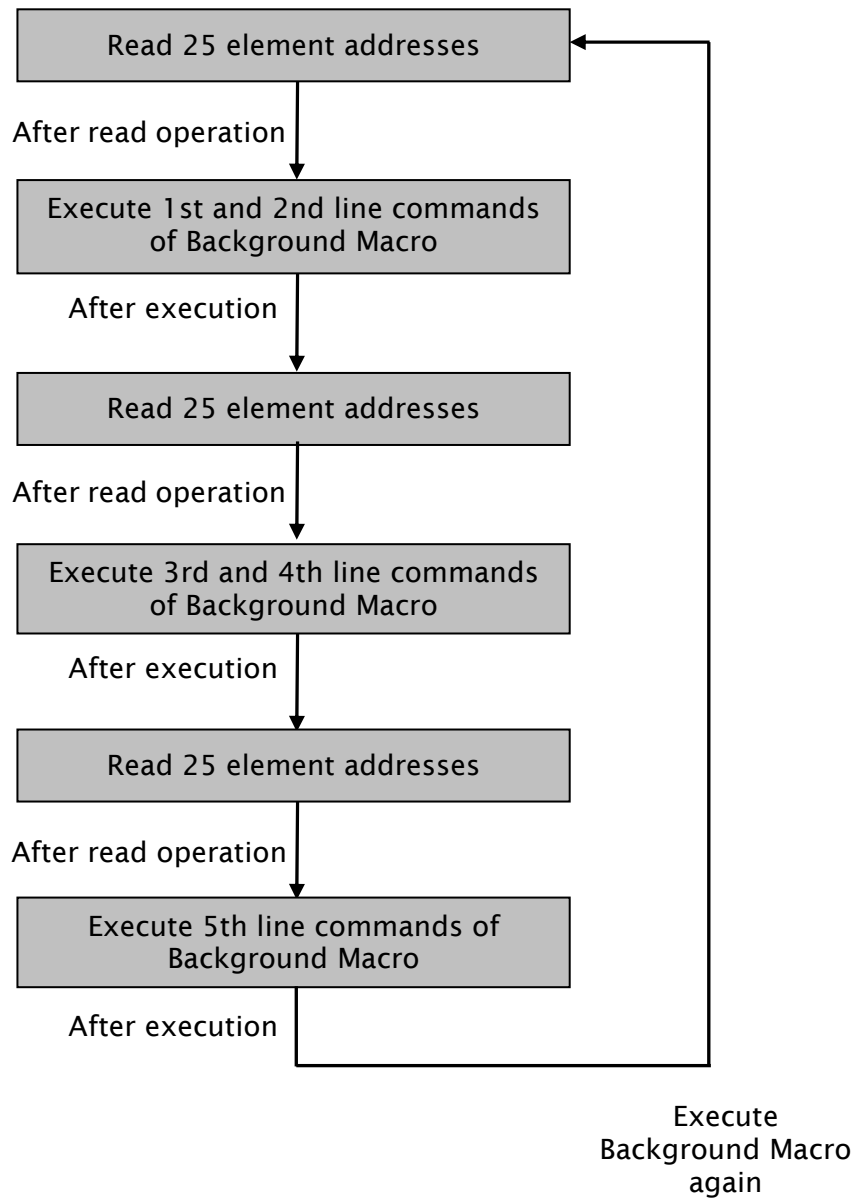

Fig. 3-14-3 Background macro update cycle

For example, suppose that there are 25 element addresses on the screen and Background is used (5 lines of macro commands), if the setting value of background macro update cycle is set to 2, when background macro is executed, HMI will first read 25 element addresses and then execute 2 lines of background macro in sequence.

```
            ┌─────────────────────────────────┐
        ┌──▶│   Read 25 element addresses      │◀─┐
        │   └─────────────────────────────────┘  │
        │   After read operation │               │
        │                        ▼               │
        │   ┌─────────────────────────────────┐  │
        │   │  Execute 1st and 2nd line commands │ │
        │   │       of Background Macro        │  │
        │   └─────────────────────────────────┘  │
        │        After execution │               │
        │                        ▼               │
        │   ┌─────────────────────────────────┐  │
        │   │   Read 25 element addresses      │  │
        │   └─────────────────────────────────┘  │
        │   After read operation │               │
        │                        ▼               │
        │   ┌─────────────────────────────────┐  │
        │   │  Execute 3rd and 4th line commands │ │
        │   │       of Background Macro        │  │
        │   └─────────────────────────────────┘  │
        │        After execution │               │
        │                        ▼               │
        │   ┌─────────────────────────────────┐  │
        │   │   Read 25 element addresses      │  │
        │   └─────────────────────────────────┘  │
        │   After read operation │               │
        │                        ▼               │
        │   ┌─────────────────────────────────┐  │
        │   │  Execute 5th line commands of     │  │
        │   │       Background Macro           │  │
        │   └─────────────────────────────────┘  │
        │        After execution │               │
        └────────────────────────┘               │
                                                  │
                              Execute             │
                           Background Macro ──────┘
                                again
```

3.14.1.10 Clock Macro

There is only an Clock Macro in a program or a machine. Similar to Screen Cycle Macro, it can be executed repeatedly for a specified period of preset clock time. The user can set Clock Macro Delay Time, i.e. the delay time every time between the end and the restart of Clock Macro in **General** tab of **Configuration** dialog box (See Fig. 3-14-4). The system default setting is 100ms.
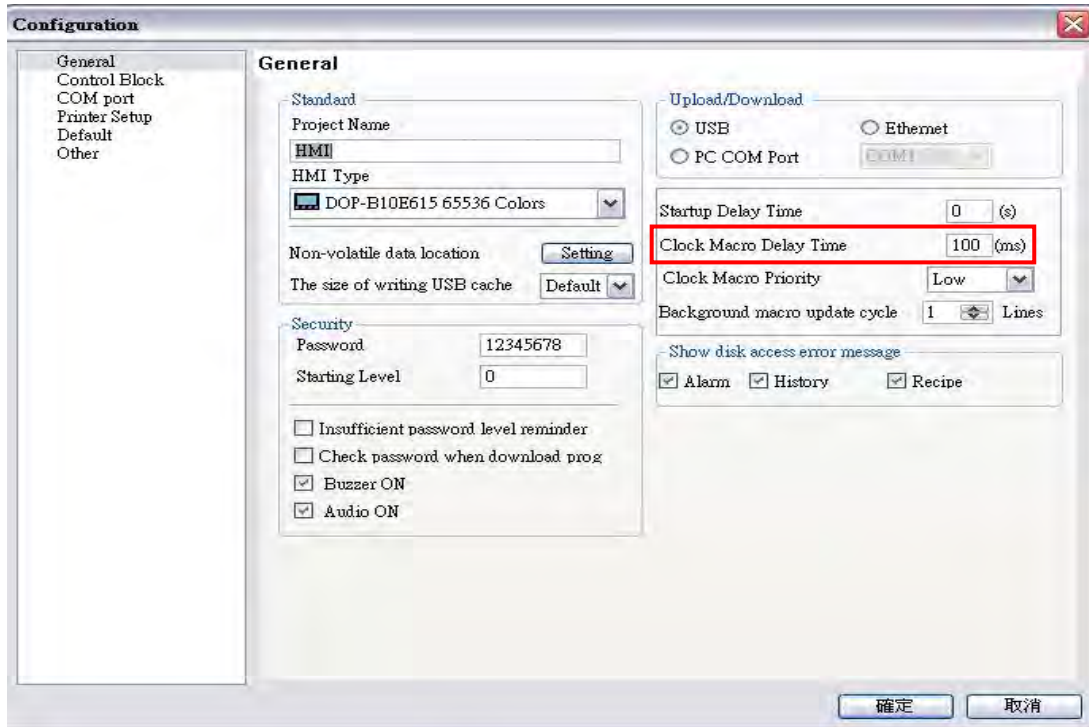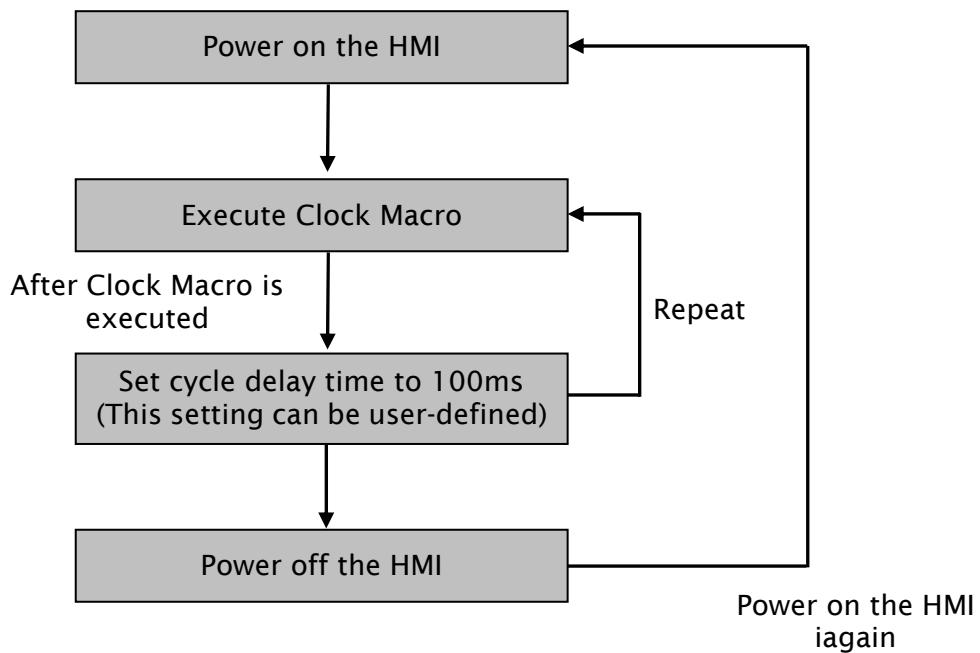

Fig. 3-14-4 Clock Macro Delay Time option

3.14.1.11 Sub-Macro

Each project (Screen Editor program) is capable of containing 512 sub-macros which is labeled from 1 to 512 by default (Fig. 3-14-5, Fig. 3-14-6). Sub-macro is similar to the subroutine in the in program. The user can write repeated action or function in sub-macro to save macro editing time and easy maintain. For example, a function is written named sub-macro 2, the user only needs to write "CALL 2" in Macro whenever it is used. In the sub-macro program, the user can also call other submacro. However, in order to keep sufficient memory, the levels for CALL sub-macro must be less than 6 levels. In addition, as the sub-macro are named 1 through 512 by default, when the user wants to change the name of the sub-macro to a more user-friendly description, the user can rename the sub-macro freely.

Number of the Sub-macro   Name of the Sub-macro
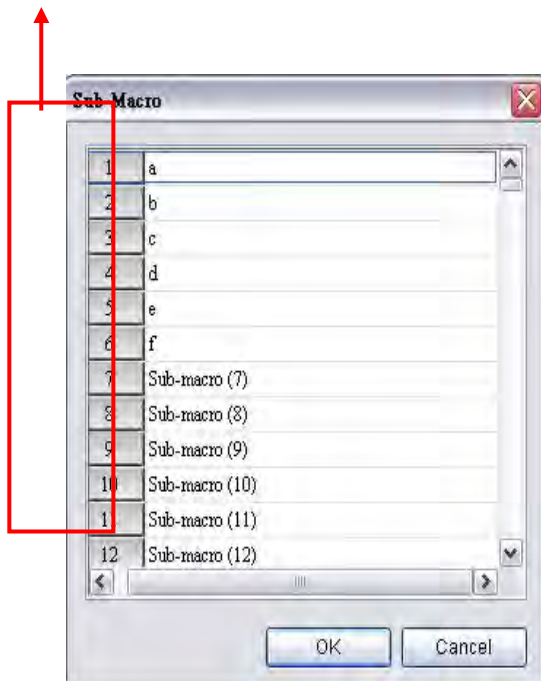
Fig. 3-14-5 Sub-macro Screen I   Fig. 3-14-6 Sub-macro Screen II
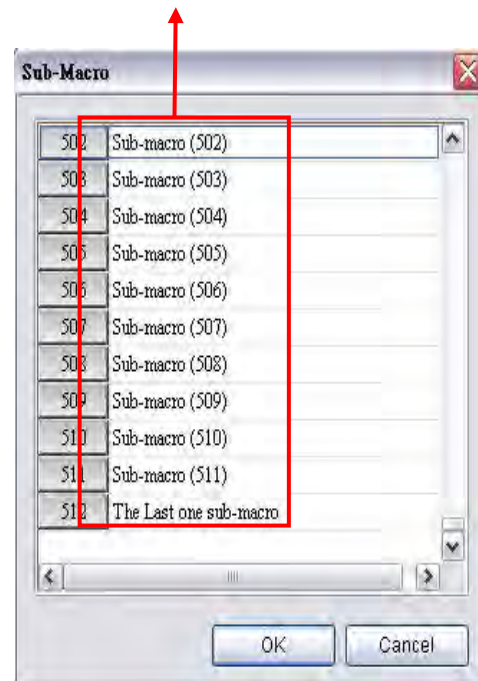
To call a specific sub-macro, a CALL command is used.

For example:

Create a Screen Open Macro command and a Sub-Macro first (Fig.3-14-7, Fig. 3-14-8).

The execution process of the Screen Open Macro will be shown as the Fig. 3-14-9.
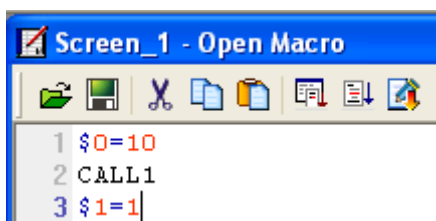
Fig. 3-14-7 Screen Open Macro   Fig. 3-14-8 Sub-Macro 1
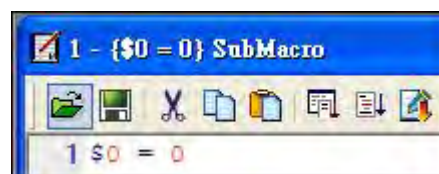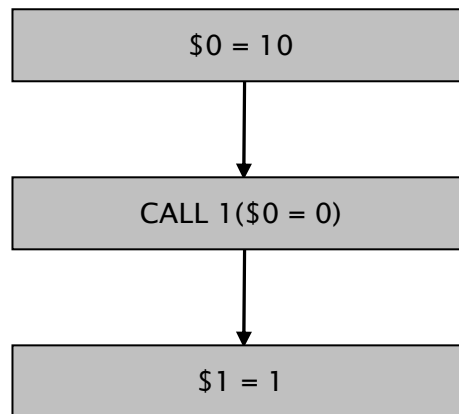
Fig. 3-14-9 Execution process of Screen Open Macro

When CALL 1 is executed, it means that Sub-Macro 1 is called and executed. After executing Sub-Macro, the system will continue to execute Sceen Open Macro till it ends. At this time, 0 = 0 and $1 = 1.

> **NOTE**

When editing any macros, please pay close attention to the logicality of macro command, especially the usage of loop and program. If the user write an infinite loop (i.e. program cannot be ended) in the macro or write a program which will not be executed until some certain condition is satisfied, it may make HMI work abnormally. Therefore, it is recommended that the user should use simulation function to verify the macro and check if HMI operation is correct or not after macro editing is completed.

3.14.2   Macro Editing

3.14.2.1 Macro Editing Widow and Toolbar

After choosing the desired Macro command from the menu bar, the user can start editing the Macro by clicking any line in the editing window shown in Fig. 3-14-10. Please note that Each macro is capable of containing 512 lines of code with a maximum of 128 characters per line.
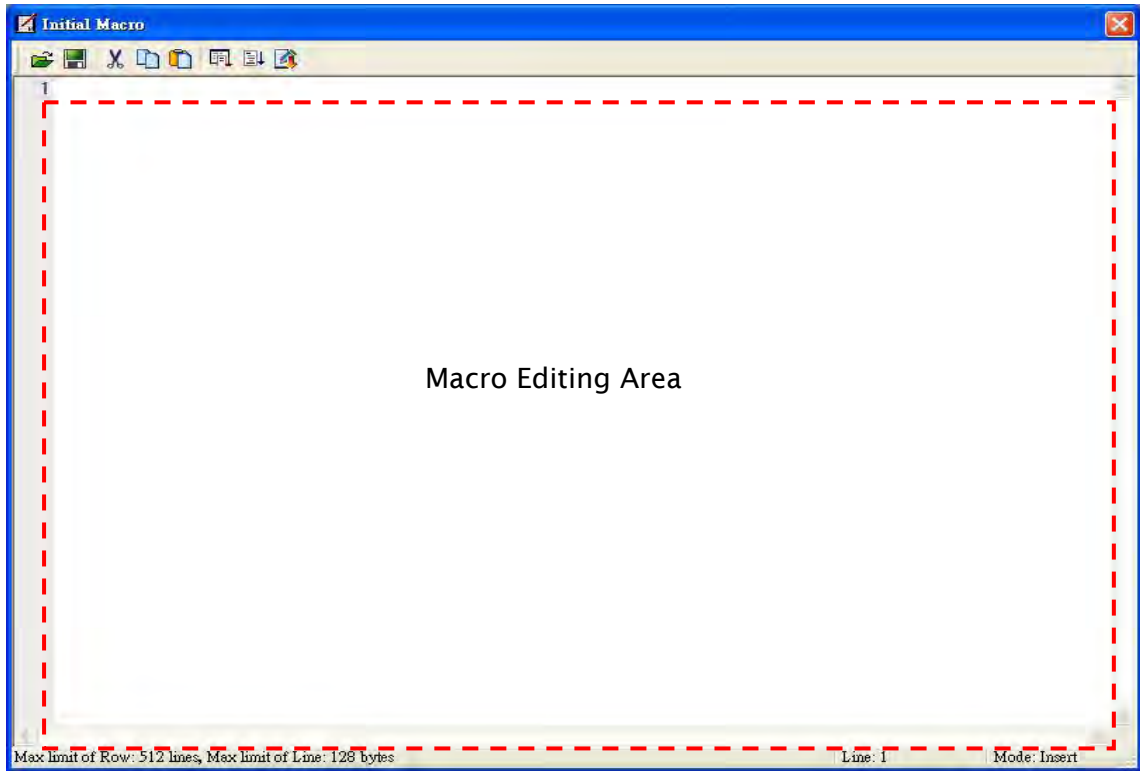
Fig. 3-14-10 Macro Editing Window

The user can also use the icons on the toolbar (Fig. 3-14-11) for Macro editing.
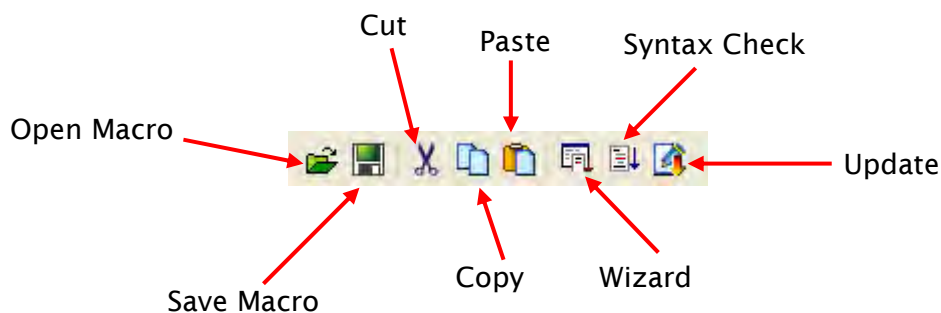
Fig. 3-14-11 Macro Toolbar

Open

This command opens macro files.

The user can open these files when connecting to different external controllers. This reduces the time to edit macros. To open a macro file, click the Open icon and the the following dialog box will show up (Fig. 3-14-12).
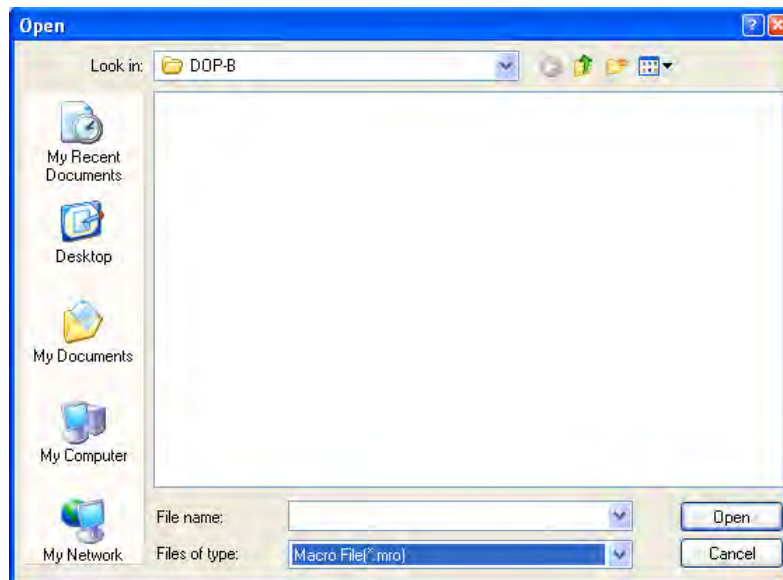
Fig. 3-14-12 Open Macro

Save

This command saves macro files.

The user can give a new name to tell the difference between the new file and others. This helps the user to backup and save reinput time of other macro commands (Fig. 3-14-13).
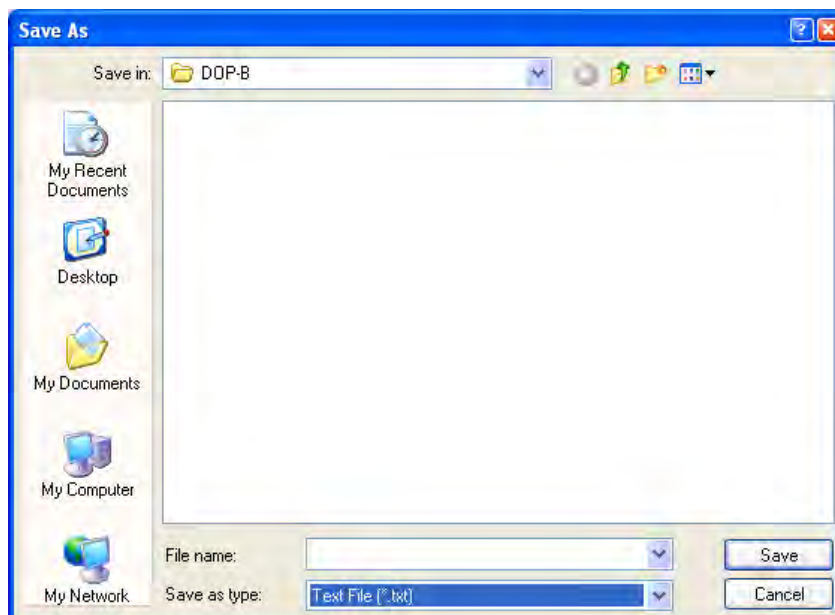
Fig. 3-14-13 Save Macro

Cut

This command cuts macro files.

The user can also press Ctrl+X to execute this function.

Copy

This command copies macro files.

The user can also press Ctrl+C to execute this function.

Paste

This command pastes macro files.

The user can also press Ctrl+V to execute this function.

Wizard

This command shows the **Macro Command** Dialog Box.

After clicking on the Wizard icon and the following dialog box will pop up. The user can use this dialog box to edit macro. If an address of the external controller is used in the macro, the address will be in brackets to distinguish it from internal memory.
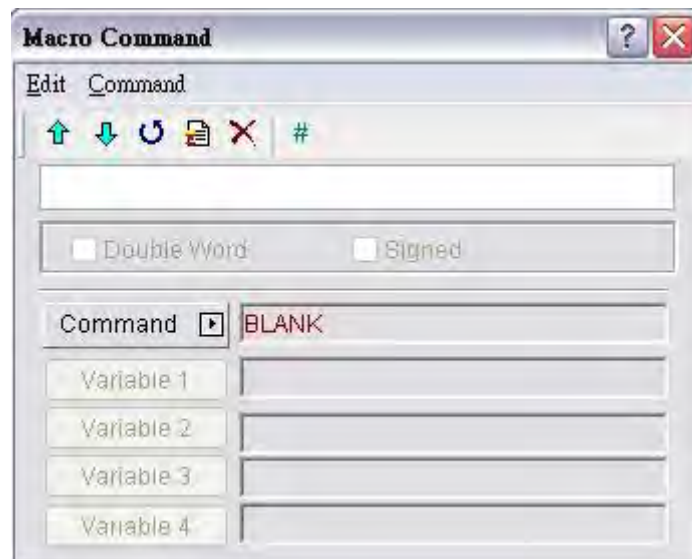
The user can enter the macro commands directly or click on the Command button to choose the command needed for the macro. For more details on macro commands, refer to the following section 3.14.2.2.

Syntax Check

This command examines if the macro syntax is correct.

The user can use this function to examine if the macro syntax is correct or not. If the macro syntax is in error, the following error message dialog box will pop up to alert the user. At this time, please examine the macro syntax again.
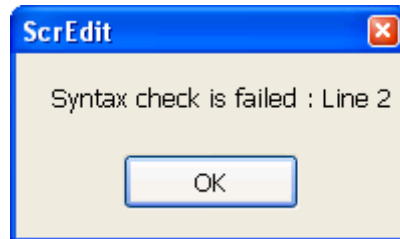
Please note that the operation of Syntax Check is different than the compile operation of macro files. The compile operation of macro file is performed when the compile operation of HMI program is executed. The compile operation of the macro file and HMI program is executed simultaneously.

Update

This command updates macro files.

The modification will not be updated if **Update** button is not pressed after editing. This gives user a second chance to decide if modify the macros or not. Therefore, if the user forgets to press **Update** button after editing, the user should re-do it again.
When **Update** button is pressed, the following dialog box will show up on the screen.
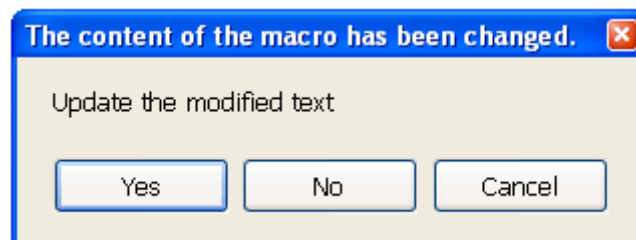
After Yes button is pressed, the system will examine if the macro syntax is correct. If the macro syntax is correct, the update function will be executed and the macro files will be updated. However, if the macro syntax is not correct, the following error message dialog box will pop up on the screen to alert the user to examine the macro syntax again.
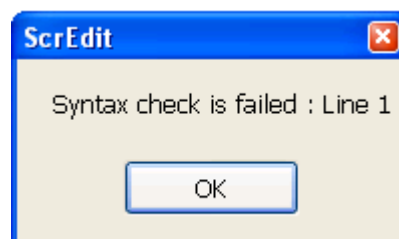
3.14.2.2 Macro Command Dialog Box

After clicking on [icon] icon on the toolbar, the **Macro Command** Dialog Box will display automatically (Fig. 3-14-14).

Macro Editing Toolbar
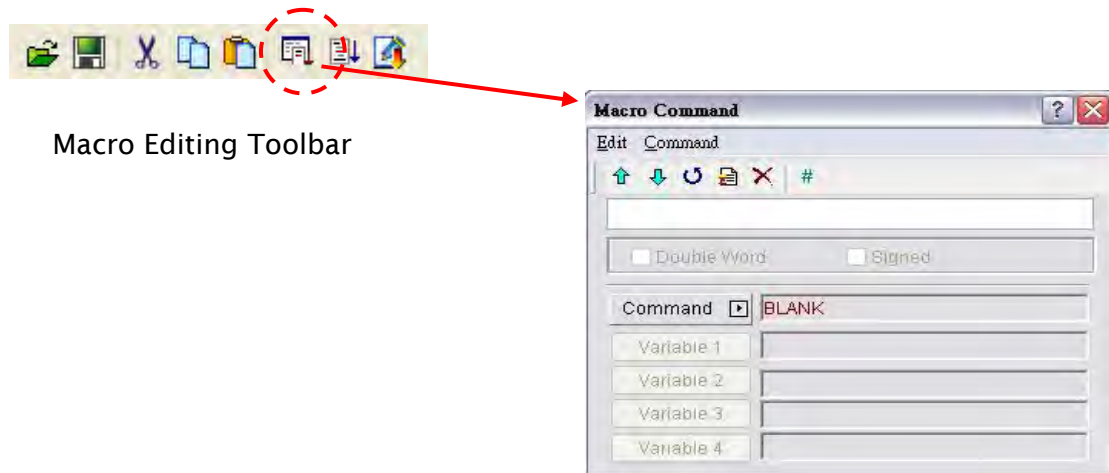
Fig. 3-14-14 Macro Command Dialog Box

Edit

The user can edit the macro files via the edit option in the Macro Command dialog box (Fig. 3-14-15) or from the toolbar (Fig. 3-14-16).
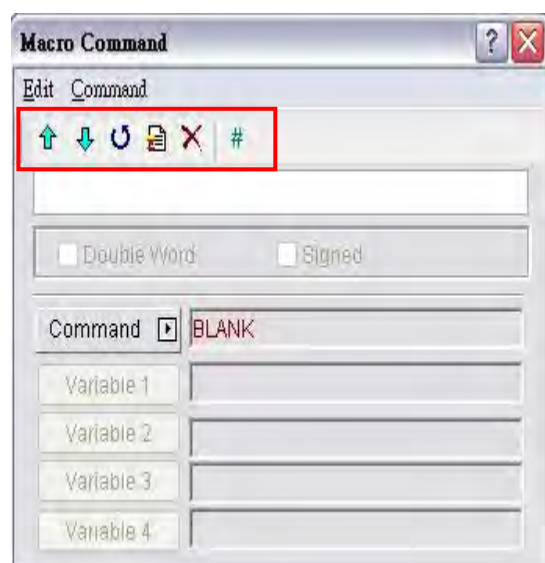
Fig. 3-14-15 Edit options from menu bar   Fig. 3-14-16 Edit option from toolbar

Previous

This command moves up the selected line by one line.

Next

This command moves down the selected line by one line.

Update

This command updates macro files. If this function is not used after editing a macro, changes are not updated. With this function, the user can know if it is necessary to change the macro or not. If the macro is not updated. When this icon is clicked, the system will perform the examination of macro syntax. If the macro syntax is correct, the update function will be executed and the macro files will be updated. When the user tries to close Macro Command dialog box without pressing this Update button, the following dialog box will show up on the screen to alert the user.
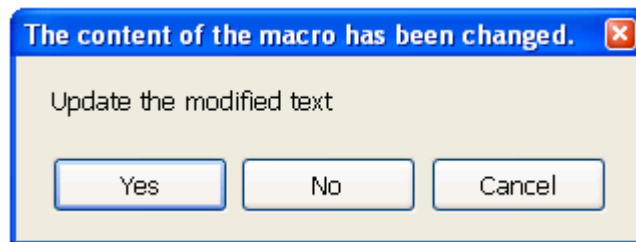
Update

After Yes button is pressed, the system will examine if the macro syntax is correct. If the macro syntax is correct, the update function will be executed and the macro files will be updated. However, if the macro syntax is not correct, the following error message dialog box will pop up on the screen to alert the user. At this time, please examine the macro syntax again.
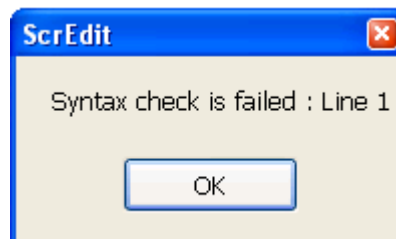
Insert

Insert

This command inserts a macro between two lines. The lines below will move down by one line.

Delete

Delete

This command deletes the selected line. The lines below will move up by one line.

Comment

Comment

To write comments in programs, the user can put a comment mark (#) in front of sentences. The sentences from the comment mark to the end are comments. Please note that the content of the comments will not be executed.

Command

The user can use commands to edit the macro. The command and equation can be typed directly, or chosen from the menu bar (Fig. 3-14-17) or selected by clicking the Command button (Fig. 3-14-18).
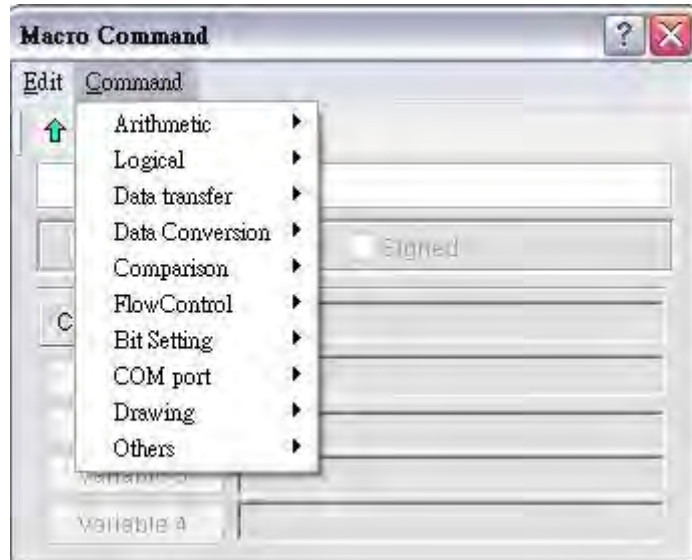
Fig. 3-14-17 Command options from menu bar
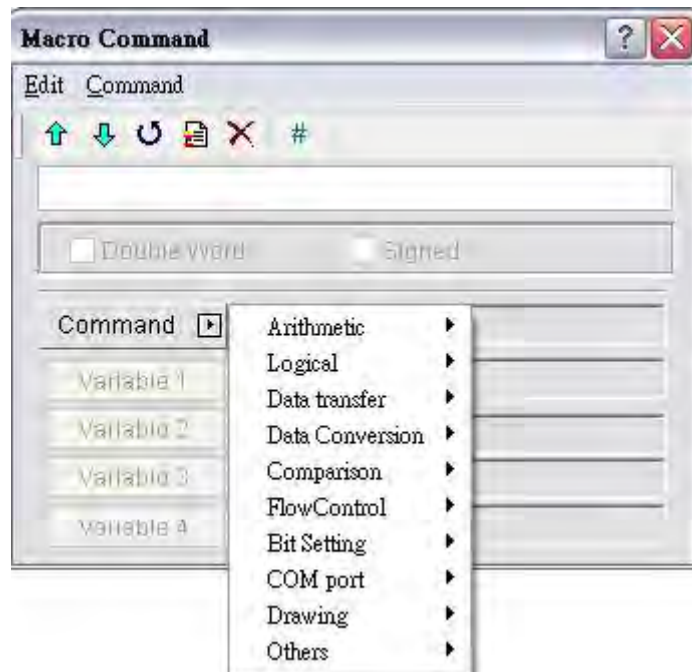
Fig. 3-14-18 Command options from drop-down list

Fig. 3-14-20 ~ Fig. 3-14-29 show all the macro commands. For more details, please refer to the section 3.14.3.

Fig. 3-14-19 Commands
options
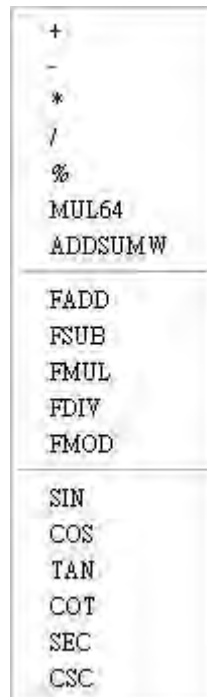
Fig. 3-14-20
Arithmetic
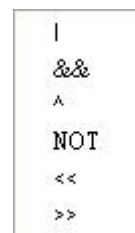
Fig. 3-14-21
Logical

Fig. 3-14-22
Data
Transfer

Fig. 3-14-23
Data Conversion
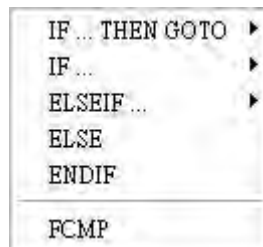
Fig. 3-14-24
Comparison
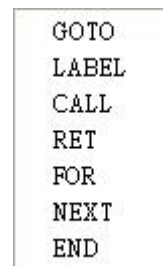
Fig. 3-14-25
Flow Control

Fig. 3-14-26
Bit Setting

Fig. 3-14-27
COM Port
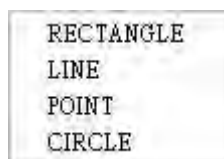
Fig. 3-14-28
Drawing

Fig. 3-14-29
Others

After macro command is selected, the user can click on Variable button to determine the necessary variables (Var1 ~ Var4) (Fig. 3-14-30, Fig. 3-14-31).
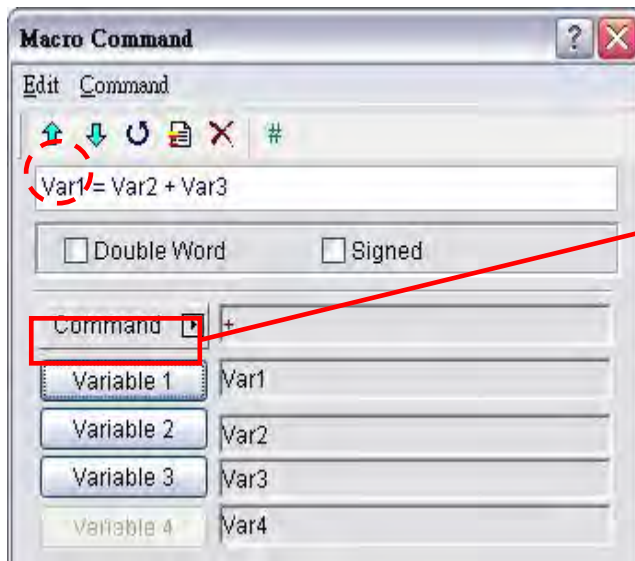
Fig. 3-14-30   Fig. 3-14-31
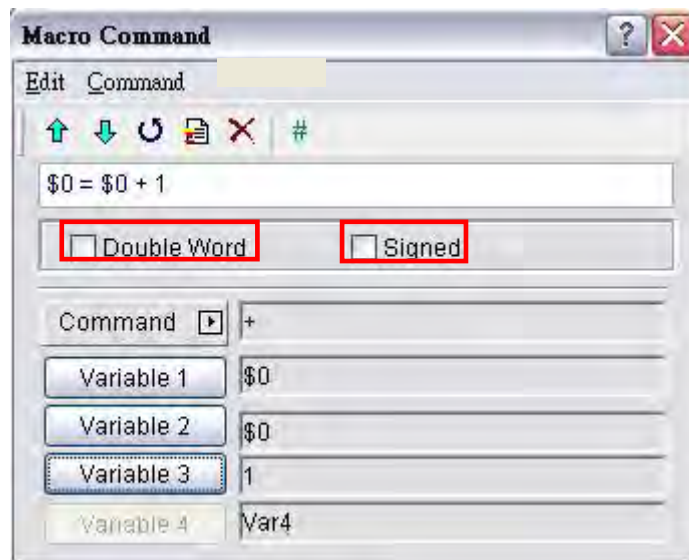
Fig. 3-14-32 Double Word and Signed options

Unsigned	A unsigned value is a numeric value without polarity,
Signed	A signed value is a numeric value with polarity, which is used to represent both positive and negative values. A byte, word or double-word can be signed.
WORD	A word consists of 16 bits of continuous data. This is used to represent 16 bits of data or 0x0000 to 0xFFFF hexadecimal or 0 to 65535 decimal.
DW, DWORD (DOUBLE WORD, DWORD)	A double-word consists of 32 bits of continuous data. This is used to represent 32 bits of data or 0x000000 to 0xFFFFFF hexadecimal or 0 to 4,294,967,295 decimal.

Table 3-14-2 Macro Definition

If DW shows after the macro command, it indicates that the command is 32 Bit data, if DW doesn't display, it indicates that the command is 16 Bit data. When the user set the format of the device as Double Word, there will be two registers used actually. It means that if the user set the format of $0 as Double Word, $0 and $1 will be used for storing data. If Signed shows after the macro command, it indicates that the command is a numeric value with polarity. If Signed doesn't display, it indicates that it is a numeric value without polarity.

For example, when the macro command is set to $0 = $2(DW), i.e. make $2 a double word, as Double Word memory will take two registers; it will assign register $2 and $3. Press Update button and the macro command will be input in the editing window shown as Fig. 3-14-33.
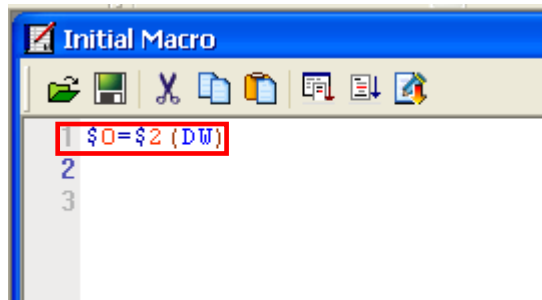
Fig. 3-14-33 Input Macro Command
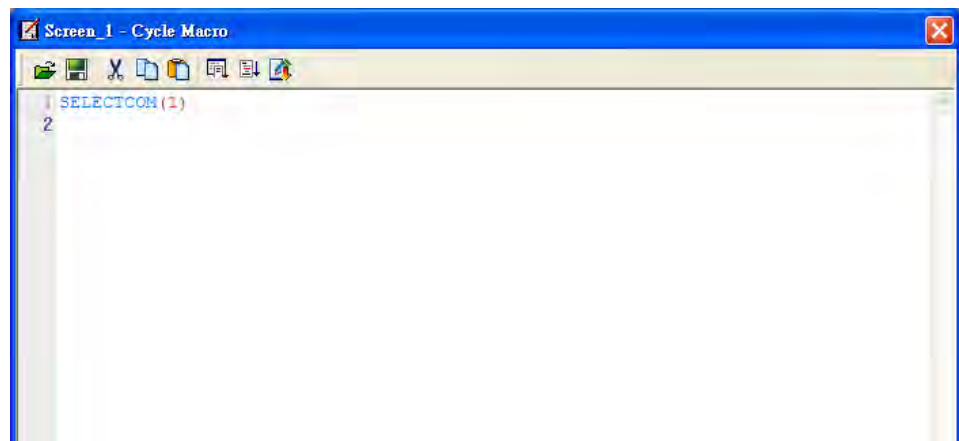
After complete macro command editing, the user needs to perform Syntax Check and Update function to makes sure that the macro syntax is correct. For more details on Update and Syntax Check function, please refer to section 3.14.2.1.

3.14.2.3 Keypad Entry

For the convenience of editing the macro, the system allows the user to edit the macro commands by keying in the commands manually. The system will check the validity automatically, if there are any errors, a warning dialog box will pop up to alert the user. It is not critical that the user place the correct amount of spaces between commands and operands, when the line is updated the system will automatically adjust the spacing and warn of formatting errors. In addition, a list of the macro commands will appear automatically when the user keys in the commands manually (Fig. 3-14-33). It is easy for the user to select the required command quickly.
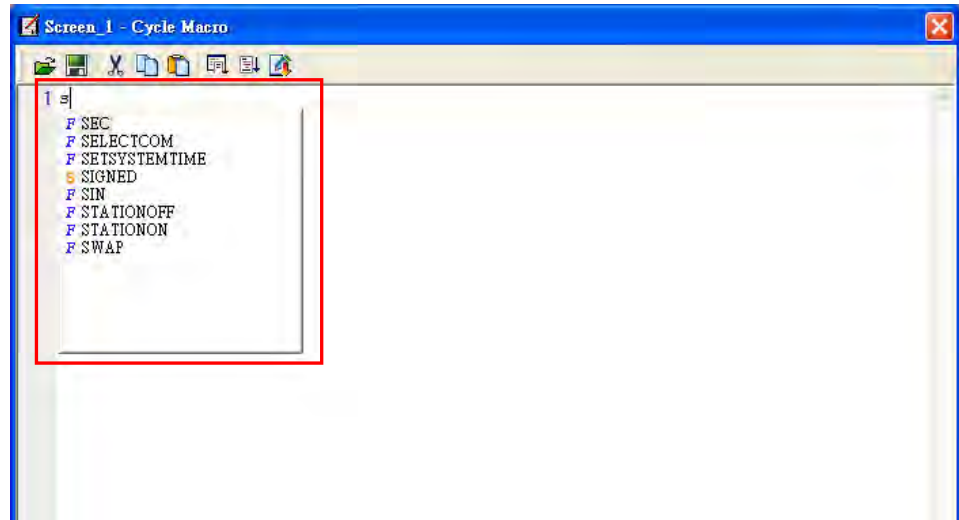
Fig. 3-14-33

After the macrom command is entered, the user's screen will look like Fig. 3-14-34 below.

Fig. 3-14-34

After complete macro command editing, the user needs to perform Syntax Check and Update function to makes sure that the macro syntax is correct. For more details on Update and Syntax Check function, please refer to section 3.14.2.1.

3.14.3   Macro Operation

3.14.3.1 Arithmetic Operation

```
+
–
*
/
%
MUL64
ADDSUMW

FADD
FSUB
FMUL
FDIV
FMOD

SIN
COS
TAN
COT
SEC
CSC
```

There are two Arithmetic Operations, which include Integer Operation and Float Operation.

Each operand can be the internal memory or constant. The operands that store output results must be the internal memory. For details, refer to this table and examples below.

■   **+ (Addition)**
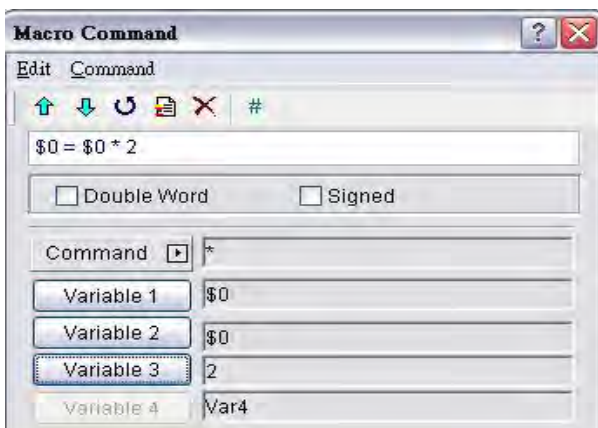
Equation

Var1 = Var2 + Var3

Explanation

Perform the addition on Var2 and Var3, and store the addition result in Var1.

Remark

➢   The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Add a value of 1 to $0 and store the value in $0 (this is an operation of unsigned 16-bit data).
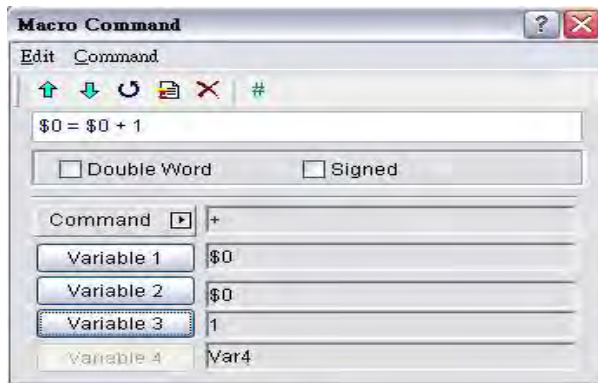
Add a value of $1 to $2 and store the value in $3 (this is an operation of signed 16-bit data).
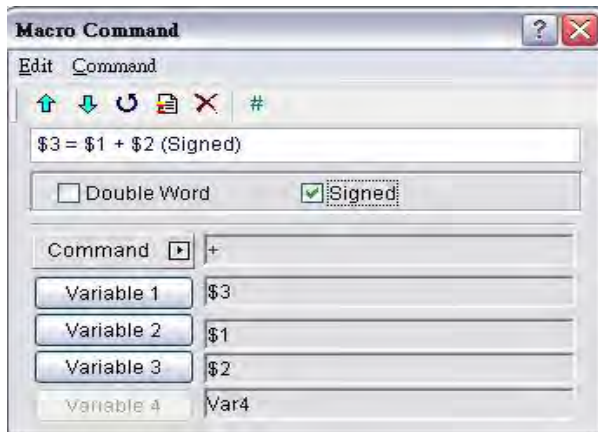
Add a value of $4 to $6 and store the value in $8 (this is an operation of signed 32-bit data).
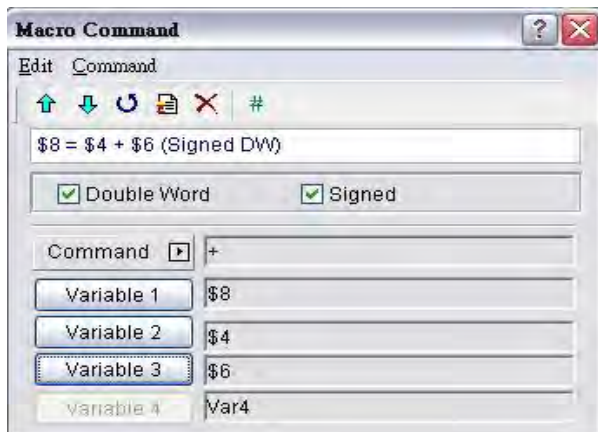
■   **- (Subtraction)**

Equation

Var1 = Var2 - Var3

Explanation

Perform the subtraction of Var2 and Var3, and store the subtraction result in Var1.

Remark

➢   The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Subtract a value of 1 from $0 and store the value in $0 (this is an operation of unsigned 16-bit data).
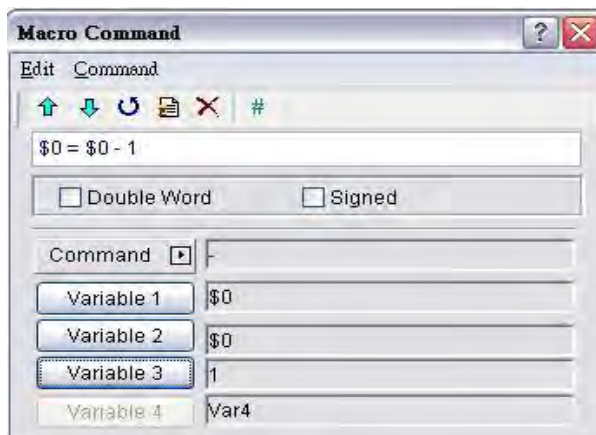
Subtract a value of $1 from $2 and store the value in $3 (this is an operation of signed 16-bit data).

Subtract a value of $4 from $6 and store the value in $8 (this is an operation of signed 32-bit data).

■   *** (Multiplication)**

Equation

Var1 = Var2 * Var3

Explanation

Perform the multiplication of Var2 and Var3, and store the multiplication result in Var1.

Remark

➢   The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Multiply $0 by 2 and store the value in $0 (this is an operation of unsigned 16-bit data).

Multiply the value of $1 by $2 and store the value in $3 (this is an operation of signed 16-bit data).

Multiply the value of $4 by $6 and store the value in $8 (this is an operation of signed 32-bit data).

■   **/ (Division)**

Equation

Var1 = Var2 / Var3

Explanation

Perform the division of Var2 and Var3, and store the division result in Var1.

Remark

➢   The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

➢   The value contained within Var3 cannot be equal to 0 (zero).

Example

Divide $0 by the value of 2 and store the value in $0 (this is an operation of unsigned 16-bit data).

Divide $1 by $2 and store the value in $3 (this is an operation of signed 16-bit data).

Divide $4 by $6 and store the value in $8 (this is an operation of signed 32-bit data).
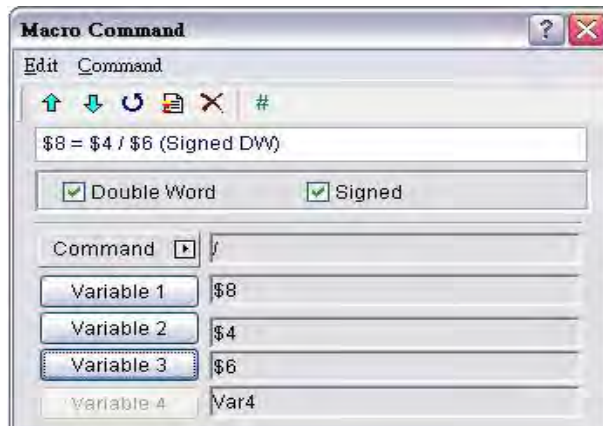
■ **% (Get Remainder)**

Equation

Var1 = Var2 % Var3

Explanation

Perform the division of Var2 and Var3, and store the remainder in Var1.

Remark

➢ The calculation result can be stored as signed or unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

➢ The value contained within Var3 cannot be equal to 0 (zero).

Example

Divide $0 by the value of 2 and store the remainder value in $1 (this is an operation of unsigned 16-bit data).

Divide $2 by $3 and store the remainder value in $4 (this is an operation of signed 16-bit data).

Divide $5 by $7 and store the remainder value in $9 (this is an operation of signed 32-bit data).
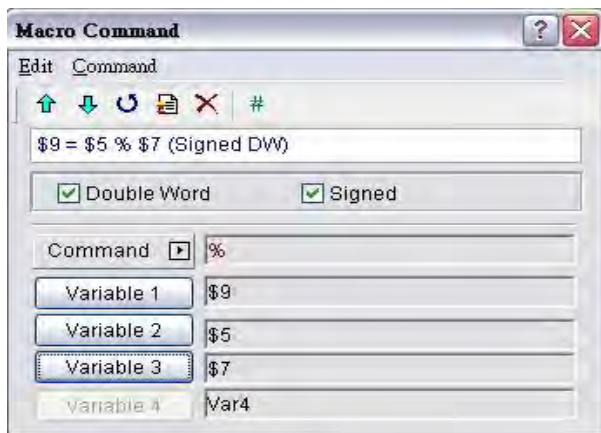
■ **MUL64 (64-bit Multiplication)**

Equation
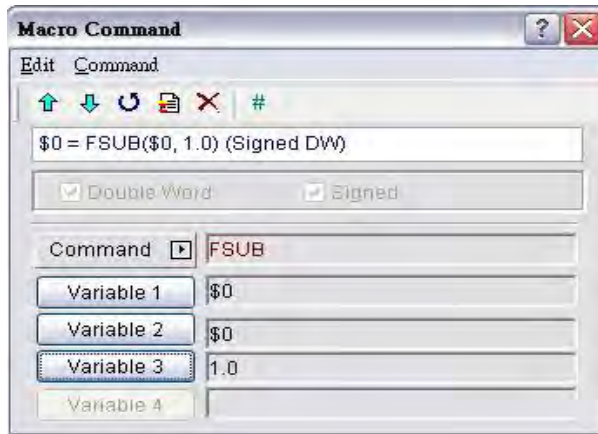
Var1 = MUL64 (Var2, Var3)

Explanation

Perform the multiplication of Var2 and Var3, and store the multiplication result in Var1.

Remark

> This is the operation of 32 Bit data.

> The calculation result can be stored as signed or unsigned DWORD.

> Var1 occupies 4 Words. Var2 and Var3 occupy 2 Words.

> Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Multiply the value of $0 by $2 and store the value in $4 (this is an operation of unsigned 32-bit data).

Multiply the value of $8 by $10 and store the value in $12 (this is an operation of signed 32-bit data).

■   **ADDSUMW (Repeated Addition)**

Equation

Var1 = ADDSUMW (Var2, Var3)

Explanation

Perform the addition on Var3 consecutive registers starting at register Var2 and store the repeated addition result in Var1.

Remark

➢   This is the operation of unsigned data.

➢   The calculation result can be stored as unsigned WORD and DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

Example

Add up the values contained within the internal memory address $0, $1, $2, $3 and $4, and the grand total is stored in the address $5 (this is an operation of unsigned 16-bit data).
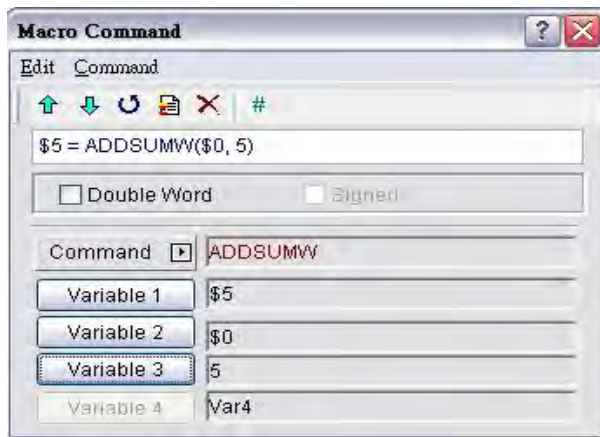
Add up the values contained within the internal memory address $6, $8 and $10, and the grand total is stored in the address $12 (this is an operation of unsigned 32-bit data).
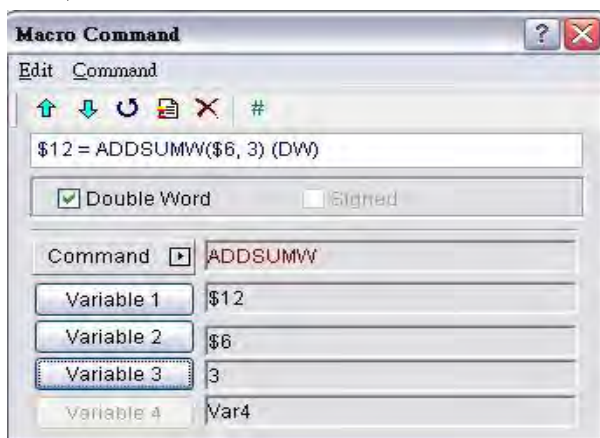
■ FADD (Floating Addition)
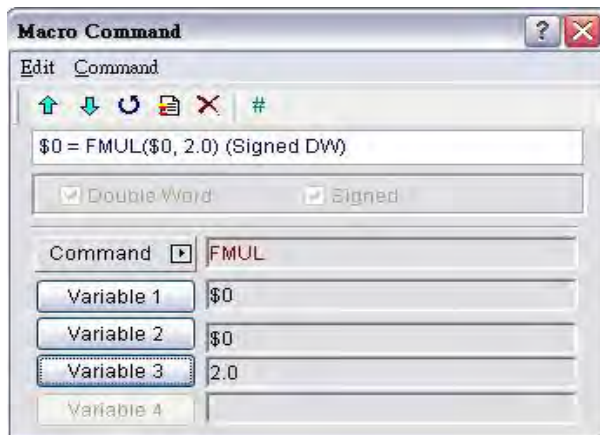
Equation

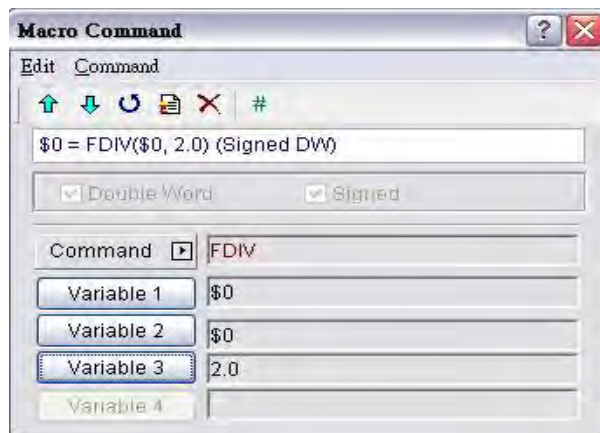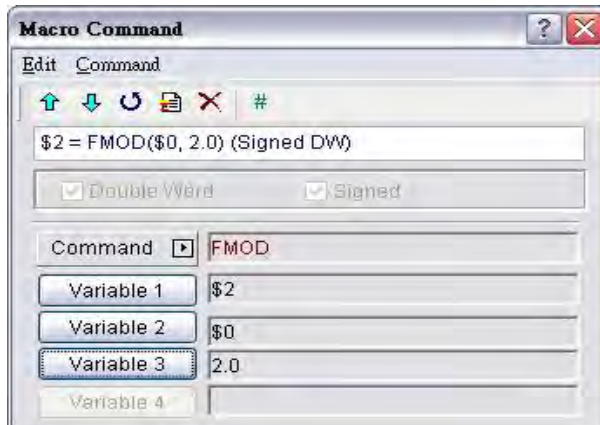Var1 = FADD (Var2, Var3)

Explanation

Perform the addition on Var2 and Var3, and store the addition result in Var1.
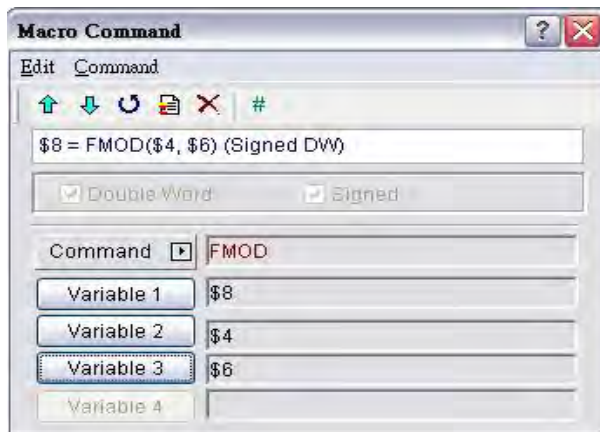
Remark

- ➢ This is the operation of signed 32-bit data.
- ➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.
- ➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Add a value of 1.0 to $0 and store the value in $0 (this is a floating point operation of signed 32-bit data).

Add a value of $4 to $2 and store the value in $6 (this is a floating point operation of signed 32-bit data).

■   **FSUB (Floating Subtraction)**

Equation

Var1 = FSUB (Var2, Var3)

Explanation

Perform the subtraction of Var2 and Var3, and store the subtraction result in Var1.

Remark

➢   This is the operation of signed 32-bit data.

➢   The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Subtract a value of 1.0 from $0 and store the value in $0 (this is a floating point operation of signed 32-bit data).

Subtract a value of $2 from $4 and store the value in $6 (this is a floating point operation of signed 32-bit data).
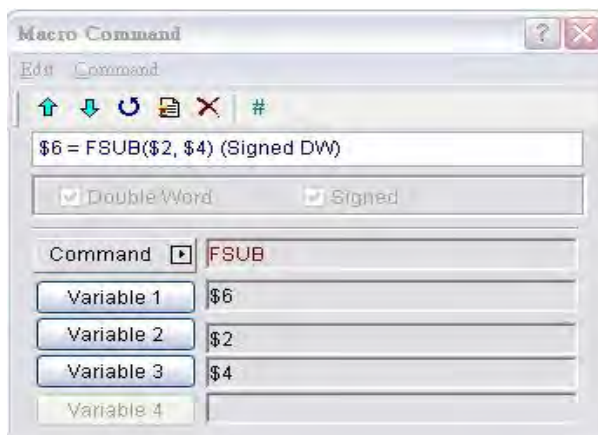
■   **FMUL (Floating Multiplication)**

Equation
Var1 = FMUL (Var2, Var3)

Explanation
Perform the multiplication of Var2 and Var3, and store the multiplication result in Var1.

Remark
- ➢   This is the operation of signed 32-bit data.
- ➢   The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.
- ➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Multiply the value of $0 by 2.0 and store the value in $0 (this is a floating point operation of signed 32-bit data).

Multiply the value of $2 by $4 and store the value in $6 (this is a floating point operation of signed 32-bit data).

■ **FDIV (Floating Division)**

Equation

Var1 = FDIV (Var2, Var3)

Explanation

Perform the division of Var2 and Var3, and store the division result in Var1.

Remark

➢ This is the operation of signed 32-bit data.

➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

➢ The value contained within Var3 cannot be equal to 0 (zero).

Example

Divide the value of $0 by 2.0 and store the value in $0 (this is a floating point operation of signed 32-bit data).

Divide the value of $2 by $4 and store the value in $6 (this is a floating point operation of signed 32-bit data).

■ FMOD (Get Floating Remainder)

Equation

Var1 = FMOD (Var2, Var3)

Explanation

Perform the division of Var2 and Var3, and store the remainder in Var1.

Remark

➤ This is the operation of signed 32-bit data.

➤ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➤ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

➤ The value contained within Var3 cannot be equal to 0 (zero).

Example

Divide $0 by the value of 2.0 and store the remainder value in $2 (this is a floating point operation of signed 32-bit data).

Divide $4 by $6 and store the remainder value in $8 (this is a floating point operation of signed 32-bit data).

■ **SIN (Sine Function)**

Equation

Var1 = SIN (Var2)

Explanation

Perform the sine function of the value within Var2, and store the result in Var1.

Remark

➢ The definition of Var2 is an angle, not radius.

➢ This is the operation of signed 32-bit data.

➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢ Var1 can be internal memory only. Var2 can be internal memory or constant.

➢ The display format of the variables must be floating point.

➢ The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of SIN30° and store the result in $0 (this is a floating point operation of signed 32-bit data).
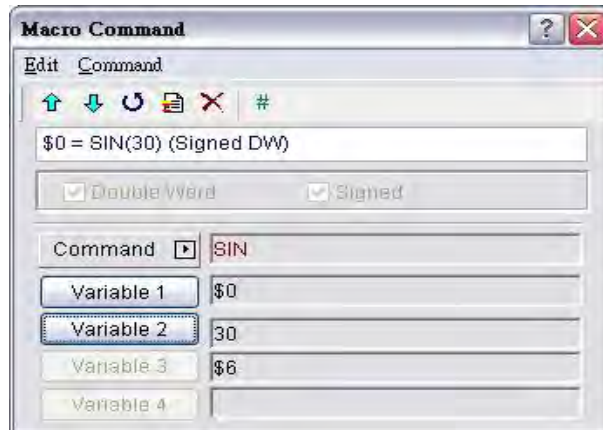
Perform the sine function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

■ **COS (Cosine Function)**

Equation

Var1 = COS (Var2)

Explanation

Perform the cosine function of the value within Var2, and store the result in Var1.

Remark

➢ The definition of Var2 is an angle, not radius.

➢ This is the operation of signed 32-bit data.

➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢ Var1 can be internal memory only. Var2 can be internal memory or constant.

➢ The display format of the variables must be floating point.

➢ The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of COS30° and store the result in $0 (this is a floating point operation of signed 32-bit data).
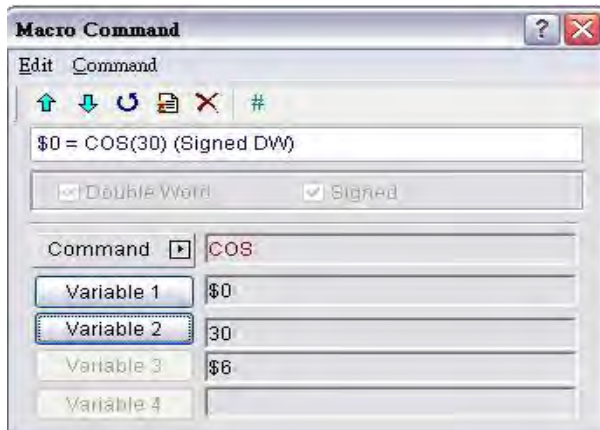
Perform the cosine function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

■   **TAN (Tangent Function)**

Equation

Var1 = TAN (Var2)

Explanation

Perform the tangent function of the value within Var2, and store the result in Var1.

Remark

➢   The definition of Var2 is an angle, not radius.

➢   This is the operation of signed 32-bit data.

➢   The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢   Var1 can be internal memory only. Var2 can be internal memory or constant.

- ➤ The display format of the variables must be floating point.
- ➤ The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of TAN30° and store the result in $0 (this is a floating point operation of signed 32-bit data).

Perform the tangent function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

■ **COT (Cotangent Function)**

Equation

Var1 = COT (Var2)

Explanation

Perform the cotangent function of the value within Var2, and store the result in Var1.

Remark

- ➤ The definition of Var2 is an angle, not radius.
- ➤ This is the operation of signed 32-bit data.
- ➤ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

> ➢   Var1 can be internal memory only. Var2 can be internal memory or constant.
> ➢   The display format of the variables must be floating point.
> ➢   The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of COT30° and store the result in $0 (this is a floating point operation of signed 32-bit data).

Perform the cotangent function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

■   **SEC (Secant Function)**

Equation

Var1 = SEC (Var2)

Explanation

Perform the secant function of the value within Var2, and store the result in Var1.

Remark

> ➢   The definition of Var2 is an angle, not radius.
> ➢   This is the operation of signed 32-bit data.

➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.

➢ Var1 can be internal memory only. Var2 can be internal memory or constant.

➢ The display format of the variables must be floating point.

➢ The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of SEC30° and store the result in $0 (this is a floating point operation of signed 32-bit data).

Perform the secant function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

■ **CSC (Cosecant Function)**

Equation

Var1 = CSC (Var2)

Explanation

Perform the cosecant function of the value within Var2, and store the result in Var1.

Remark

➢ The definition of Var2 is an angle, not radius.

> ➢ This is the operation of signed 32-bit data.
> ➢ The calculation result can be stored as signed DWORD. When the data exceeds the length of designated unit, the data out of range will be discarded.
> ➢ Var1 can be internal memory only. Var2 can be internal memory or constant.
> ➢ The display format of the variables must be floating point.
> ➢ The input variable must be a signed decimal value without the decimal point.

Example

Perform the function of CSC30° and store the result in $0 (this is a floating point operation of signed 32-bit data).

Perform the cosecant function of $2 and store the result in $4 (this is a floating point operation of signed 32-bit data).

3.14.3.2 Logical Operation

```
 |
&&
 ^
NOT
<<
>>
```
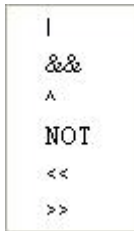
There are six logical operations which include OR, AND, XOR, NOT, Shift-left and Shift-right. There are three operands for each operation and each operand can be internal memory or constant, but it is internal memory only when outputting. The unit can be Word and Double Word.

■   **| (Logical OR operation)**

Equation

Var1 = Var2 | Var3

Explanation

Perform the logical OR operation on Var2 and Var3, and save the result of this calculation in Var1.

Remark

➢ The calculation result can be stored as WORD and DWORD.
➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

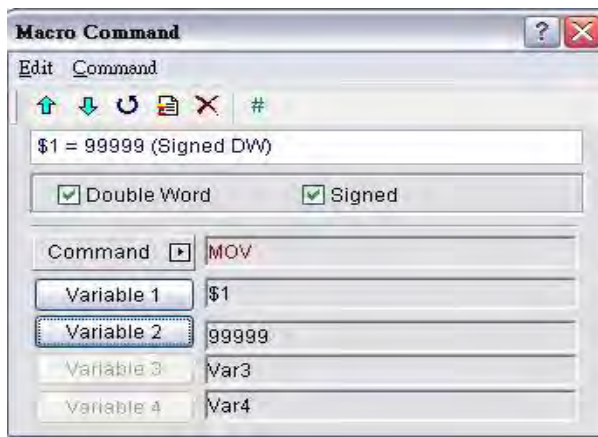Perform the logical OR operation on $0 and $1, and save the result in $2 (this is an operation of unsigned 16-bit data)

$2 = $0 | $1 Store the result of $2. $0 = F000H, $1 = 0F00H, then $2 = FF00H.

Perform the logical OR operation on $3 and $5, and save the result in $7 (this is an operation of unsigned 32-bit data)
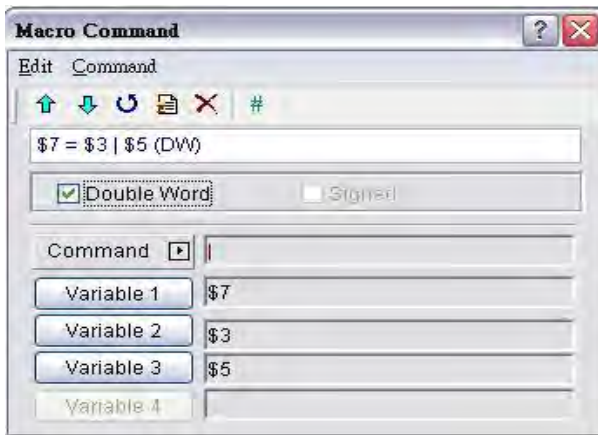
$7 = $3 | $5 (DW) Store the result of $7. $3 = F000F000H, $5 = 0F000F00H, then $7 = FF00FF00H.

■ && (Logical AND operation)

Equation

Var1 = Var2 && Var3

Explanation

Perform the logical AND operation on Var2 and Var3, and save the result of this calculation in Var1.

Remark

➢ The calculation result can be stored as WORD and DWORD.
➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Perform the logical AND operation on $0 and $1, and save the result in $2 (this is an operation of unsigned 16-bit data)

$2 = $0 && $1 Store the result of $2. $0 = F000H, $1 = 0F00H, then $2 = 0000H.

Perform the logical AND operation on $3 and $5, and save the result in $7 (this is an operation of unsigned 32-bit data)
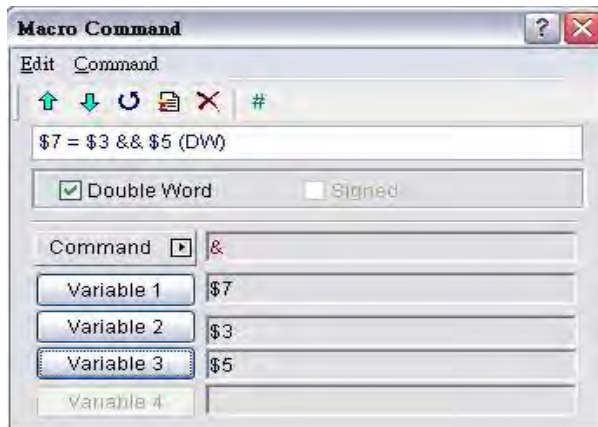
$7 = $3 && $5 (DW) Store the result of $7. $3 = F000F000H, $5 = 0F000F00H, then $7 = 00000000H.

■   ^ (Logical XOR operation)

Equation
Var1 = Var2 ^ Var3

Explanation
Perform the logical XOR operation on Var2 and Var3, and save the result of this calculation in Var1.

Remark
➢   The calculation result can be stored as WORD and DWORD.
➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example
Perform the logical XOR operation on $0 and $1, and save the result in $2 (this is an operation of unsigned 16-bit data)

$2 = $0 ^ $1 Store the result of $2. $0 = F100H, $1 = 0F00H, then $2 = FE00H.

Perform the logical XOR operation on $3 and $5, and save the result in $7 (this is an operation of unsigned 32-bit data)
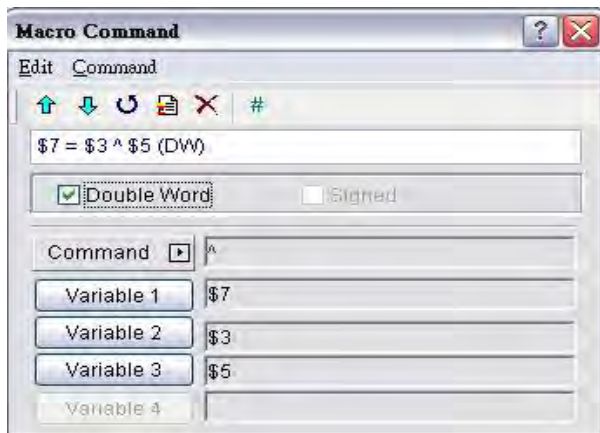
$7 = $3 ^ $5 (DW) Store the result of $7. $3 = F100F100H, $5 = 0F000F00H, then $7 = FE00FE00H.

■　　NOT (Logical NOT operation)

Equation

Var1 = NOT Var2

Explanation

Perform the logical NOToperation on Var2, and save the result of this calculation in Var1.

Remark

➢　　The calculation result can be stored as WORD and DWORD.

➢　　Var1 can be internal memory only. Var2 can be internal memory or constant.

Example

Perform the logical NOT operation on $0, and save the result in $1 (this is an operation of unsigned 16-bit data).
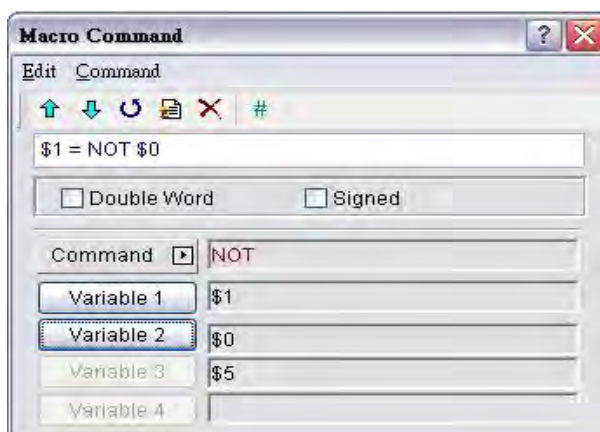
$1 = NOT $0 Store the result of $1. $0 = F100H, $1 = 0EFFH.

Perform the logical NOT operation on $2, and save the result in $4 (this is an operation of signed 32-bit data).
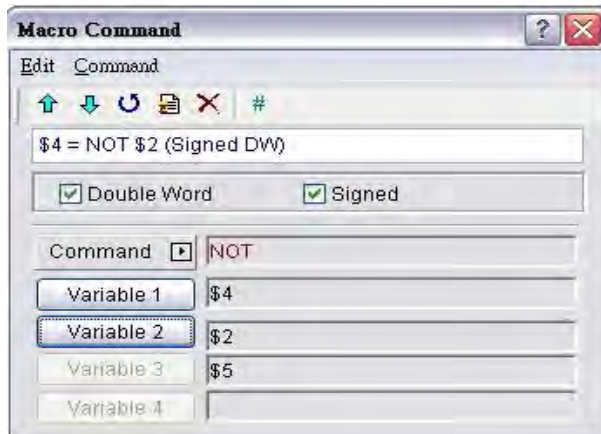
$4 = NOT $2 (Signed DW) Store the result of $4. $2 = F100 F100H, $4 = 0EFF 0EFFH.

■   **<< (SHL, Logical Shift-left operation)**

Equation

Var1 = Var2 << Var3

Explanation

Shift Var2 (WORD/DWORD) data to left (number of bit is Var3). The result of this calculation is stored in Var1.

Remark

➢   The calculation result can be stored as WORD and DWORD.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

$0 = F100H

Shift-left 4 bits and becomes $1 = 1000H (this is an operation of unsigned 16-bit data).

$2 = F1000000H

Shift-left 4 bits and becomes $4 = 10000000H (this is an operation of unsigned 32-bit data).

■   **>> (SHR, Logical Shift-right operation)**

Equation

Var1 = Var2 >> Var3

Explanation

Shift Var2 (WORD/DWORD) data to right (number of bit is Var3). The result of this calculation is stored in Var1.

Remark

➢   The calculation result can be stored as WORD and DWORD.

➢   If the shift number of bit is more than the address itself, the number out of range will be discarded.

➢   Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

$0 = F100H

Shift-left 4 bits and becomes $1 = 0F10H (this is an operation of unsigned 16-bit data).

```
Macro Command                              ? X
Edit  Command
 ↑ ↓ ↻ ≣ ✕  #
 $1 = $0 >> 4
   □ Double Word        □ Signed

   Command ▶  >>
   Variable 1   $1
   Variable 2   $0
   Variable 3   4
   Variable 4
```

$2 = F1000000H

Shift-left 4 bits and becomes $4 = 0F100000H (this is an operation of unsigned 32-bit data).

```
Macro Command                              ? X
Edit  Command
 ↑ ↓ ↻ ≣ ✕  #
 $4 = $2 >> 4 (DW)
   ☑ Double Word        □ Signed

   Command ▶  >>
   Variable 1   $4
   Variable 2   $2
   Variable 3   4
   Variable 4
```

3.14.3.3 Data Transfer

```
MOV
BMOV
FILL
FILLASC
FMOV
```
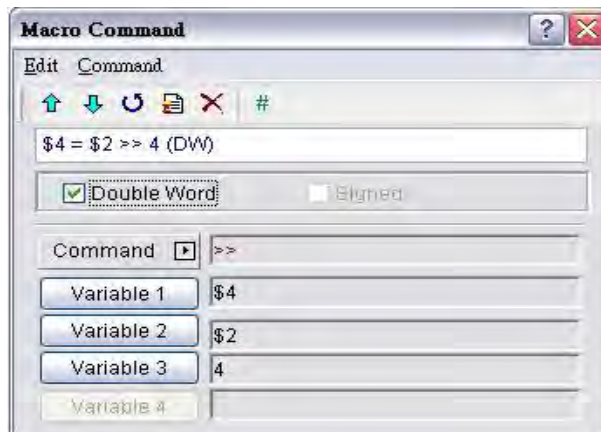
There are five commands for data transfer, including MOV, BMOV, FILL, FILLASC and FMOV.

■　**MOV (Transfer Data)**

Equation

Var1 = Var2

Explanation

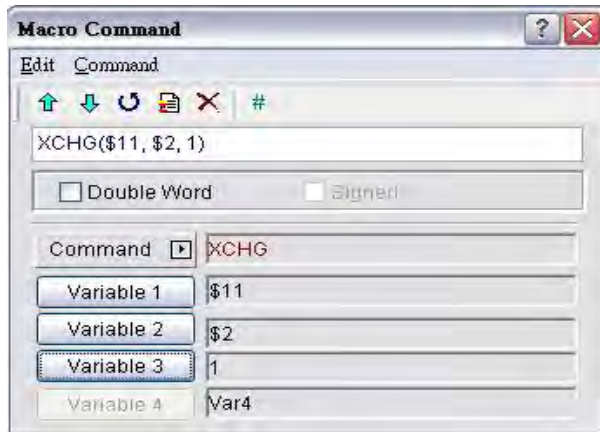Transfer data from Var2 to Var1. No data change within Var2 after executing MOV command.

Remark

➢　The calculation result can be stored as WORD and DWORD.

➢　Var1 can be internal memory only. Var2 can be internal memory or constant.

Example

$0 = 0

The data within the internal memory address $0 is assigned to the constant 0 (this is an operation of unsigned 16-bit data).

$1 = 99999 (Signed DW)

The data within the internal memory address $1 is assigned to the constant 99999 (this is an operation of signed 32-bit data).

Macro Command

Edit Command

⬆ ⬇ ↻ 🗎 ✕ | #

$1 = 99999 (Signed DW)

☑ Double Word   ☑ Signed

Command ▶ | MOV
Variable 1 | $1
Variable 2 | 99999
Variable 3 | Var3
Variable 4 | Var4

■ **BMOV (Block Move Copy Block)**

Equation

BMOV (Var1, Var2, Var3)

Explanation

BMOV (Var1, Var2, Var3) means to move sequential data of Var3 in length from address Var2 to address Var1 in block.

Remark

➢ The calculation result can be stored as unsigned WORD.

➢ If the block length is more than internal memory or max number of PLC register, there will be an error when compiling.

➢ Var1 and Var2 can be controller address or internal memory. Var3 can be internal memory or constant.

Example

Move the data in $0, $1, $2, $3, $4 to $10, $11, $12, $13 in order (this is an operation of unsigned 16-bit data).

Macro Command

Edit Command

⬆ ⬇ ↻ 🗎 ✕ | #

BMOV($10, $0, 4)

☐ Double Word   ☐ Signed

Command ▶ | BMOV
Variable 1 | $10
Variable 2 | $0
Variable 3 | 4
Variable 4 | Var4
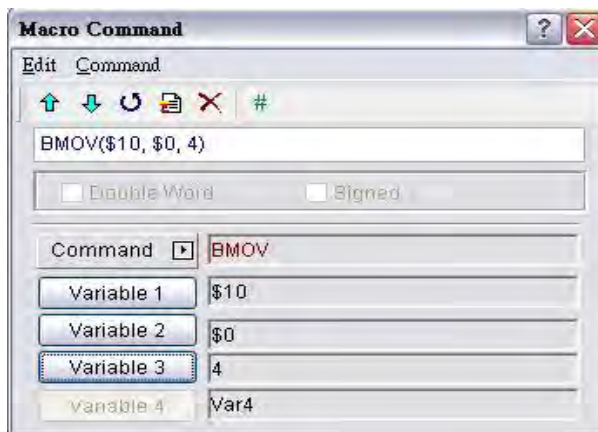
■ **FILL (Fill the Memory)**

Equation

FILL (Var1, Var2, Var3)

Explanation

FILL (Var1, Var2, Var3) means to fill address Var1 with data in address Var2 for a sequential V3 number of registers.

Remark

- ➢ The calculation result can be stored as unsigned or signed WORD.
- ➢ If the block length is more than internal memory or max number of PLC register, there will be an error when compiling.
- ➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Executing FILL command to fill $0, $1, $2, $3, $4 with constant 0 (this is an operation of unsigned 16-bit data).

■ **FILLASC (Convert Text to ASCII code)**

Equation

FILLASC (Var1, "Var2")

Explanation

FILLASC (Var1, "Var2") means to convert text in address V2 to ASCII code and store in V1.

Remark

- ➢ The calculation result can be stored as unsigned WORD.
- ➢ The max length is 128 words.

> ➤ One address can store up to two words. The excess word will be stored in next address in order. The low and high bit of the converted ASCII code will be exchanged.
> ➤ Var1 can be internal memory only. Var2 can be internal memory or constant.

Example

After executing FILLASC command, 4241H will be stored in $0 and 3130H will be stored in $1 (this is an operation of unsigned 16-bit data).

■   **FMOV (Transfer Floating Point Data)**

Equation

Var1 = FMOV (Var2)

Explanation

Transfer floating point data from Var2 to Var1. No data change within Var2 after executing FMOV command.

Remark

> ➤ The calculation result can be stored as signed DWORD.
> ➤ Var1 can be controller address or internal memory. Var2 can be controller address, internal memory or constant.

Example

Transfer constant 44.3 to the internal memory address $0 (this is an operation of signed 32-bit data).

Transfer the same data of PLC 1@C200 to the internal memory address $2 (this is an operation of signed 32-bit data).

3.14.3.4 Data Conversion

BCD	XCHG
BIN	MAX
TODWORD	MIN
TOWORD	TOHEX
TOBYTE	TOASC
SWAP	
	FCNV
	ICNV

There are various kinds of commands for data conversion. For more details, please refer to the following sections.

■ **BCD (Convert BIN Data into BCD Value)**

Equation

Var1 = BCD (Var2)

Explanation

The binary data in Var2 is converted into a BCD value and stored in Var1.

Remark

➢ The calculation result can be stored as unsigned WORD or DWORD.

➢ Var1 and Var2 can be internal memory only.

Example

After executing BCD command, the binary data in $0 is converted to a BCD value and stored in $1 (this is an operation of unsigned 16-bit data).

■　**BIN (Converts BCD Data into BIN Value)**

Equation

Var1 = BIN (Var2)

Explanation

The BCD data in Var2 is converted into binary value and stored in Var1.

Remark

➢　　The calculation result can be stored as unsigned WORD or DWORD.

➢　Var1 and Var2 can be internal memory only.

Example

After executing BIN command, the BCD data in $0 is converted to a binary value and stored in $1 (this is an operation of unsigned 16-bit data).

■　**TODWORD (Convert WORD to DWORD)**

Equation

Var1 = TODWORD (Var2)

Explanation

The WORD value in Var2 is converted into DWORD value and stored in Var1.

Remark

➢　The calculation result can be stored as unsigned WORD or DWORD.

➢　Var1 and Var2 can be internal memory only.

Example

After executing TODWORD command, the WORD value in $0 is converted to a D WORD value and stored in $1. As it is in DWORD format, it indicates that the value has occupied $1 and $2 these two addresses. (this is an operation of unsigned 16-bit data).

■   **TOWORD (Convert BYTE to WORD)**

Equation

Var1 = TOWORD (Var2, Var3)

Explanation

Convert Var3 number of BYTE data from Var2 to Var3 number of WORD values and start storing the result in Var1.The high byte will be filled with 0.

Remark

➢   The calculation result can be stored as unsigned WORD.

➢   Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

➢   The unit of Var2 is WORD. Each WORD of Var2 can be converted to two WORDs.

➢   After data conversion is completed, the low and high bit of the converted WORD data will be exchanged.

Example

Assume that the value of $0 is 12, this will convert 12 BYTES (6 WORDS) to 12 WORDS starting at $4 and store the result in $10 to $12 (this is an operation of unsigned 16-bit data).

■   **TOBYTE (Convert WORD to BYTE)**

Equation

Var1 = TOWORD (Var2, Var3)

Explanation

Convert Var3 number of WORD data from low-byte of Var2 to BYTE format and store the result in Var1. This will discard high-byte of Var2.

Remark

➢   The calculation result can be stored as unsigned WORD.

➢   Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

➢   After data conversion is completed, the low and high bit of the converted WORD data will be exchanged.

Example

Assume that the value of $0 is 12, this will convert 12 WORDS starting from the low-byte of $4 and convert these 12 WORDS into 12 BYTES (6 WORDS) and store the result in $10 to $16 (this is an operation of unsigned 16-bit data).

■   **SWAP (Swap High-Byte and Low-Byte Data)**

Equation

SWAP (Var1, Var2, Var3)

Explanation

Swap high-byte and low-byte of Var3 number of words starting at Var2 and save it in memory starting at Var1.

Remark

➢   The calculation result can be stored as unsigned WORD.

➢   Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

Example

Swap the high-byte and low-byte of $11 and store the result in $2 (this is an operation of unsigned 16-bit data).

If $11 = 1234H, after executing SWAP command, $2 = 3412H.

■   **XCHG (Exchange Data)**

Equation

XCHG (Var1, Var2, Var3)

Explanation

Exchange Var3 number of words of data starting at Var2 with the same number of words starting at Var1.

Remark

➢   The calculation result can be stored as unsigned WORD.

➢   Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

> ➢ The data of V1 and V2 will be exchanged after executing XCHG command.

Example

Exchange the data of $11 and $2 (this is an operation of unsigned 16-bit data).

If $11 = 1234H and $2 = 5678H, $2 = 1234H and $1 = 5678H after executing XCHG command.

■ **MAX (Get Maximum Value of a Range of Data)**

Equation

Var1 = MAX (Var2, Var3)

Explanation

Get the maximum value from Var2 and Var3 and store the result in Var1.

Remark

> ➢ The calculation result can be stored as signed or unsigned WORD and DWORD.

> ➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Get the maximum value from $0 and $1 and store the result in $2 (this is an operation of unsigned 16-bit data).

If $0 = 2 and $1 = 10, $2 = 10 after executing MAX command.

■ **MIN (Get Minimum Value of a Range of Data)**

Equation

Var1 = MIN (Var2, Var3)

Explanation

Get the minimum value from Var2 and Var3 and store the result in Var1.

Remark

➢ The calculation result can be stored as signed or unsigned WORD and DWORD.

➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Get the maximum value from $0 and $1 and store the result in $2 (this is an operation of unsigned 16-bit data).

If $0 = 2 and $1 = 10, $2 = 2 after executing MAX command.

■ **TOHEX (Convert 4 ASCII Code to a Four-Digit Integer in Hexadecimal Format)**

Equation

Var1 = TOHEX (Var2)

Explanation

Convert a single ASCII code of Var2 and the next 3 words (4 WORDS) to a hex value and stores the result in Var1.

Remark

➢ The calculation result can be stored as unsigned WORD.

➢ Var1 and Var2 can be internal memory only.

Example

Convert a single ASCII code of $0 and the next 3 words (4 WORDS) to a hex value and stores the result in $10 (this is an operation of unsigned 16-bit data).

$0 = 0034H (ASCII 4),

$1 = 0033H (ASCII 3),

$2 = 0036H (ASCII 6),

$3 = 0038H (ASCII 8),

$10 = TOHEX ($0)

After executing TOHEX command, the data in $10 will be converted to 4368H.

■ **TOASC (Convert a Hexidecimal Value Var2 to Four Single ASCII Values (4 WORDS) Starting at Var1.)**

Equation

Var1 = TOASC (Var2)

Explanation

Convert Var2 (1 WORD in hexadecimal format) to the ASCII (4 WORDS) code and store the result in Var1.

Remark

➢ The calculation result can be stored as unsigned WORD.

➢ Var1 and Var2 can be internal memory only.

Example

Convert $0 (1 WORD in hexadecimal format) to the ASCII (4 WORDS) code and store the result in $10 (this is an operation of unsigned 16-bit data).

$0 = 1234H

$10 = TOASC ($0)

After executing TOASC command,

$10=0031H (ASCII 1)

$11=0032H (ASCII 2)

$12=0033H (ASCII 3)

$13=0034H (ASCII 4)
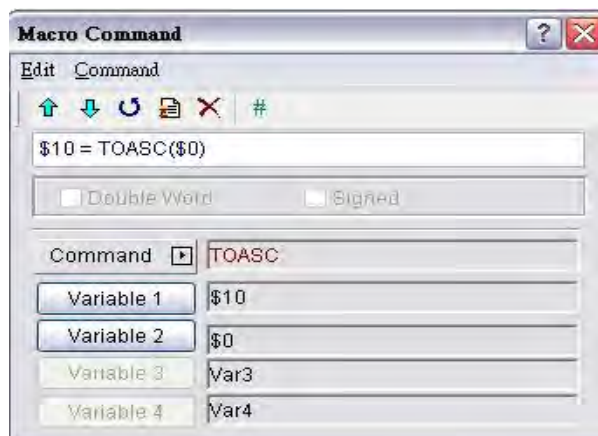
■   **FCNV (Convert Integer to Floating Point Value)**

Equation

Var1 = FCNV (Var2)

Explanation

Convert an integer in Var2 to floating point value and store in Var1.

Remark

➢   The calculation result can be stored as signed DWORD.

➢   Var1 can be internal memory only. Var2 can be internal memory or constant.

Example

Convert an integer in $0 to floating point value and store in $2 (this is an operation of signed 32-bit data).

If $0 = 100, $2 = 100.0 after executing FCNV command.
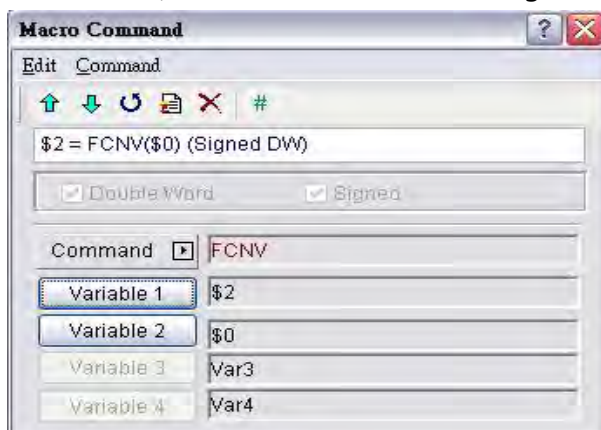
■   **ICNV (Convert Floating Point Value to Integer)**

Equation

Var1 = ICNV (Var2)

Explanation

Convert a floating point value in Var2 to an integer and store in Var1.

Remark

➢   The calculation result can be stored as signed DWORD.

➢   Var1 can be internal memory only. Var2 can be internal memory or constant.

Example

Convert a floating point value in $0 to an integer and store in $2 (this is an operation of signed 32-bit data).

If $0 = 100.0, $2 = 100 after executing ICNV command.

3.14.3.5 Comparison
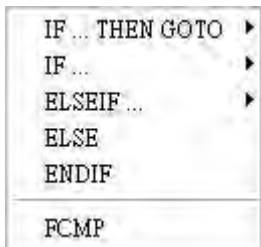
There are various kinds of commands for comparison. For more details, please refer to the following sections.

■ **IF…THEN GOTO** …

Equation

IF *expression* THEN GOTO LABEL *identifier*

Explanation

If the command of *expression* is true, then it will go to LABEL *identifier* and perform the program.

Remark

➢   Please refer to the following Comparison command table for the command of *expression*.

Example

If the value in $2 is equal to or greater than 10, it will go to LABEL 1 and perform the program.

Equation

IFB **expression** THEN GOTO LABEL *identifier*

Explanation

If the command of *expression* is true, then it will go to LABEL *identifier* and perform the program (for PLC register).

Remark

➤   Please refer to the following Comparison command table for the command of *expression.*

Example

If 1@M0 is ON, it will go to LABEL 1 and perform the program.

Equation

IF **expression** THEN CALL **sub-macro**

Explanation

If the command of *expression* is true, then it will call *sub-macro* and perform the program.

Remark

➢ Please refer to the following Comparison command table for the command of *expression*.

Example

If the value in $2 is equal to 10, it will call sub-macro 1 and perform the program.
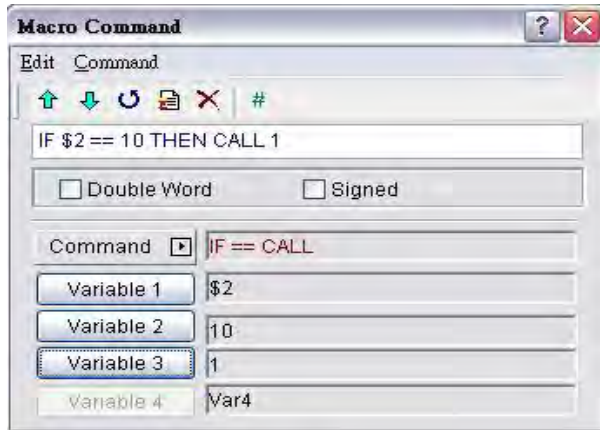
Equation	Explanation	Remark
Var1 == Var2	Var1 is equal to Var2	Var1 and Var2 can be internal memory or constant.
Var1 != Var2	Var1 is not equal to Var2	
Var1 > Var2	Var1 is greater than Var2	
Var1 >= Var2	Var1 is equal to or greater than Var2	
Var1 < Var2	Var1 is smaller than Var2	
Var1 <= Var2	Var1 is equal to or smaller than Var2	
Var1 && Var2 == 0	Perform AND command on V1 and V2 and the result of AND operation is equal to 0.	
Var1 && Var2 != 0	Perform AND command on V1 and V2 and the result of AND operation is not equal to 0.	
Var1== ON	Var1 is ON	Var1 can be the controller address or internal memory (BIT)。
Var1== OFF	Var1 is OFF	

Table 3-14-3 Comparison command table

■　　**IF…ELSEIF…ELSE…ENDIF**

Equation

IF *expression1*

Statement1

ELSEIF *expression2*

Statement2

ELSE

Statement3

ENDIF

Explanation

This is logical determination from multiple conditions. If *expression1* is true, *Statement1* will be executed. If *expression1* is false, it will run *expression2*. If *expression2* is true, *Stemenent2* will be executed. If both *expression1* and *expression2* are false, *Statement3* will be executed. ENDIF should be placed in the end of the IF comparison command

Remark

➢　　Please refer to the Comparison command table on previous page 3-343 for the command of *expression*.

Example

IF $0 == 0
$10 = 0
ELSEIF $0 == 1
$10 = 1
ELSE
$10 = 2
ENDIF
	IF $0 == 0
	$10 = 0
	ELSEIF $0 ==1
	$10 = 1
	ELSE
	$10 = 2
	ENDIF
		If $0 is equal to 0,
		$10 is equal to 0;
		If $0 is equal to 1, not equal to 0,
		$10 is equal to 1;
		If $0 is equal to neither 0 nor 1, ,
		$10 is equal to 2.

■ **FCMP (Floating Point Value Comparison)**

Equation

Var1 = FCMP (Var2, Var3)

Explanation

Compare the floating point value in Var2 and Var3 and store the result in Var1.

The comparison methods include:

Var1=0, Var2 = Var3

Var1=1, Var2 > Var3

Var1=2, Var2 < Var3

Remark

➢ The calculation result can be stored as signed DWORD.

➢ Var1 can be internal memory only. Var2 and Var3 can be internal memory or constant.

Example

Compare the floating point value in $0 and $2 and store the result in $4 (this is an operation of signed 32-bit data).
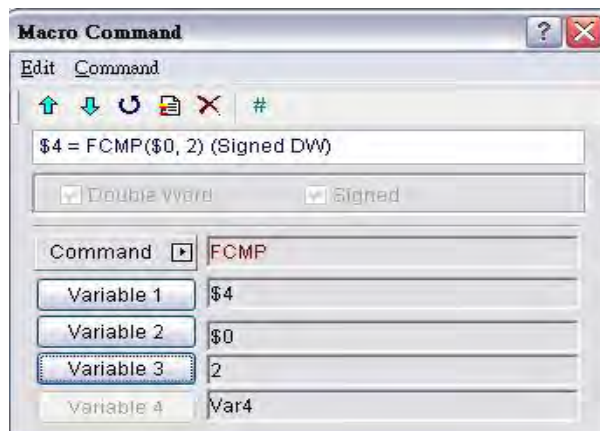
3.14.3.6 Flow Control

```
GOTO
LABEL
CALL
RET
FOR
NEXT
END
```

There are various kinds of commands for flow control. For more details, please refer to the following sections.

■ **GOTO (Unconditionally Go To a Specific Label. GOTO command will jump to designated label like Label Var1 unconditionally)**

Equation

GOTO LABEL Var1

Explanation

Go to the internal designated Label Var1 in the program unconditionally.

Remark

➢ Var1 can be constant only.

Example

Go to the position of designated Label 1 and continue to execute the program unconditionally.

■   **LABEL (Label such as Label Var1)**

Equation

LABEL Var1

Explanation

GOTO statement shifts the program execution to the position of LABEL
unconditionally.

Remark

➢   Var1 can be constant only.

➢   A label value is unique per macro and it cannot be used more then once in a
     single macro. The user can only use LABEL 1 once per individual macro.

Example

LABEL 1.
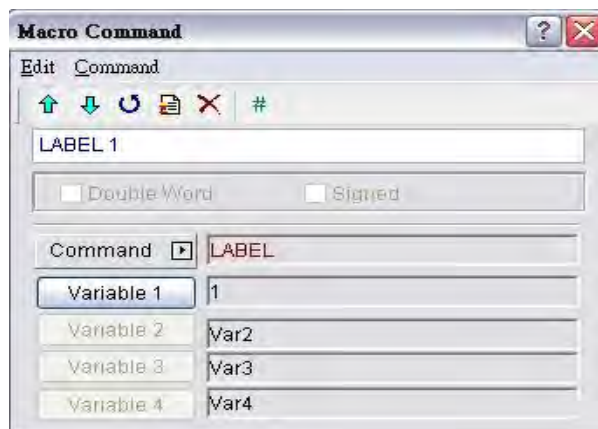
■   **CALL..RET (Call Sub-Macro Program)**

Equation

CALL Var1…RET

Explanation

"CALL Var1" is to call sub-macro Var1. Var1 represents the sub-macro number.
"RET" is to exit sub-macro Var1. It should be placed in the end of the Var1 sub-macro
command.

Remark

➢   The sub-macro number could be 001 – 512.

➢   Var1 can be internal memory or constant.

Example
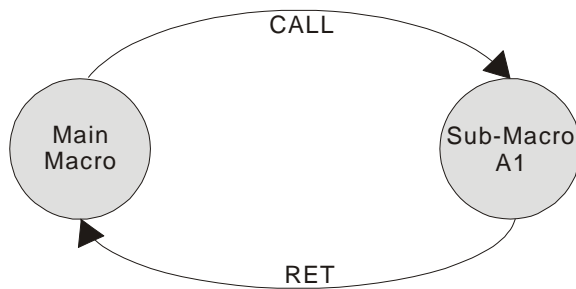
The rights of macro control will be transferred to sub-macro when executing CALL Var1 command. After CALL Var1 command is executed and completed, Var1 needs to return through RET command. RET command will transfer the rights of macro control to the next command of CALL command. The sub-macro number could be 1 ~ 512. Regarding the comment name of the sub-macro, the user can name it freely. In the sub-macro program, the users also can CALL another sub-macro but the levels for CALL submacro should be less than 6 levels due to memory limit and also for avoiding unexpected error.

■   **FOR…NEXT (Program Loop)**

Equation
FOR Var1 *Statement* NEXT

Explanation
It is for nested loops. "FOR" is the start of the loop and "NEXT" is the end of the loop. When this command is executed, the number of Var1 Statement will be executed continuously. The users can change the Var1 value through command, but the number of times cannot be changed.

Remark
➢   The nested loop can be up to 3 levels max.
➢   Var1 can be internal memory or constant.
➢   Statement is the combination of a section of macro commands and also can be within the nested loop.

Example

```
FOR 10
$0 = $0 + 1
NEXT
```
If $10=10, $0=0, after the operation, the result is $0 = 10

If a $10 = 2 is inserted between the FOR and the NEXT in the above macro, the FOR … NEXT loop will still loop 10 times even though $10 is changed to a value of 2 the first pass through the loop.

■ **END (End the Macro)**

Equation

Statemenets1 END *Statements2*

Explanation

End command is used to end the macro program and all statements after the END command will not be executed. If this command is in a main macro then the program will go to the first line again and begin execution, if this command is in a sub-macro then the sub-macro will end and the program will return to the previous program.

Remark

➢ It executes the Statemenets1 and then ends the macro executing. It does not execute the Statements2.

➢ Statement is the combination of a section of macro commands and also can be within the nested loop.

➢ If there is END command in sub-macro, the program ends here. If the user wants to return to the previous macro program, please user RET command.

Example

```
$1 = 10
$1 = $1 + 1
END
$1 = $1 + 1
```

After the operation, the result is $1 = 11, not $1 = 12 as the END command has ended the macro program.

3.14.3.7 Bit Setting

```
BITON
BITOFF
BITNOT
GETB
```

There are various kinds of commands for Bit setting. For more details, please refer to the following sections.

■ **BITON (Set Specific Bit to be ON)**

Equation

BITON Var1

Explanation

This command sets Var1 bit to be ON.

Remark

➢ Var1 can be the controller address or internal memory (BIT).

Example

Set the 5th Bit within the internal memory $0 to be ON.

If $0 = 0000000000000000, after the operation, $0 = 0000000000010000

■ **BITOFF (Set Specific Bit to be OFF)**

Equation

BITOFF Var1

Explanation

This command sets Var1 bit to be OFF.

Remark

➢ Var1 can be the controller address or internal memory (BIT).

Example

Set the 5th Bit within the internal memory $0 to be OFF.

If $0 = 1111111111111111, after the operation, $0 = 1111111111101111

■ **BITNOT (Set Specific Bit to be Inversed. ON to OFF, OFF to ON)**

Equation

BITNOT Var1

Explanation

This command sets the specific Bit to be inversed. ON to OFF, OFF to ON

Remark

➢ Var1 can be the controller address or internal memory (BIT).

Example

Set the 5th Bit within the internal memory $0 to be inversed.

If $0 = 1111111111111111, after the operation, $0 = 1111111111101111

■ **GETB (Get Bit value)**

Equation

Var1 = GETB Var2

Explanation

This command gets Var2 Bit value and store in Var1

Remark

➢ Var1 and Var2 can be the controller address or internal memory (BIT).

Example

Get the 5th Bit value within the internal memory $0 and store it to the 5th Bit value within the internal memory $1.

If $0 = 1111111111111111 and $1 = 0000000000000000, after the operation, $1 = 0000000000010000.

3.14.3.8 Communication

There are various kinds of commands for communication. For more details, please refer to the following sections.

■　**INITCOM (Initial setup COM port)**

Equation

Var1 = INITCOM (Var2)

Explanation

This command uses initial setup COM port to start communication and set communication protocol. After the user sets each COM port, this command starts communication and stores the result in Var1.

Remark

➢　Var1: Response value after communication

　　　　1: Completed normally

　　　　0: Failed

➢　For the settings of Var2, please refer to the following table of Var2 Settings in INITCOM (Communication Protocol).

Var2 Settings in INITCOM (Communication Protocol)

Item	Type	Code	Remark
COM Port	COM1	0	
	COM2	1	
	COM3	2	
Communication Interface	RS232	0	
	RS422	1	
	RS485	2	
Data Bit	7 Bits	0	
	8 Bits	1	
Parity Bit	None	0	
	Odd	1	
	Even	2	
Stop Bit	1 Bits	0	
	2 Bits	1	
Baud Rate	300	0	
	600	1	
	900	2	
	1200	3	
	2400	4	
	4800	5	
	9600	6	
	14400	7	
	19200	8	
	28800	9	
	38400	10	
	57600	11	
	115200	12	
Flow Control	No Flow Control	0	Please refer to the following descriptions.
	CTS RTS Flow Control	1	
	DTR DSR Flow Control	2	
	Xon Xoff Flow Control	3	

No Flow Control: Flow control function is disabled.

Flow Control: The transmission speed and communication validity are enhanced during communication due to new transmission technology, such as compress immediately, debug,...etc. But the new technology also makes the transmission speed between HMI and PC will be longer than the actual transmission speed. Therefore, ensure the data security and transmit complete data between computer and HMI, when transmitting data through serial communication port, the flow control is necessary.

To make sure that data transmit between computer and HMI is completed, the user can use Flow Control functions.

CTS / RTS: Flow control for hardware. It uses handshaking signal to control receiving and sending data. The control is achieved via internal modem or external modem that connects to HMI by a connecting cable.

DSR / DTR: Flow control for hardware also. It is used when PC and HMI are connected directly by a cable.

XON / XOFF: Flow control for software. Only used for 2400bps modem. The control method is to generate control code by software and add it in the transmission data.

Example

When the communication protocol is set to COM1, RS232, 7, Even, 1, 9600, and No Flow Control, if the response value is stored in $0, the user's screen will look like the following figure.
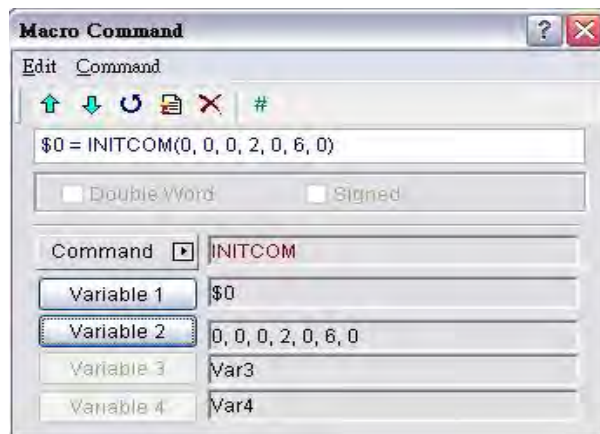
■ **ADDSUM (Use Addition to Calculate Checksum)**

Equation

Var1 = ADDSUM (Var2, Var3)

Explanation

This command uses addition to calculate checksum. Var1 is the value after calculation, Var2 is the starting address for calculation and Var3 is data length.

Remark

➢ The calculation result can be stored as unsigned WORD.

➢ Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

Example

The starting address is for calculation $0, the data length is set to 2. After the communication, the calculated checksum through addition calculation is stored in $2 (this is an operation of unsigned 16-bit data).
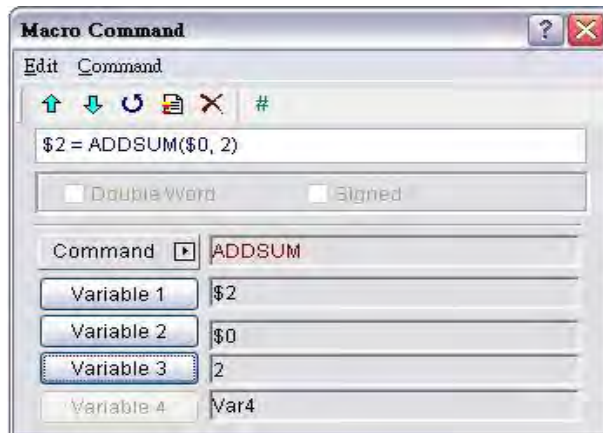
■ **XORSUM (Use XOR to Calculate Checksum)**

Equation

Var1 = XORSUM (Var2, Var3)

Explanation

This command uses XOR to calculate checksum. Var1 is the value after calculation, Var2 is the starting address for calculation and Var3 is data length.

Remark

➢ The calculation result can be stored as unsigned WORD.

➢ Var1 and Var2 can be internal memory only. Var3 can be internal memory or constant.

Example

The starting address is for calculation $0, the data length is set to 2. After the communication, the calculated checksum through XOR calculation is stored in $2 (this is an operation of unsigned 16-bit data).

■ **PUTCHARS (Output Characters by COM Port)**

Equation

Var1 = PUTCHARS (Var2, Var3, Var4)

Explanation

This command outputs characters by COM port. Var1 is the response value after the communication, Var2 is the starting address of transmission data, Var3 is the data length, and Var4 is the allowance communication time (unit is ms). The result will be stored in Var1.

Remark

➢ Var1: Response value after communication

      1: Completed normally

      0: Failed

➢ Var1 and Var2 can be internal memory only. Var3 and Var4 can be internal memory or constant.

Example

Output three consecutive WORD data starting from $1 and store the result in $0.

■ **GETCHARS (Get Characters by COM Port)**

Equation

Var1 = GETCHARS (Var2, Var3, Var4)

Explanation

This command gets characters by COM port. Var1 is the response value after the communication, Var2 is the starting address of transmission data, Var3 is the data length, and Var4 is the allowance communication time (unit is ms). The result will be stored in Var1.

Remark

➢ Var1: Response value after communication

1: Completed normally

0: Failed

➢ Var1 and Var2 can be internal memory only. Var3 and Var4 can be internal memory or constant.

Example

Get three consecutive WORD data starting from $1 and store the result in $0.

■ **SELECTCOM (Select COM Port)**

Equation

SELECTCOM (Var1)

Explanation

This command is used to select COM port. When not connecting to the external controller (set PLC to NULL) in **Options > Configuration** in Screen Editor software program, the user can use two COM ports (0:COM1, 1:COM2, 3:COM3 (for some models only)) at the same time.

Remark

➢ Var1 can be constant only.

➢ All communication commands will be processed via the COM port that the user selects after executing this command. Different macros will not support each other or have any interference.

Example

Select COM1 port.

■ **CLEARCOMBUFFER (Clear the COM Port Buffer)**

Equation

CLEARCOMBUFFER (Var1, Var2)

Explanation

This command is used to clear COM port buffer.

Var1 is the number of communication port. It represents as constant 0(COM1), 1(COM2) or 2(COM3).

Var2 is the type of buffer area. It represents as constant 0 (receiving buffer area) or 1 (sending buffer area).

Remark

➢ Var1 and Var2 can be constant only.

Example

Clear the sending buffer area of COM2.

■ **CHRCHKSUM (Calculate Data Length of Texts or Characters and Checksum)**

Equation

Var1 = CHRCHKSUM ("Var2", Var3, Var4)

Explanation

This command is used to calculate the data length of texts or characters and checksum.

Var1 is the internal memory address that stores the text length of Var2.

Var2 is the string of text.

Var3 is the internal memory address that stores the checksum of Var2.

Var4 is the data length of the checksum that stores in Var3. 1 represents Byte and 2 represents Word.

Operation of checksum:

Convert format of each data characters to ASCII code and add them up. For example, convert '2' to ASCII code '31H', convert '4' to ASCII code '34H' and the checksum is 31Hex + 34Hex = 65H.

Remark

➢ Var1 and Var3 can be internal memory only. Var2 can be a string of texts only. Var4 can be constant only.

Example

Calculate the data length of "24" and checksum

$0 = CHRCHKSUM("24", $10, 2)

After the above operation, 4 is stored in $0 and 4 represents the data length is 2 WORDS. The checksum stored in $10 is 65H.

■   **LOCKCOM / UNLOCKCOM (Lock COM Port / Unlock COM Port)**

Equation

Lock COM Port

Var1 = LOCKCOM (Var2, Var3)

Unlock COM Port

Var1 = UNLOCKCOM (Var2)

Explanation

LOCKCOM command locks COM port. Var1 is the response value after the communication, Var2 is the COM port and represents as constant 0(COM1), 1(COM2) or 2(COM3). Var3 is the communication time out time (unit is ms). When the specified communication time out time is reached, if the COM port cannot be locked, an error will be responsed. When Var3 is set to 0, it indicates that HMI will continuously wait without time limit.

UNLOCKCOM command unlocks COM port. Var2 is the COM port and represents as constant 0(COM1), 1(COM2) or 2(COM3).

Remark

➢   Var1: Response value after communication

1: Completed normally

0: Failed

➢   Var1 can be internal memory only. Var2 and Var3 can be constant only.

➢   When the communication commands are used in different macros, such as Screen Cycle Macro, Clock Macro, Background Macro, Befor/After Execute Macro, ON/OFF Macro, if LOCKCOM and UNLOCKCOM commands are not used, the different macros may have interferences and causes the error result. To ensure the correct communication and not to interrupt the communication at the same time, it is recommended to use these two commands.

> ➢ When Var3 is set to 0, it indicates that LOCKCOM command will be executed twice and HMI will continuously wait without time limit. At this time, HMI may have no response at all.

Example

```
$0 = LOCKCOM(0, 200)
$1 = PUTCHARS($1, 3, 300)
$2 = GETCHARS($1, 3, 300)
UNLOCKCOM(0)
```

Explanation of LOCKCOM Command		
Background Macro $0 = LOCKCOM(0,0) $1 = PUTCHARS($1, 3, 300)	On Macro $0 = LOCKCOM(0,0) $1 = GETCHARS($1, 3, 300)	Screen Cycle Macro $0 = LOCKCOM(0,0) $1 = PUTCHARS($1, 3, 300)
In the above macro commands, the communication commands are all used. When Background Macro is executed first, COM1 will be locked. At this time, the execution of ON Macro and Screen Cycle Macro commands will stop when reaching LUCKCOM (0,0) this command. After UNLOCKCOM command in Background Macro is executed, the execution of ON Macro and Screen Cycle Macro command will be activated again. This can avoid the interference and incorrect calculation or communication result.		

Explanation of UNLOCKCOM Command	
Background Macro $0 = LOCKCOM(0,0) $1 = PUTCHARS($1, 3, 300)	On Macro UNLOCKCOM(0)
If the macro commands is set as shown as the above, the user can lock the COM port and transmission data by using Background Macro, and unlock the COM port by using ON Macro. It means that the actions of locking COM port and unlocking COM port can be separated.	

■　**STATIONON (Station ON)**

Equation

STATIONON (Var1, Var2)

Explanation

This command is used to enable the Var2 number of station of Var1 COM port.

Var1 represents as constant 0(COM1), 1(COM2) or 2(COM3, for some models only).

Remark

➤　Var1 and Var2 can be internal memory or constant.

➤　This macro command cannot be used When **Communication Interrupt times then ignore** box is checked (**Options > Configuration > COM Port**).

Example

Enable the first station of COM1 port.
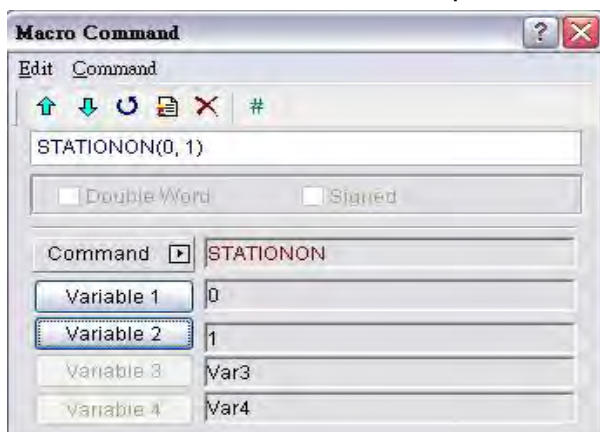
■　**STATIONOFF (Station OFF)**

Equation

STATIONOFF (Var1, Var2)

Explanation

This command is used to disable the Var2 number of station of Var1 COM port.

Var1 represents as constant 0(COM1), 1(COM2) or 2(COM3, for some models only).

Remark

➤　Var1 and Var2 can be internal memory or constant.

➤　This macro command cannot be used When **Communication Interrupt times then ignore** box is checked (**Options > Configuration > COM Port**).

Example

Disable the first station of COM1 port.

3.14.3.9 Drawing
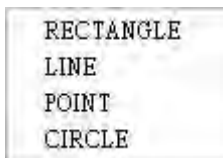
There are various kinds of drawing commands. For more details, please refer to the following sections.

■ **RECTANGLE (Draw a Rectangle)**

Equation

RECTANGLE (Var1)

Explanation

This command is used to draw a rectangle on the screen.

Var1 is the upper-left X-coordinate

Var1+1 is the upper-left Y-coordinate

Var1+2 is the width of the rectangle

Var1+3 is the height of the rectangle

Var1+4 is the color of the rectangle

Remark

➢ Var1 can be internal memory only.

Example

When the Screen Open Macro command is set as

```
$0 = 20
$1 = 20
$2 = 100
$3 = 100
$4 = 25
```

and the Screen Cycle Macro is set as

```
RECTANGLE($0)
```

the user's screen will look like the figure shown below.
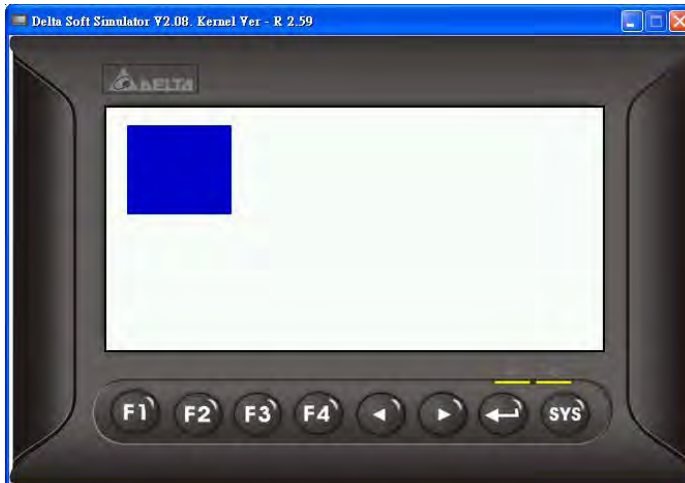
■   **LINE (Draw a Line)**

Equation

LINE (Var1)

Explanation

This command is used to draw a line on the screen.

Var1 is the starting X-coordinate

Var1+1 is the starting Y-coordinate

Var1+2 is the ending X-coordinate

Var1+3 is the ending Y-coordinate

Var1+4 is the width of the line

Var1+5 is the color of the line

Remark

➤   Var1 can be internal memory only.

Example

When the Screen Open Macro command is set as

```
$0 = 80
$1 = 80
$2 = 160
$3 = 160
$4 = 10
$5 = 10000
```

and the Screen Cycle Macro is set as

```
LINE ($0)
```

the user's screen will look like the figure shown below.
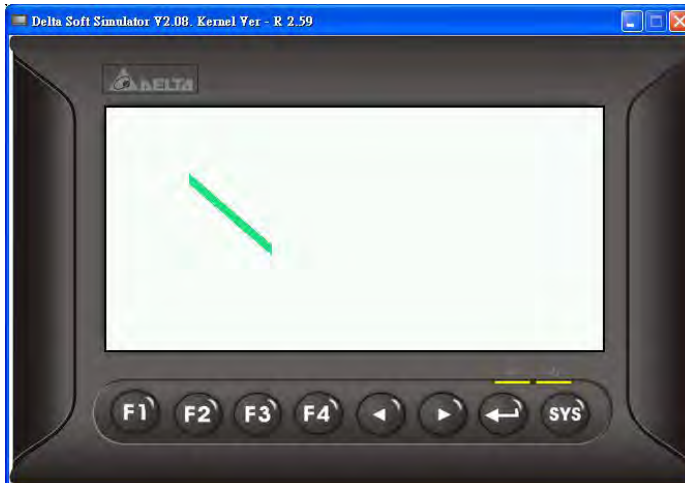
■   **POINT (Draw a Point)**

Equation

POINT (Var1)

Explanation

This command is used to draw a point on the screen.

Var1 is the X-coordinate

Var1+1 is the Y-coordinate

Var1+2 is the color of the point

Remark

➢   Var1 can be internal memory only.

Example

When the Screen Open Macro command is set as

```
$0 = 80
$1 = 80
$2 = 1000
```

and the Screen Cycle Macro is set as

`POINT($0)`

the user's screen will look like the figure shown below.

■　**CIRCLE (Draw an Ellipse)**

Equation

RECTANGLE (Var1)

Explanation

This command is used to draw an ellipse on the screen.

Var1 is the X-coordinate of the center of the ellipse

Var1+1 is the Y-coordinate of the center of the ellipse

Var1+2 is the length of the ellipse

Var1+3 is the width of the ellipese

Var1+4 is the color of the ellipse

Remark

➢　Var1 can be internal memory only.

Example

When the Screen Open Macro command is set as

```
$0 = 100
$1 = 100
$2 = 50
$3 = 40
$4 = 1000
```

and the Screen Cycle Macro is set as

`CIRCLE($0)`

the user's screen will look like the figure shown below.
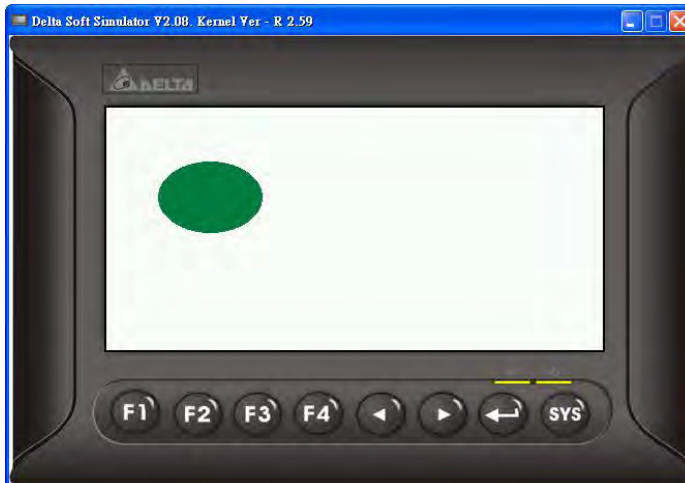
3.14.3.10 Others

For more details of other macro commands, please refer to the following sections.

■   **Time Tick (Get the Time from System Startup to Present)**

Equation

Var1=TIMETICK

Explanation

This command is used to get the time from system startup to present and save into the specified address. The time unit is ms.

Remark

➢   Var1 can be internal memory only.

Example

Get the time from system startup to present and save into $0.

■   **GETLASTERROR (Get the Last Error Value)**

Equation

Var1 = GETLASTERROR

Explanation

This command is used to get last error value. If there is no error, the result of GETLASTERROR will be 0. Even if each Macro is executed simultaneously, the error messages will not affect the macro. For more details on error code information, refer to section 3.14.4 Macro Error Messages on page 3-374.

Remark

➢   Var1 can be internal memory only.

Example

Get the last error value and save into $0.

■   **# (Comment)**

Equation

 # Statement

Explanation

This command is used to insert macro descriptions and make the macro readable. Using this command will not affect the macro function. The user only need to put # symbol in front of the equation and the macro will become readable. To change the comment to be back to the equation, just remove the # symbol.

Remark

➢   ***Statement*** can be a string of texts or macro commands.

Example

When the comment is a string of texts: #This is a Comment.

When the comment is a string of macro commands: #$0 = $ 0 + 1

■   **Delay (System Delay)**

Equation

Delay (Var1)

Explanation

This command is used to delay the user setting time by system. Because DOP-B series HMI is a multiplexer system, a system delay may occur. Therefore, time set will be increased due to a System Busy condition and the condition that setting the time forward will not happen. Please note that too long delay time may result in slow response of HMI. The unit of delayed time is ms.

Remark

➢   Var1 can be internal memory or constant.

➢   After Delay command is executed, HMI will stop the operation. The operation will resume after the delay time has elapsed (expired).

Example

Delay two seconds.

Delay(2000)

■　**GETSYSTEMTIME (Get System Time)**

Equation

Var1 = GETSYSTEMTIME

Explanation

This command is used to get the system time. Var1 is the starting address of continuous 7Words in the internal memory address.

Var1 represents Year

Var1 + 1 represents Month

Var1 + 2 represents Date

Var1 + 3 represents Week

Var1 + 4 represents Hour

Var1 + 5 represents Minute

Var1 + 6 represents Second

Remark

➢　Var1 can be internal memory or constant.

Example

Now the system time is 2009/02/27 FRI 13:20:06.

This command gets the current system time, and stores it in $0 to $6.

The user's screen will look like the figure shown as below.
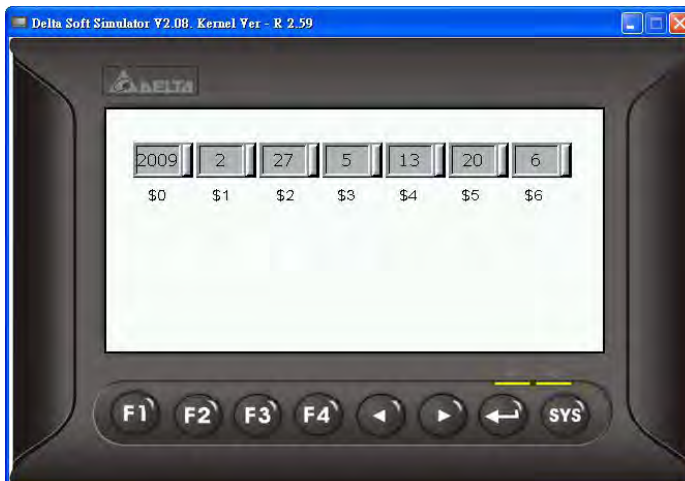
■   **SETSYSTEMTIME (Set System Time)**

Equation

SETSYSTEMTIME (VAR1)

Explanation

This command is used to set the system time. Var1 is the starting address of continuous 7Words in the internal memory address.

Var1 represents Year

Var1 + 1 represents Month

Var1 + 2 represents Date

Var1 + 3 represents Week

Var1 + 4 represents Hour

Var1 + 5 represents Minute

Var1 + 6 represents Second

Remark

➢   Var1 can be internal memory or constant.

➢   The input number should be a valid number or the system will not allow the user to set the system time. For example, if a number of 8 is entered into the address of Var1+3 which represents Week, the system will determine the number of 8 is an invalid number and does not allow the user to change it. This is because the valid number for this address is from 1 to 7 (Monday to Sunday).

Example

Suppose that now the system time is set to 2009/02/27 FRI 13:25:34.

The user's screen will look like the figure shown as below.

```
$0 = 2009
$1 = 02
$2 = 27
$3 = 5
$4 = 13
$5 = 25
$6 = 34
SETSYSTEMTIME($0)
```

■   **GETHISTORY (Get History Data)**

Equation

Var1 = GETHISTORY (Var2, Var3, Var4, Var5, Var6)

Explanation

This command is used to get the history data.

Var1 is the internal memory address where the data length is storeed.

Var2 is the internal memory, constant, the buffer number of history buffer area.

Var3 is the internal memory, constant, the starting address for sampling.

Var4 is the internal memory, constant, the points for reading.

Var5 is the internal memory, external controller address where the data is stored.

Var6 is the internal memory, constant, the data type for reading.

Remark

➢   Var1 can be internal memory only.

➢   Var2, Var3 and Var4 can be internal memory or constant.

➢   Var5 can be the external controller address or internal memory.

➢   Var6 can be internal memory or constant.

   0: Data, 1: Time, 2: Time and Data

Example

When the equation is set to $0 = GETHISTORY ($1, $2, $3, $4, $5), HMI can get the history data.
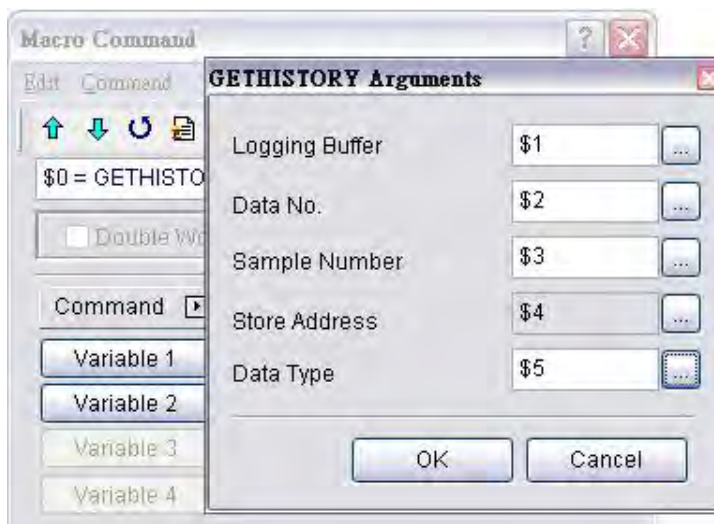
■   **EXPORT (Output Data)**

Equation

EXPORT (Var1)

Explanation

This command is used to output the data to the external interface. The function of EXPORT macro command is the same as the function of Report List button element. Var1 represents the output interface:

0: SD card

1: USB disk

2: Printer

Remark

➢   Var1 can be internal memory only.

Example

When the equation is set to EXPORT(0), HMI can export the data to a SD card.

3.14.4   Macro Error Messages

When compiling, it will shows errors in output window for user to find out easily. The users can read error messages by macro. Once there is an error and the users execute a correct command before reading error messages, the error message will be overwritten. When executing each macro, each Macro error message will not be influenced by other macros.

Error Messages While Editing

■   **Code – 100 LABEL cannot be found**

There is no such LABEL that GOTO designates.

■   **Code – 101 Recursion occurs**

This error message usually shows in sub-macro. The function of a sub-macro to call is called recursion whether the HMI calls it directly or not. Basically, recursion cannot be adopted for a sub-macro. You can use GOTO or FOR (infinite times) to replace it.

■   **Code – 102 More than 10 nested FOR is used**

This error message statement is to warn the user not to use more than 10 nested FOR commands. The purpose is to avoid insufficient memory. The users can use GOTO or IF to replace it.

■   **Code – 103 Sub-macro does not exist**

This error message means that there is no sub-macro in the program. For example, CALL 5 means CALL sub-macro 5. If the user does not edit sub-macro 5 in the program, this error message will display to warn the users. The purpose is to warn the users to be more careful when editing (reduce input error or avoid forgetting to edit the corresponding sub-macro) and prevent unexpected error

■   **Code – 104 Number of NEXT is less than the number of FOR**

Numbers of NEXT and FOR should match. This error code is used to remind the user to find out the missing NEXT.

■   **Code – 105 Number of FOR is less than the number of NEXT**

Numbers of FOR and NEXT should match. This error code is used to remind the user if there is any missing FOR.

■   **Code – 106 Repeated LABEL**

This error message means that there are repeated LABELs in the same Macro. The program will be confusing with that. This may be caused by carelessness (an input error or forgetting to edit the corresponding sub-macro), and the user will get an error message during editing to help the user avoid unexpected error.

■   **Code – 107 There is RET in Macro**

This error message means that there is RET command in Macro. The RET command should be used for sub-macro to return program. But in Macro, it should use END not RET.

HMI Macro Error Messages

The users can read error messages by macro files. Once there is an error and the users execute a correct command before reading error messages, the error message will be overwritten. When executing each macro, each Macro error message will not be influenced by other macros.

■   **Code – 10 GOTO Error**

This message means that there is a GOTO error in the macro.

■   **Code – 11 Stack Overflow**

This message means that the stack in the macro is full. This may be caused by using too many sub-macros or executing different macros at the same time. This message appears to help avoid insufficient memory.

■   **Code – 12 Empty Sub-macro**

This is a CALL sub-macro error. The sub-macro that is called should not be an empty sub-macro. This message is to avoid unexpected errors.

■   **Code – 13 Data Read Error**

This is a data read error. Sometimes this may be caused by a memory data error, but most of the time it is an external controller data read error.

■   **Code – 14 Data Write Error**

This is a data write error. Sometimes this may be caused by a memory data error, but most of the time it is an external controller data write error.

■   **Code – 15 Divisor is 0**

This error message means that the devisor is 0 when performing a division operation.

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Chapter 4 Examples

4.1 How to Create a 16bits Recipe Data

Create a new project first. After pressing ▢ or click **File > New**, it can create a new project and the user will get a dialog box as shown in the following.
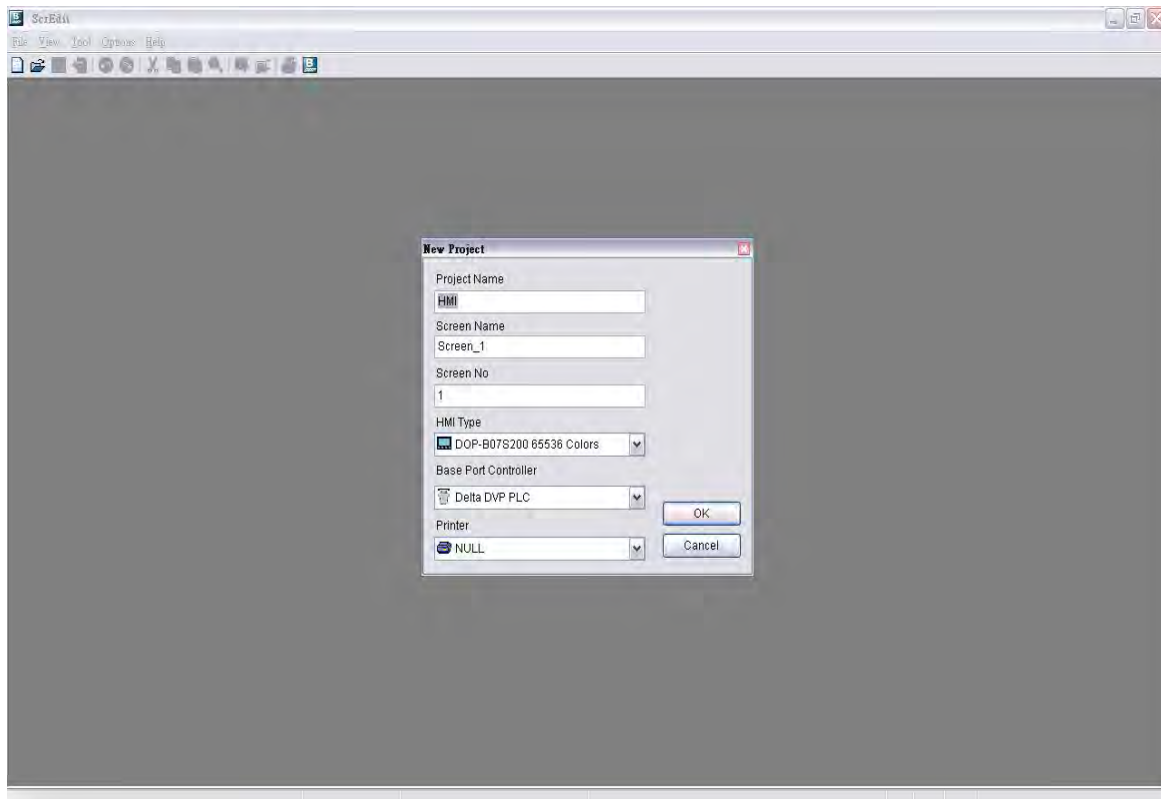
Enter the project name, screen name, screen No. and select connected HMI, controller or printer. Then, click OK. It can create a new project in Screen Editor software program as shown in the following.
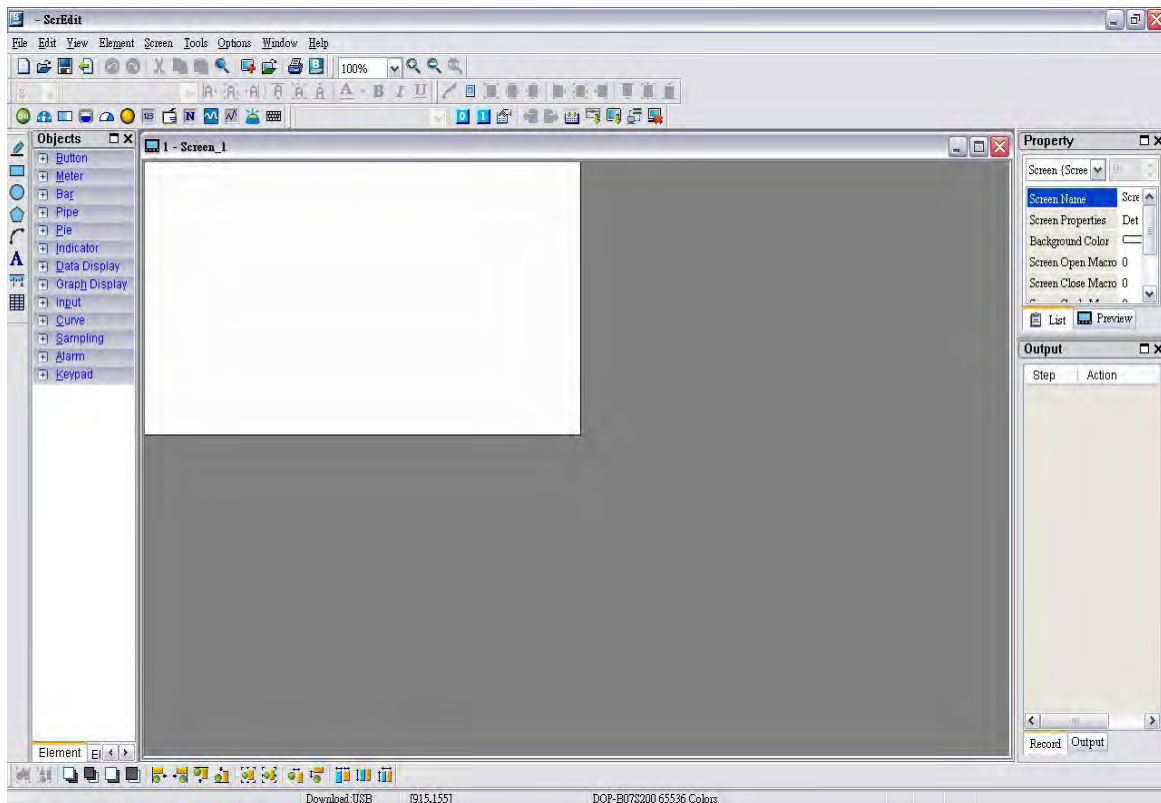
Click **Options > Recipe**, it can open Recipe Setup dialog box. Enable the recipe function and set the non-volatile area to HMI. In this example, the Length is set to 5, Group is set to 3 and Address is set to 1@D100. After pressing **Input** button, the user's screen will look like the figure shown below.
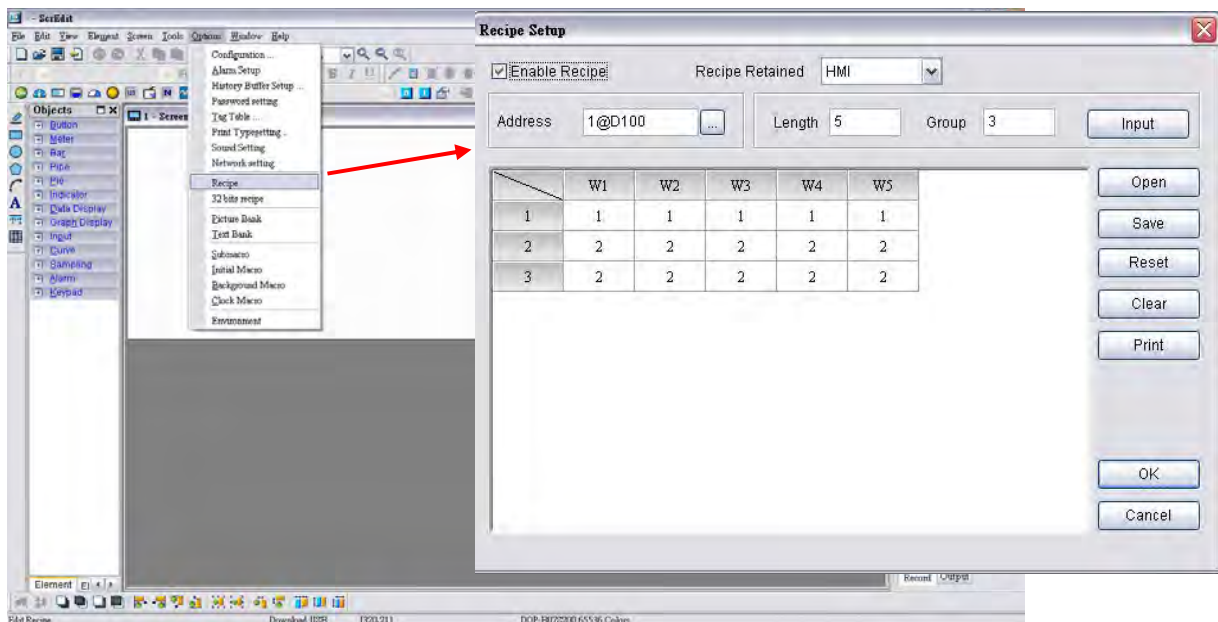
Then, press **OK** button to complete the Recipe settings.

Next, click **Options > Configuration**, select **Control Block** tab. To control the read and write operation of recipes, in this example, Control Address is set to 1@D0 and the Length is set to 8. After complete the above settings, the user's screen will look like the figure shown below.
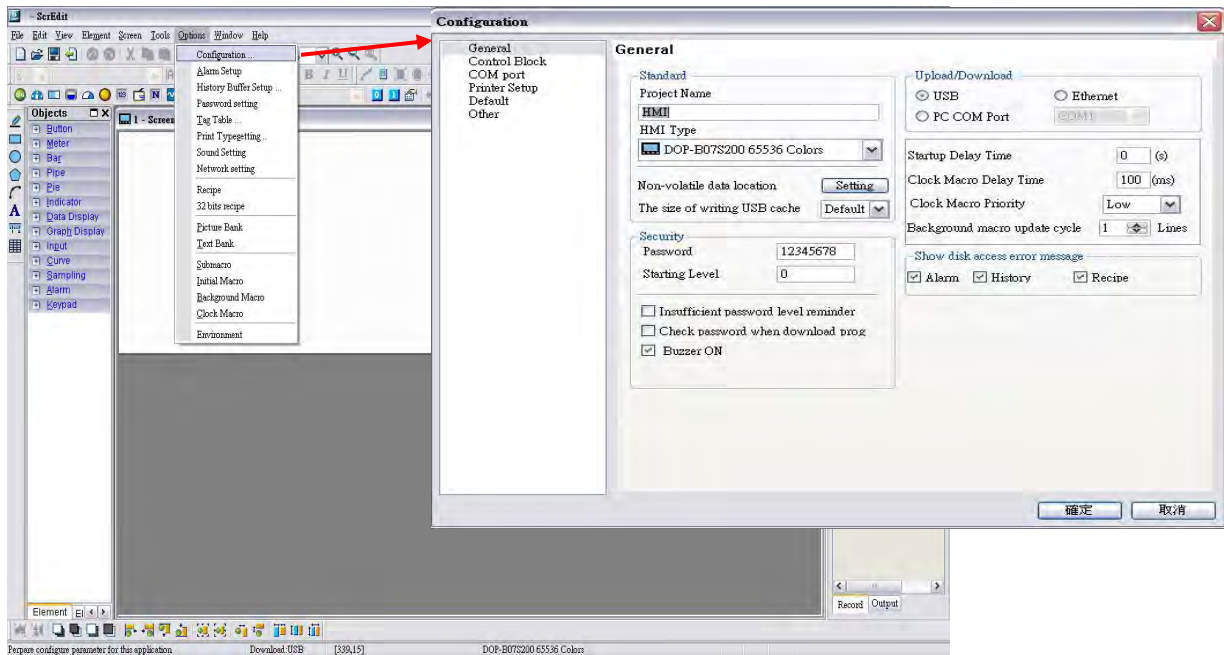
Then, press **OK** button to complete the Control Block settings.

In the editing area of HMI, create Numeric Entry elements to indicate recipe buffer (RCP0~RCP4), recipe table (RCP5~RCP19) and recipe write addresses (1@D100~1@D104). In addition, create three registers, Recipe Number Designation Register (RCPNO), Recipe Write (1@D5=2) Register and Recipe Read (1@D5=4) Register by using Numeric Entry elements as shown as the figure below.
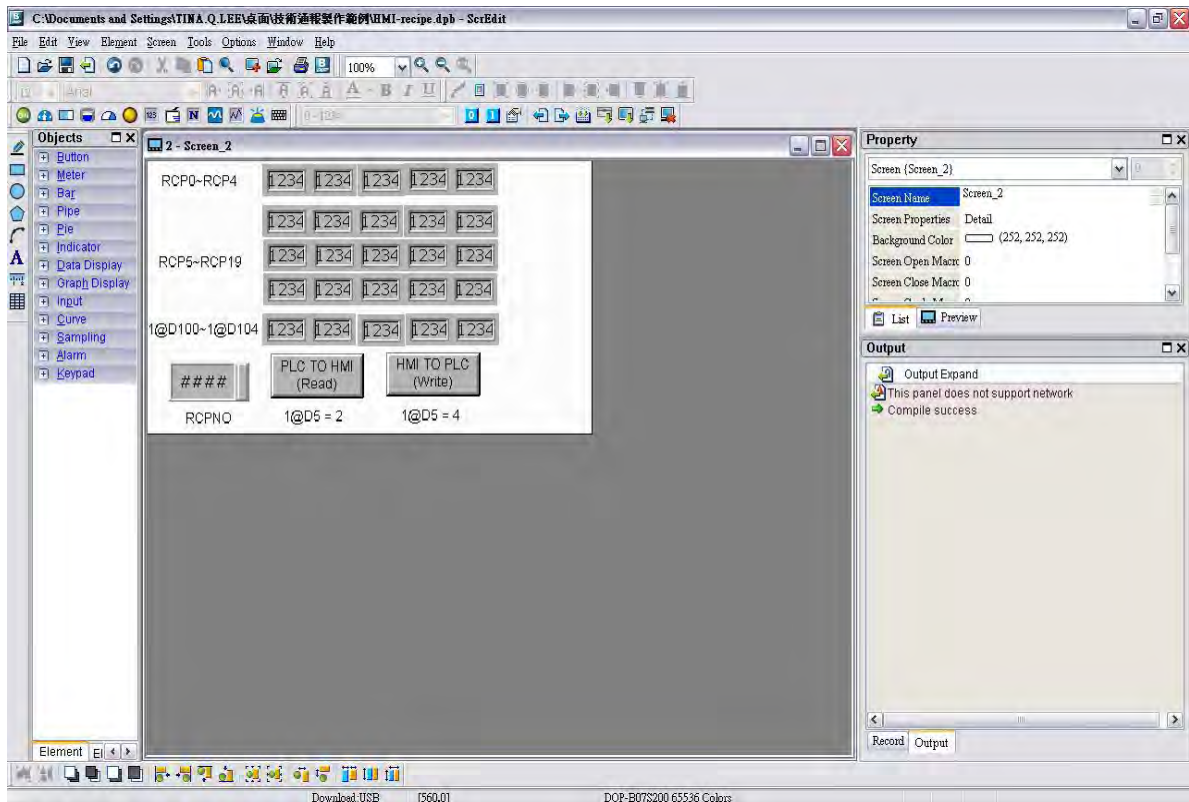
Perform **Compile** operation and download the screen data into HMI.

Then, user's HMI screen will look like the figure shown below. As the default value of RCPNO is 1, the history buffer RCP0~RCP4 will display the 1st number of recipe data. At this time, the recipe data has not been written into PLC address 1@D100~1@D104. Therefore, the display values of 1@D100~1@D104 are all 0.
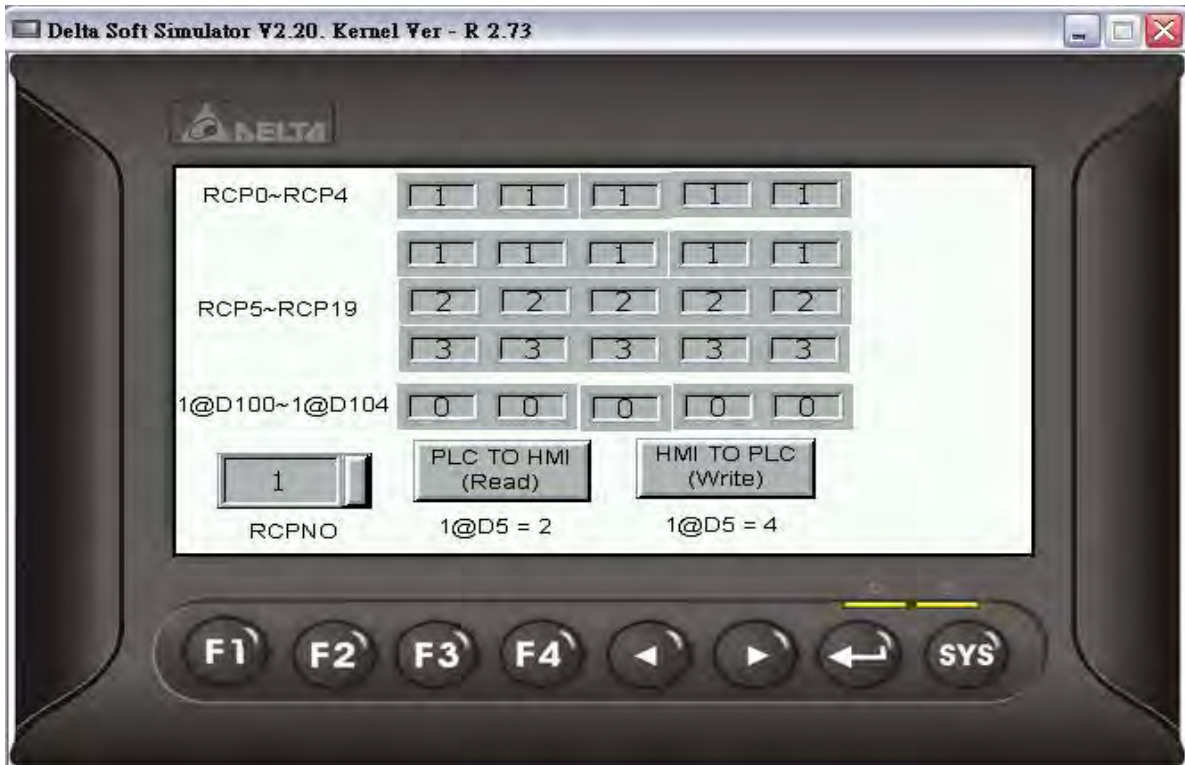
Press **Write** button on the screen and HMI will write the 1st number of recipe data into PLC address 1@D100~1@D104. At this time, the display value of 1@D100~1@D104 will become 1 shown as the figure below.
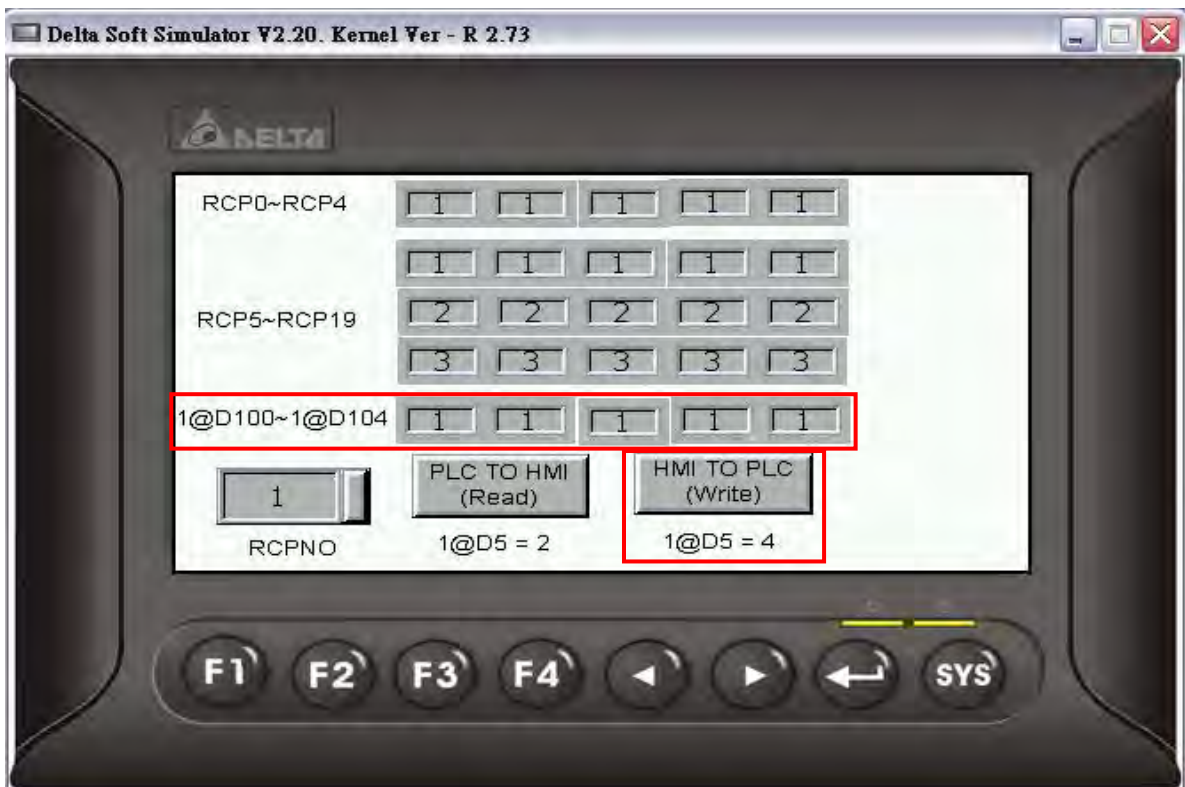
Set RCPNO = 2 and the display value of history buffer RCP0~RCP4 will change to 2.
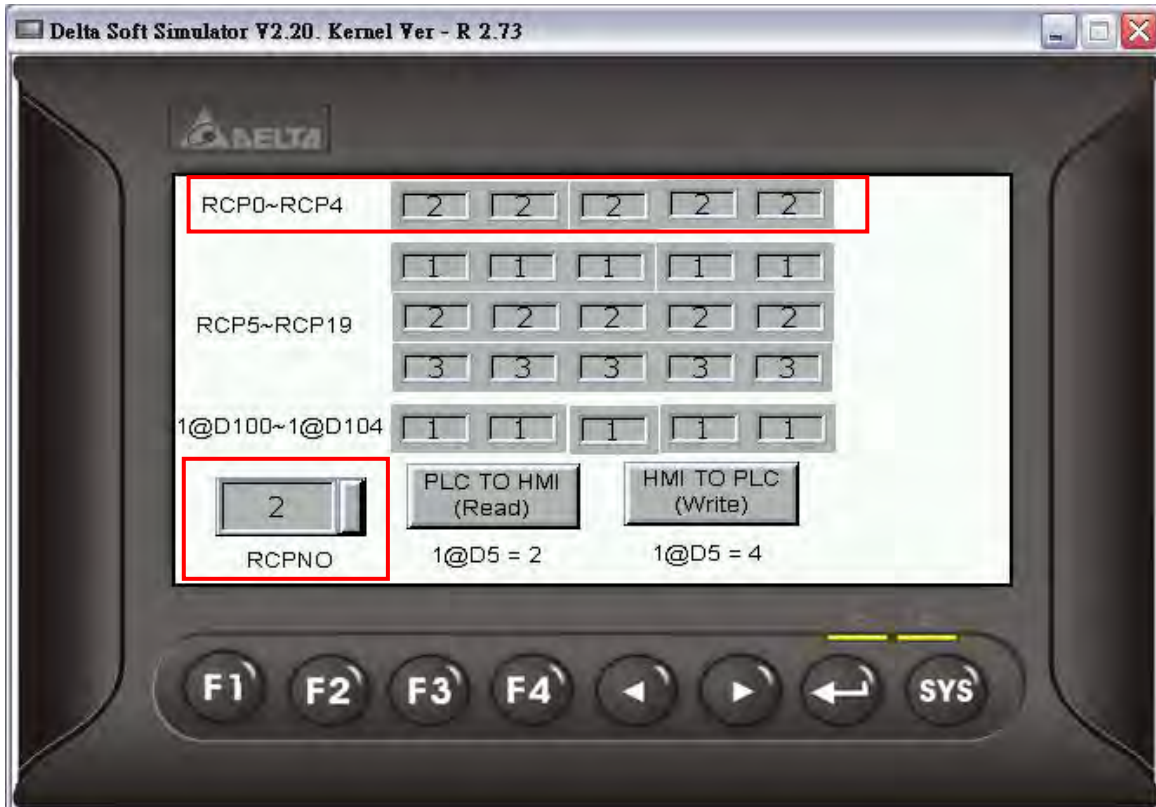
Press **Read** button on the screen and HMI will read the recipe data in PLC and save the data in the 2nd number of recipe data.
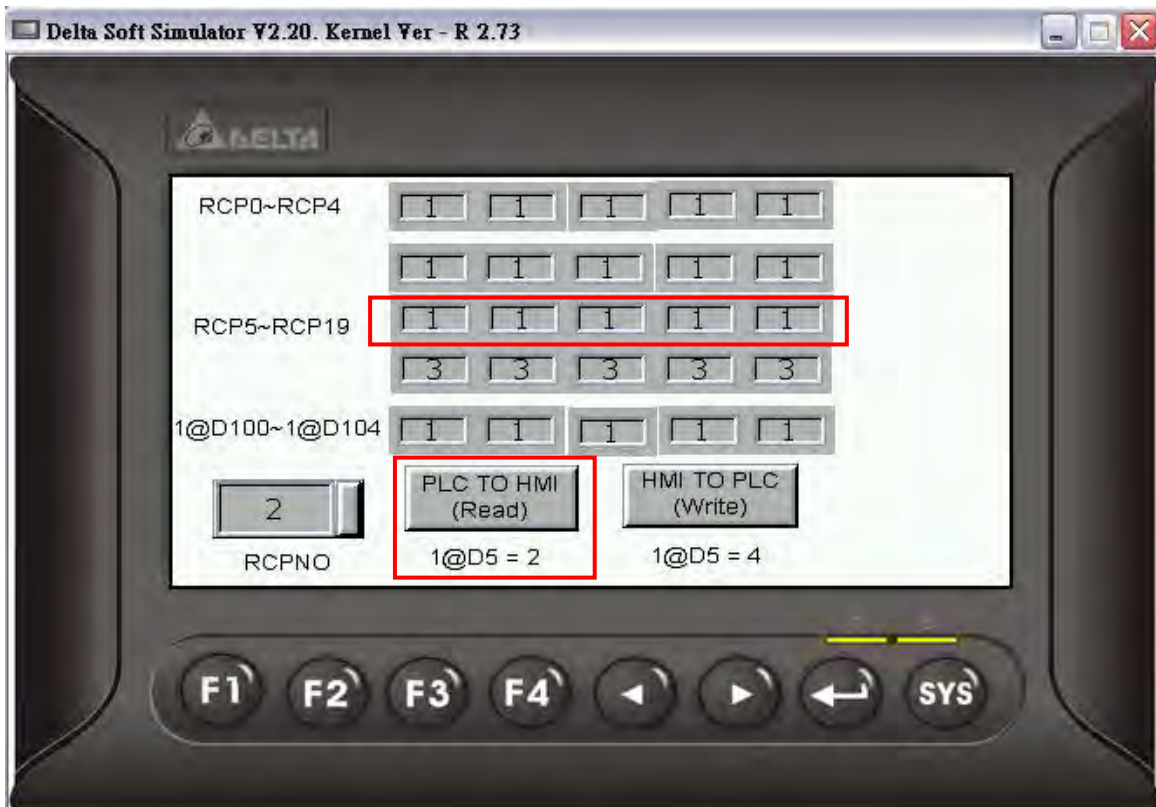
Then, the value of 2nd number of recipe data will be changed.

4.2 How to Create a 32bits Recipe Data

Create a new project first. After pressing   or click **File > New**, it can create a new project

and the user will get a dialog box as shown in the following
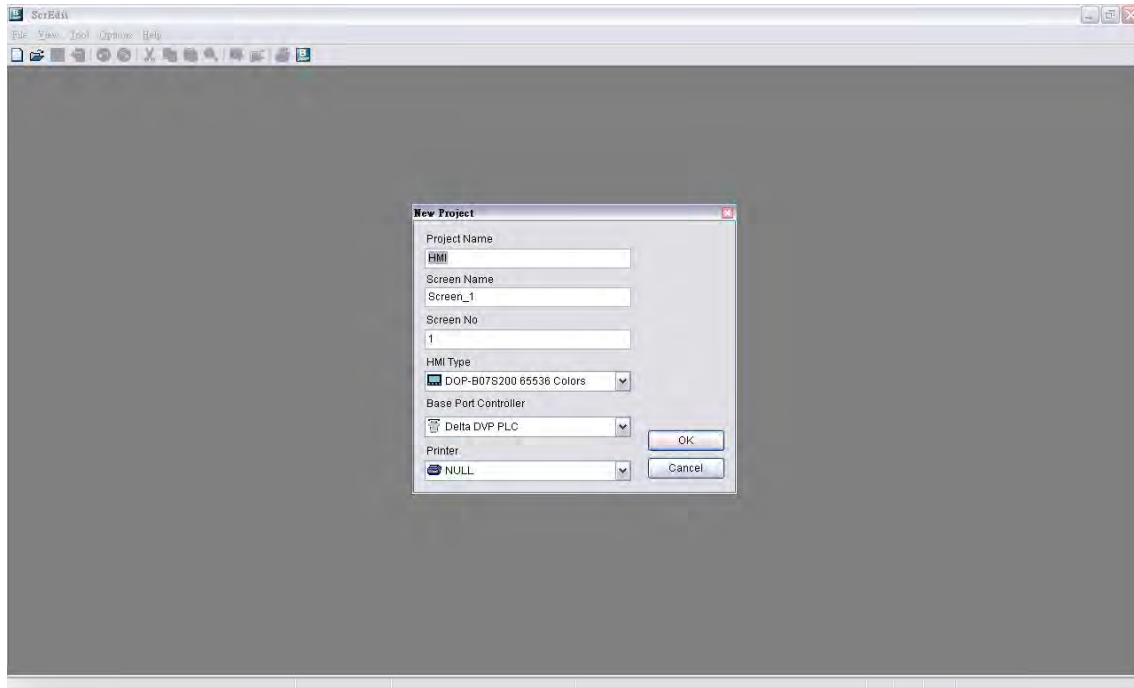
Enter the project name, screen name, screen No. and select connected HMI, controller or printer.
Then, click OK. It can create a new project in Screen Editor software program as shown in the
following.
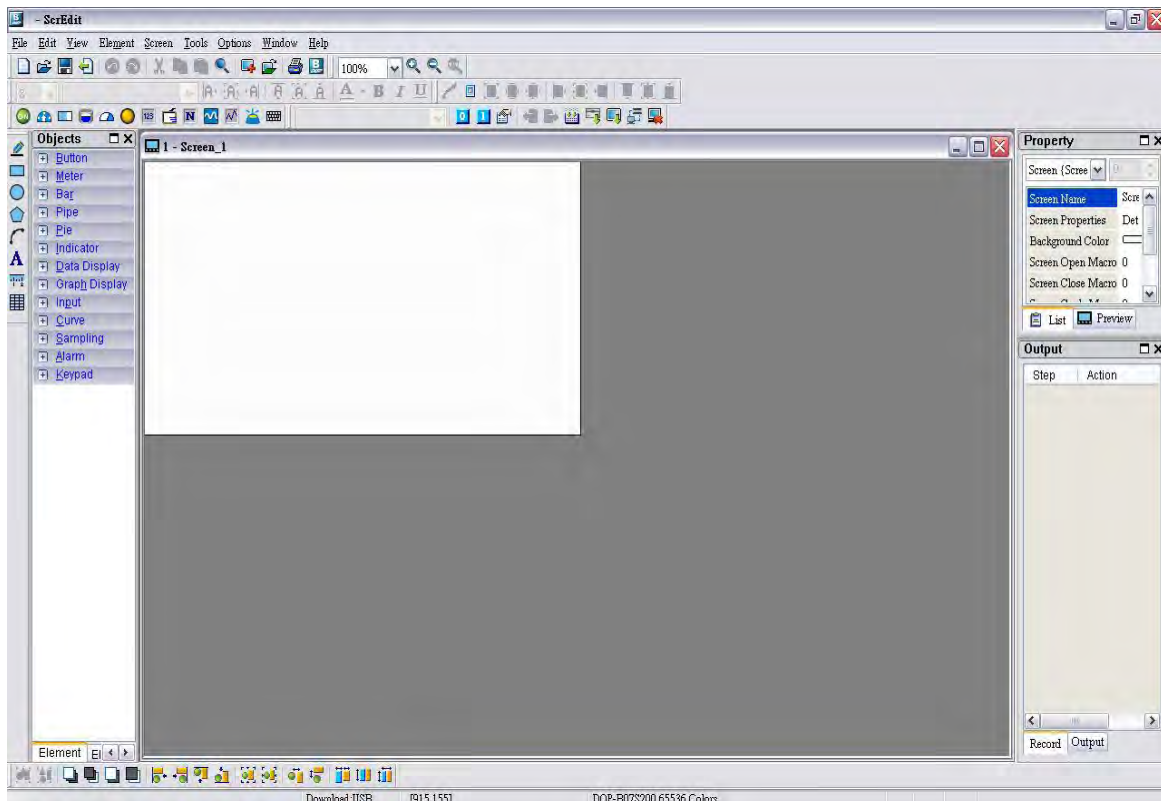
Click **Options > 32bitss recipe**, it can open 32bits Recipe Setup dialog box. In this example, two recipe tables are created, the write address is set to 1@D100 and the non-volatile area is set to HMI. In the 1st recipe table, set the Length to 5 and set the Group to 5. In the 2nd recipe table, set the Length to 5 and set the Group to 3.

After pressing **OK** button, the user's screen will look like the figure shown below.
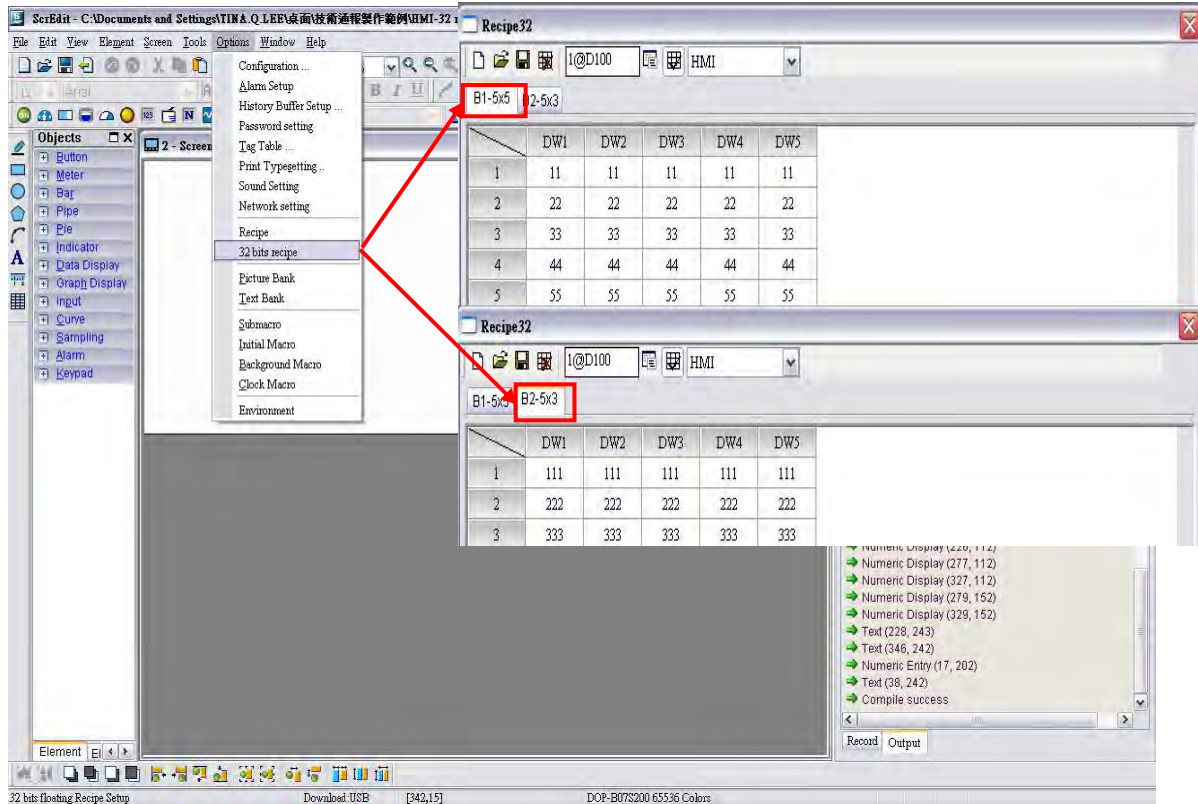
Then, click **Save** icon to complete the settings.

Next, click **Options > Configuration**, select **Control Block** tab. To control the read and write operation of recipes, in this example, Control Address is set to 1@D0 and the Length is set to 8. After complete the above settings, the user's screen will look like the figure shown below.
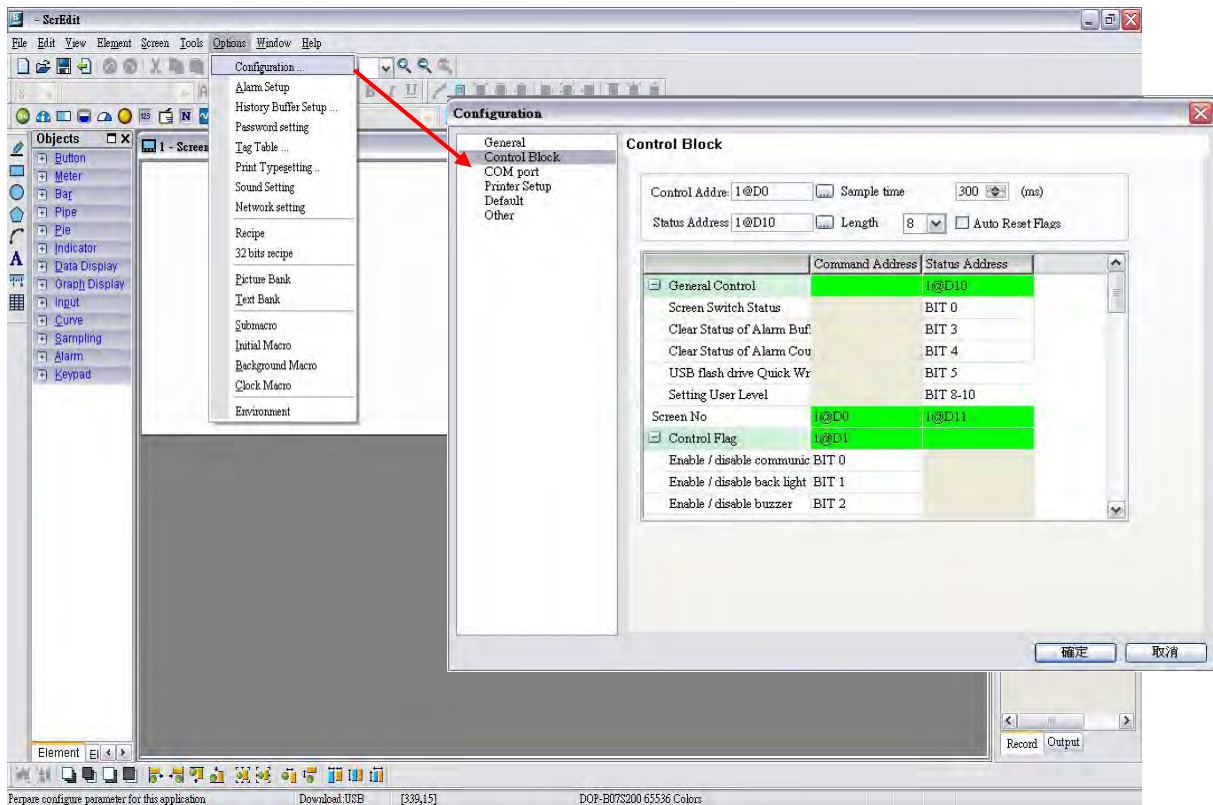
Then, press **OK** button to complete the Control Block settings.

In the editing area of HMI, create Numeric Entry elements to indicate recipe buffer (RCP0~RCP4), recipe table (RCP5~RCP19) and recipe write addresses (1@D100~1@D108). In addition, create three registers, Recipe Group Designation Register (RCPG), Recipe Number Designation Register (RCPNO), Recipe Write (1@D5=2) Register and Recipe Read (1@D5=4) Register by using Numeric Entry elements as shown as the figure below.
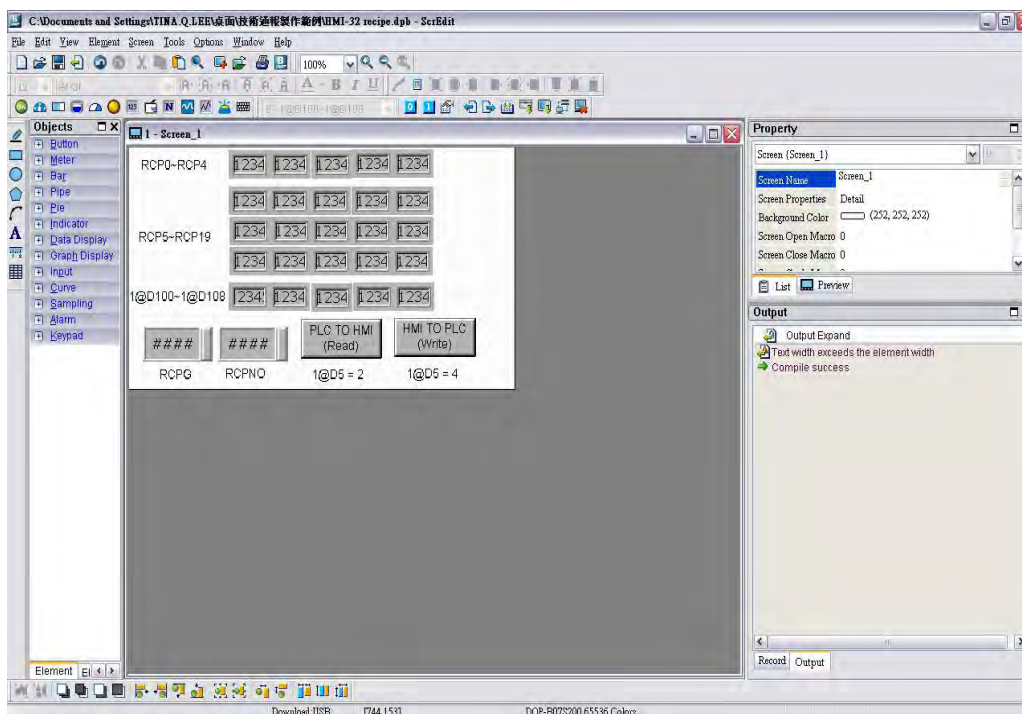
Perform **Compile** operation and download the screen data into HMI.

Then, user's HMI screen will look like the figure shown below. As the default value of RCPG is 0 and RCPNO is 1, the value of history buffer RCP0~RCP4 and recipe table RCP5~RCP19 will be shown as 0. At this time, the recipe data has not been written into PLC address 1@D100~1@D108. Therefore, the display values of 1@D100~1@D108 are all 0.
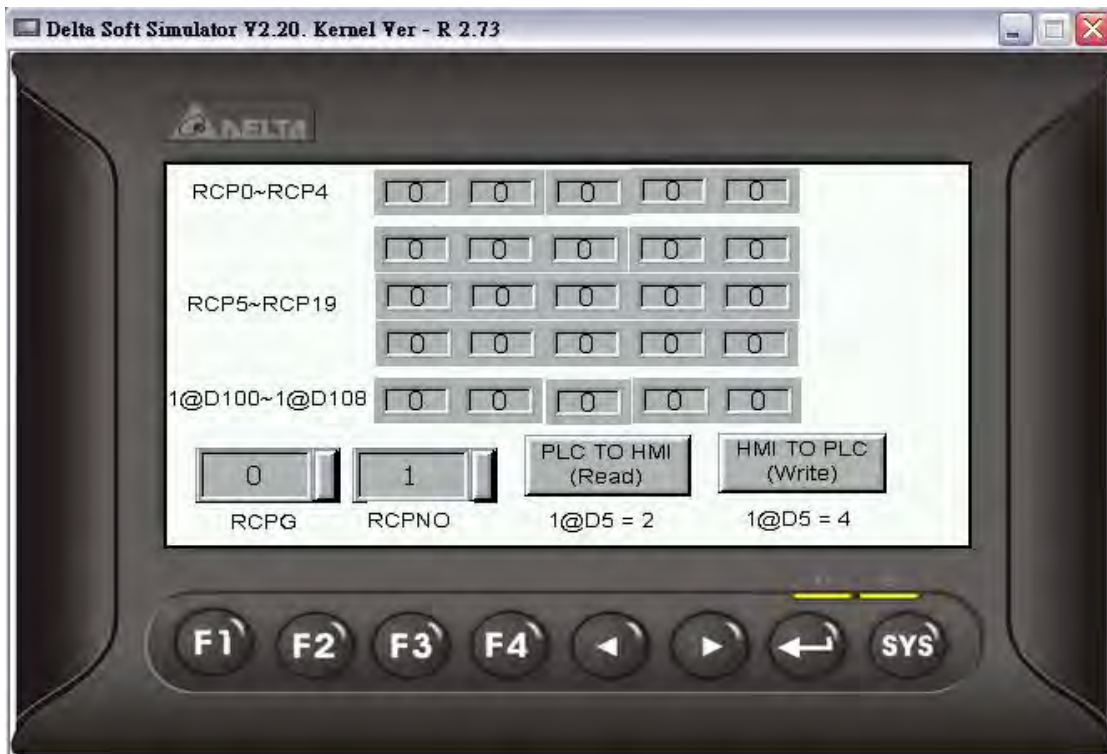
Set RCPG=2, the recipe table RCP5~RCP19 will display the data of the 2nd group of the recipes and the history buffer RCP0~RCP4 will display the data of the 1st group of the recipes. The HMI screen will be shown as the figure below.
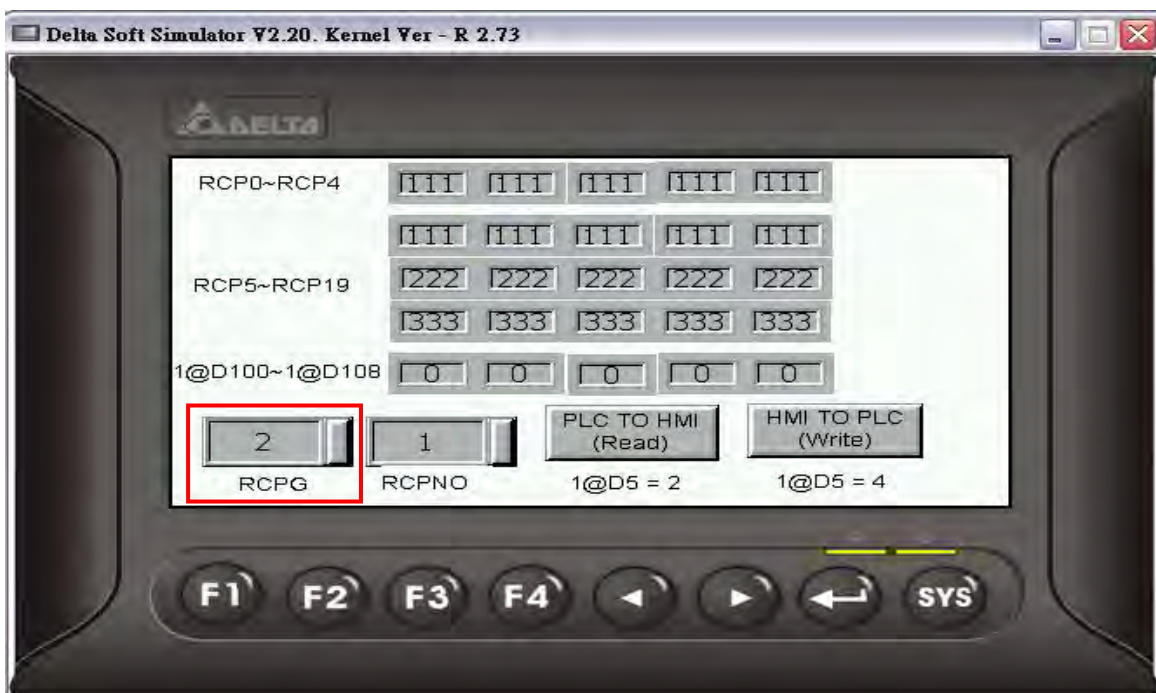
At this time, the recipe data has not been written into PLC addresses 1@D100~1@D108, therefore, the display value will be 0 still.

Press **Write** button on the screen and HMI will write the 1st group of recipe data into PLC address 1@D100~1@D108. At this time, the display value of 1@D100~1@D108 will become 111 shown as the figure below.
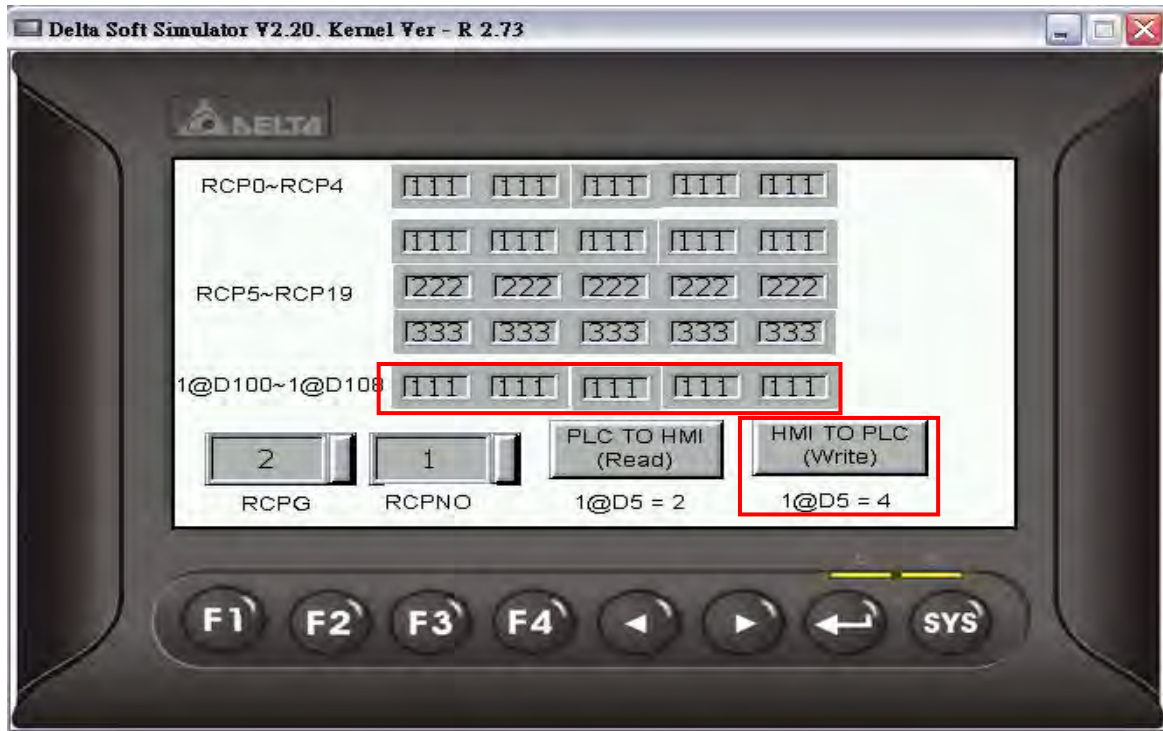
Set RCPNO = 2, the 2nd group of recipe data will be displayed in RCP0~RCP4 as shown as the figure below.
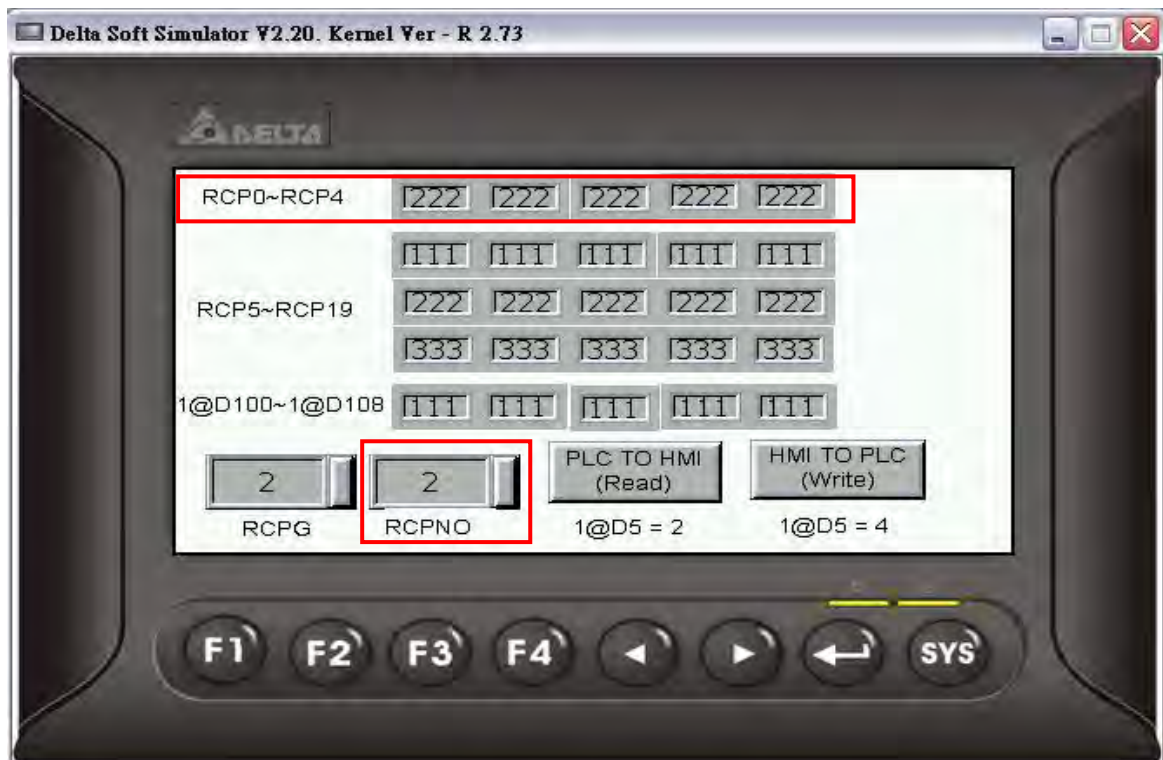
Press **Read** button on the screen and HMI will read the recipe data in PLC and save the data in the 2nd group of recipe data.
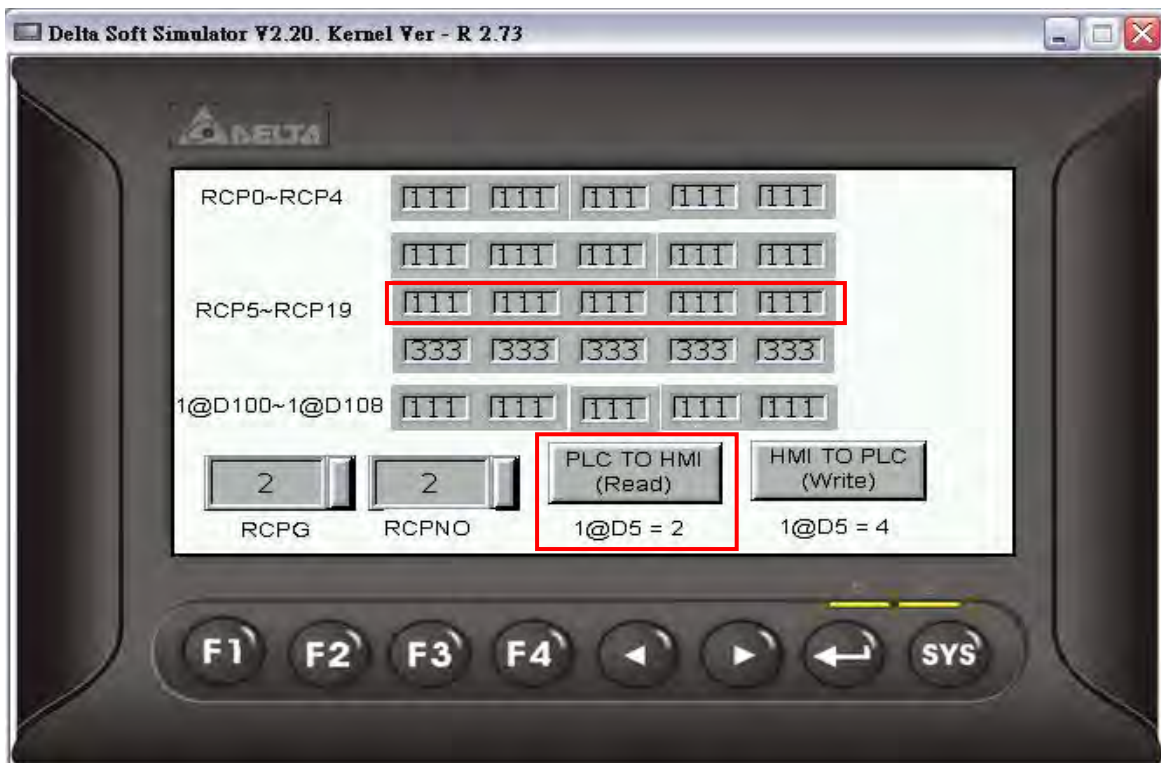
Then, the value of 2nd group of recipe data will be changed.

4.3   How to Use Windows Excel CSV File

There are two kinds of format accepted by recipe editor. One is RCP file and the other is CSV file. RCP file can be opened and edited in Screen Editor software program only and CSV file can be created and edited in Microsoft Windows Excel environment. The following section describes how to create and edit the CSV file in Microsoft Windows Excel environment.

After finishing the editing of the recipe data, the user can save the recipe file as Windows Excel CSV file.

16bits Recipe

When the user opens a 16bits recipe CSV file in Microsoft Windows Excel environment, the first row shows the setting value of data length and group, and the other rows shows the recipe data value. In this example, the Length is set to 5 and the Group is set to 3, i.e. it is a 5 x 3 recipe data.

32bits Recipe

When the user opens a 32bits recipe CSV file in Microsoft Windows Excel environment, the first row shows the version of 32bits recipe data, i.e. RCP32-1.0.
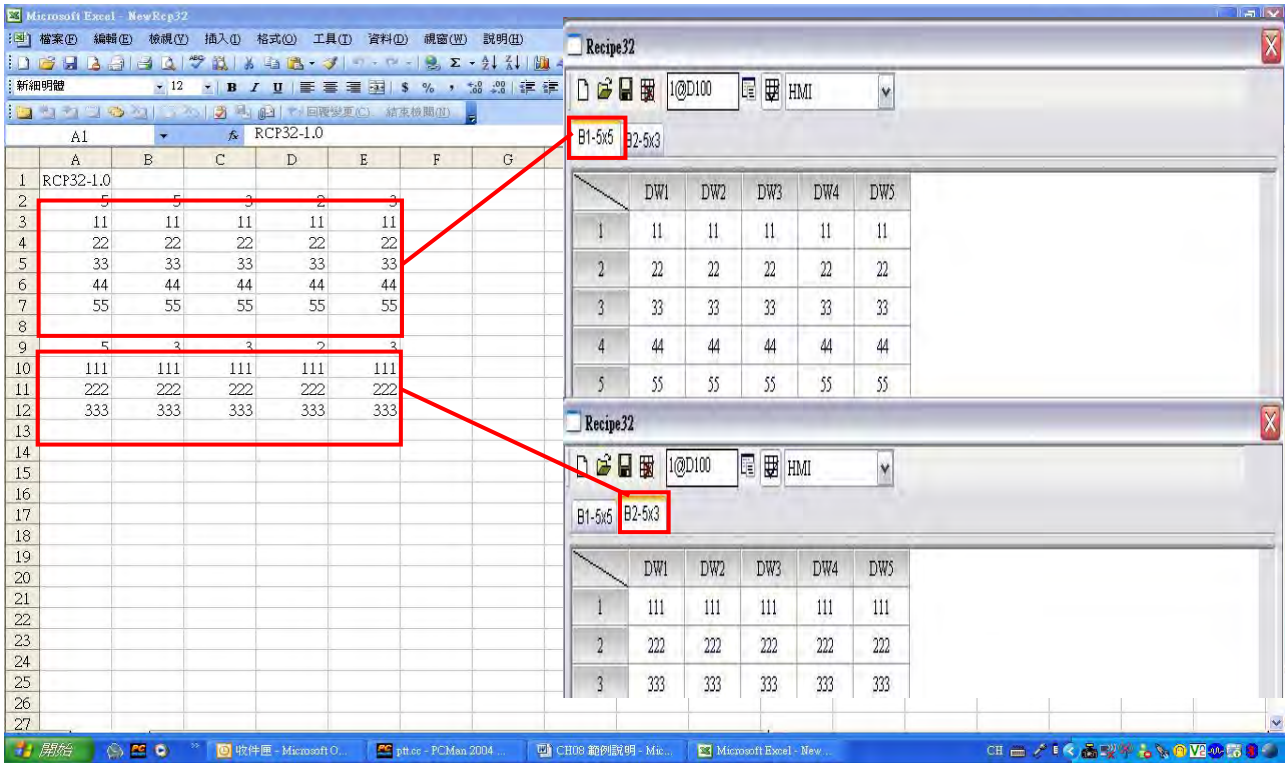
In the figure above, the left size shows the editing environment of Microsoft Windows Excel and the right size shows the 32bits recipe setup dialog box in Screen Editor software program. The 1st group of the recipe data will be located in the upper area and the 2nd group of the recipe data will be located in the lower area. **Please note that there must be a blank row between the data of two recipe table.**

For the settings, please refer to the following cross reference.

Column of Excel File	Setting Value of Recipe Data
A	Length
B	Group
C	Integral Digits (The digit number will be a real decimal number only when the data format is selected as Floating.)
D	Fractional Digits (The digit number will be a real decimal number only when the data format is selected as Floating.)
E	Data format: 2：Signed Decimal 3：Unsigned Decimal 6：Floating

4.4　How to Use Multi-Language Function

Create a new project first. After pressing ▯ or click **File > New**, it can create a new project

and the user will get a dialog box as shown in the following.
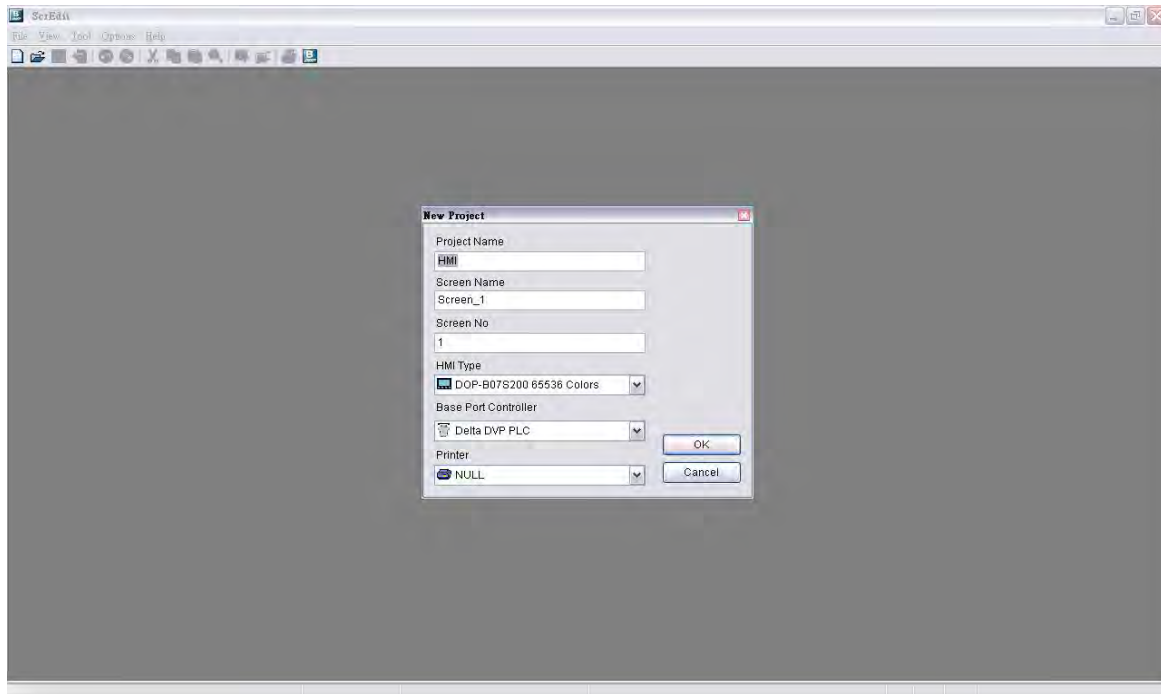
Enter the project name, screen name, screen No. and select connected HMI, controller or printer.
Then, click OK. It can create a new project in Screen Editor software program as shown in the
following.
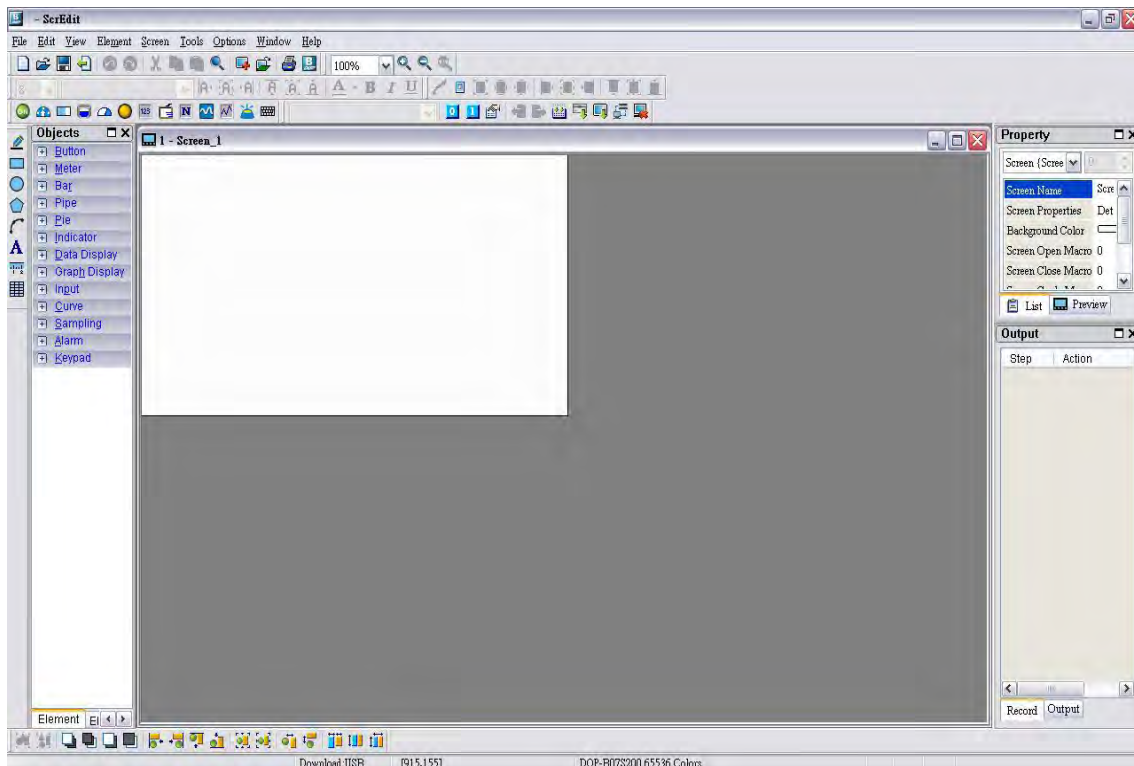
Click **Options > Configuration**, select **Control Block** tab. To control the multi-language selection, in this example, Control Address is set to $0 and the Length is set to 8. After complete the above settings, the user's screen will look like the figure shown below.
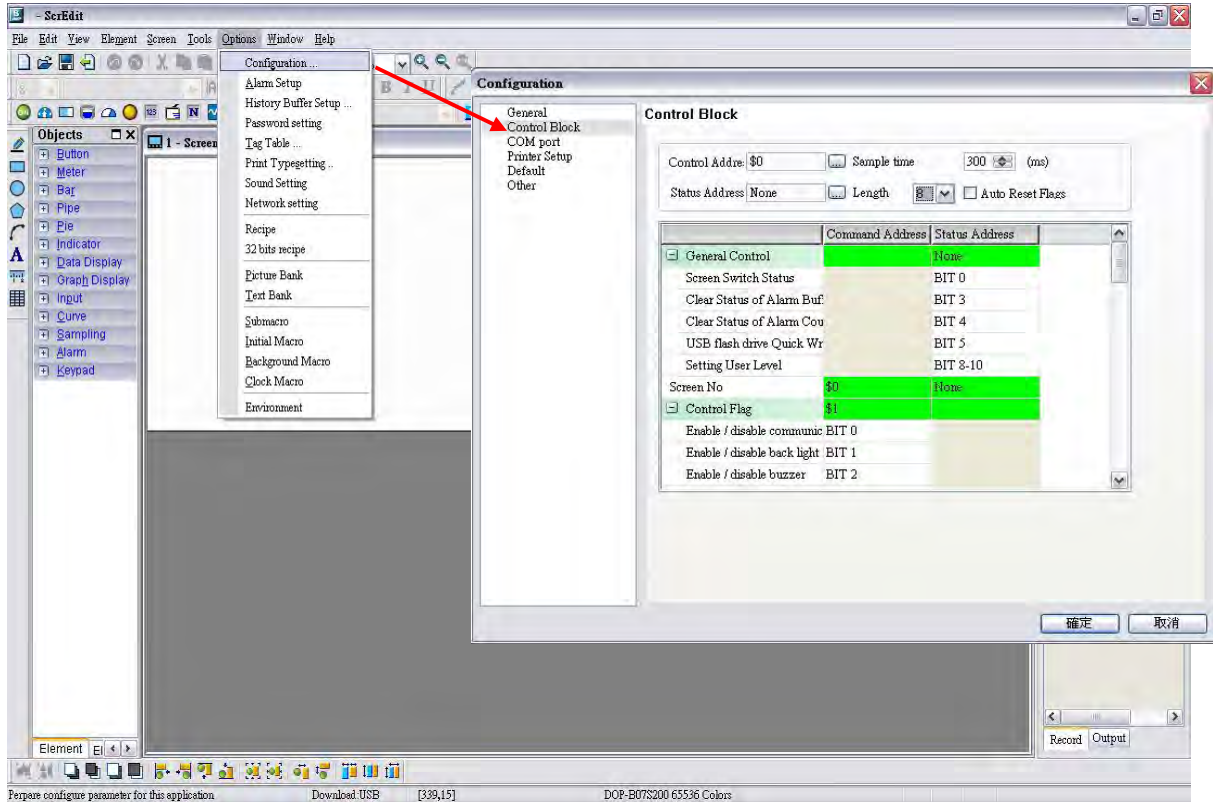
Then, press **OK** button to complete the Control Block settings.

Next, click **Options > Configuration**, select **Other** tab (refer to the figure below).
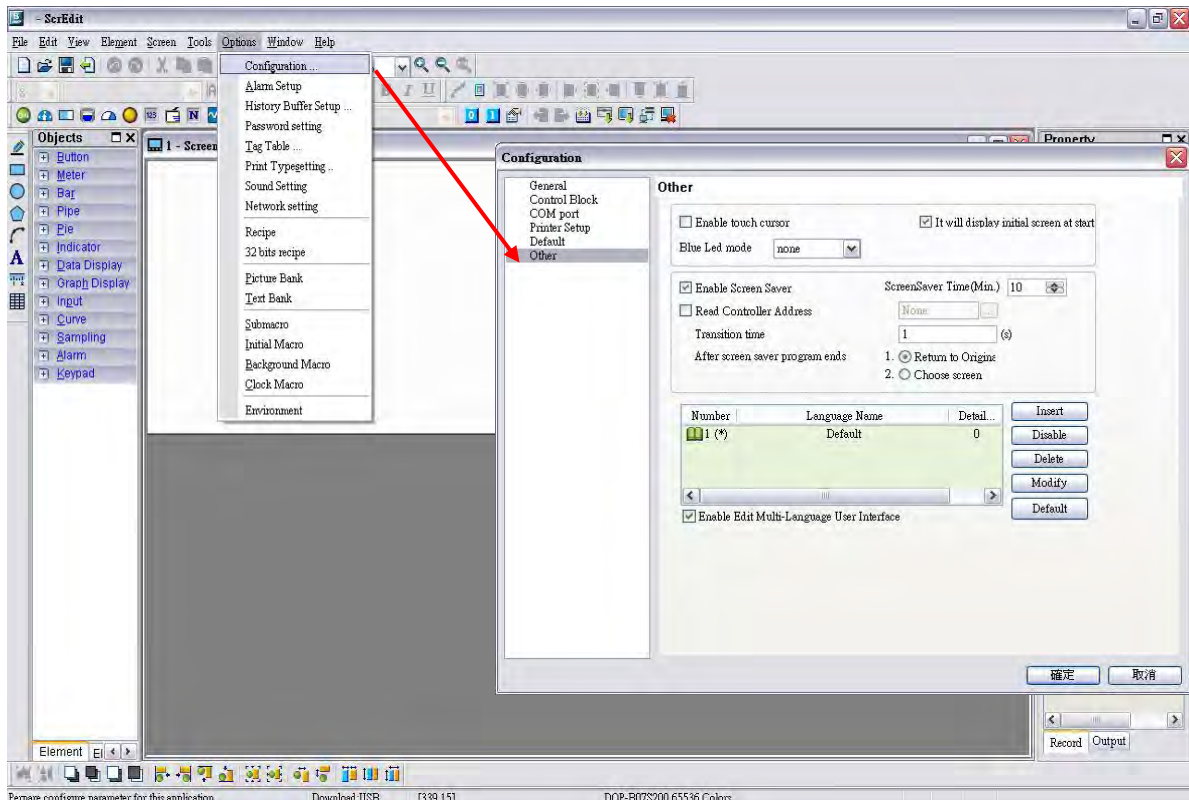
Press **Insert** button to Add Chinese (ROC), English (english), Japanese (japan). The setting values are 1, 2 and 3 for each language respectively.
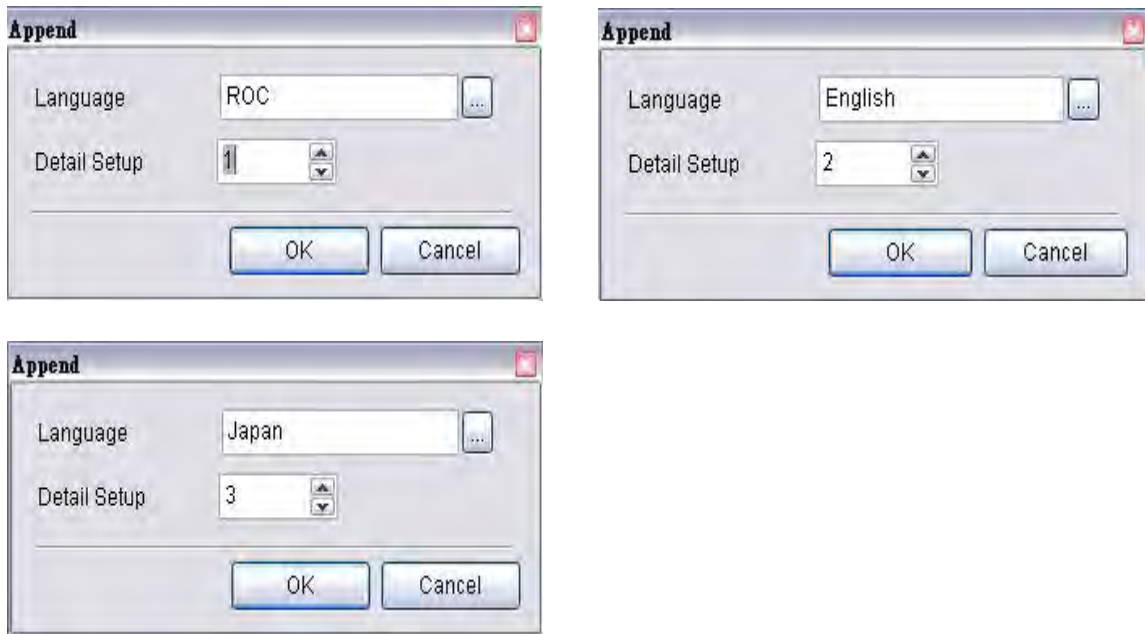
In this example, the default setting is set to Chinese and all the language settings will also be shown in the window.
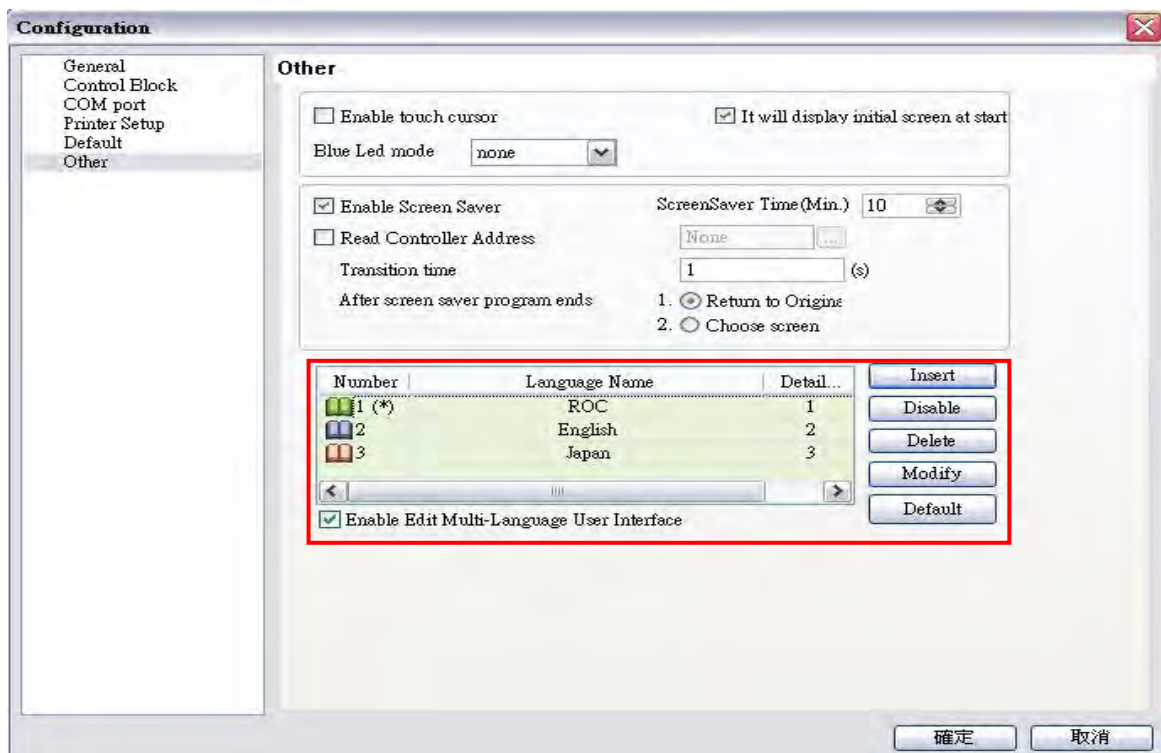
Then, press **OK** button to complete the settings.

Create a **Text** element on the screen. Then, set the display text of Text element in different languages.
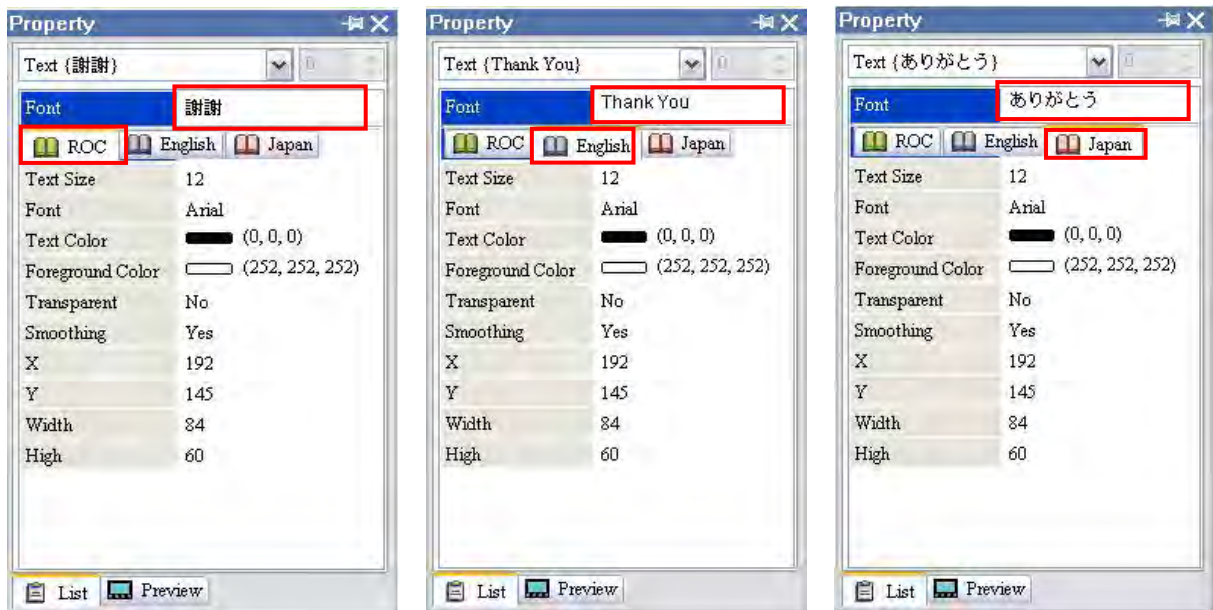
The user can define the font, text size and text color by preference.

In addition, create an **Increment** button element on the screen. In property setting of Increment button element, set the write address as the internal memory $7.
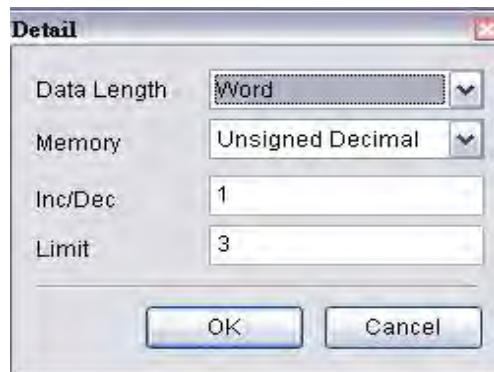
In this example, we use three kinds of languages so the value of Limit should be set to 3.

Set the setting value of **Before Execute Macro** as follows. This is a logical determination from multiple conditions. After switching to the last language, it will return to the first language.


```
1 if $7 == 3
2 $7=0
3 endif
```
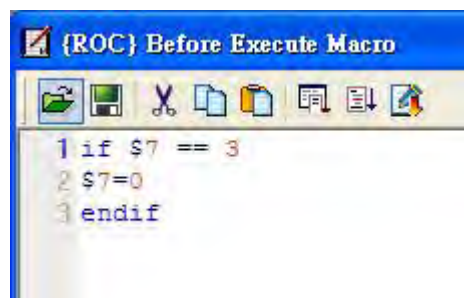
In property setting of the Increment button element, double click the tabs and enter the text in different languages.
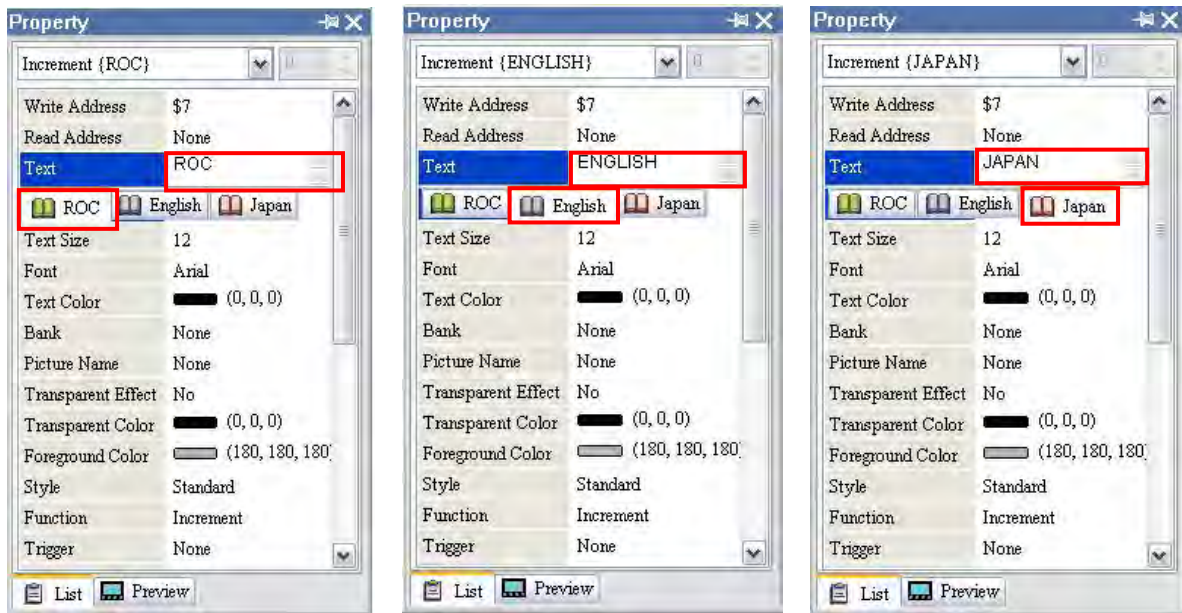
After complete the above settings, the user's screen will look like the figure below.
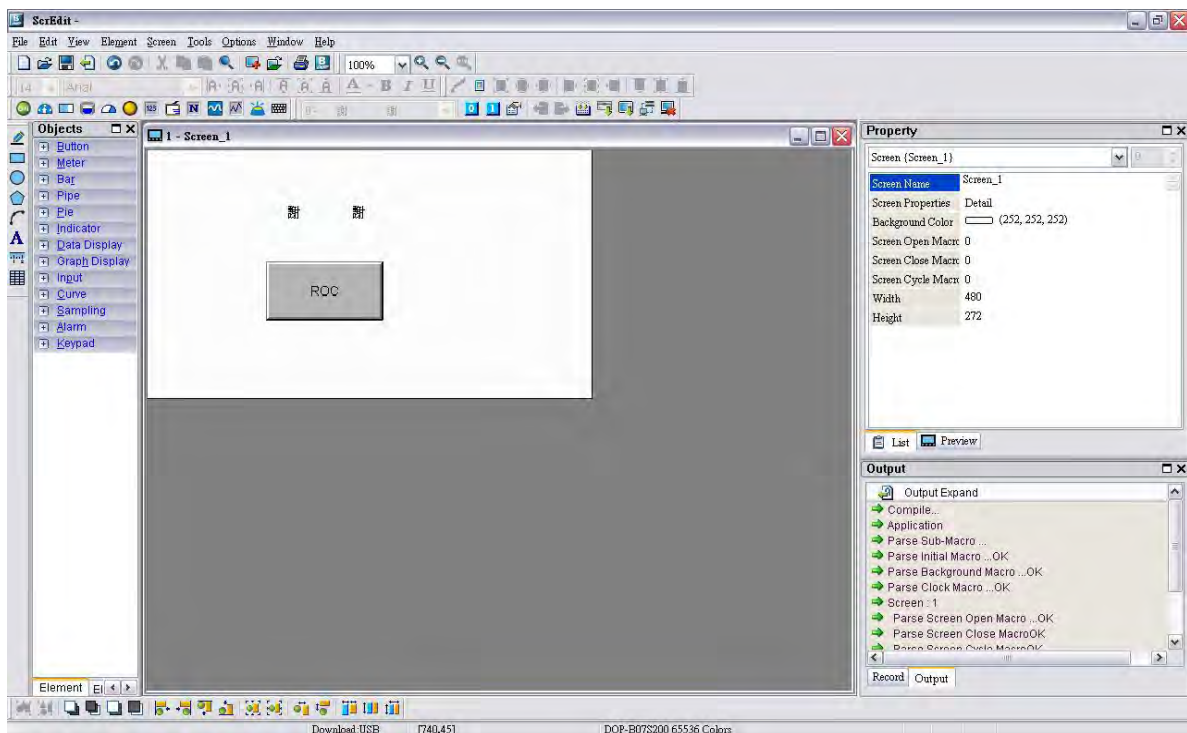
Select the **Compile** command and perform **Compile** operation to download the data into HMI.

Then, user's HMI screen will look like the followings. The default display language is Chinese. The text of the Text element is changed to a different language by pressing the Increment button element.
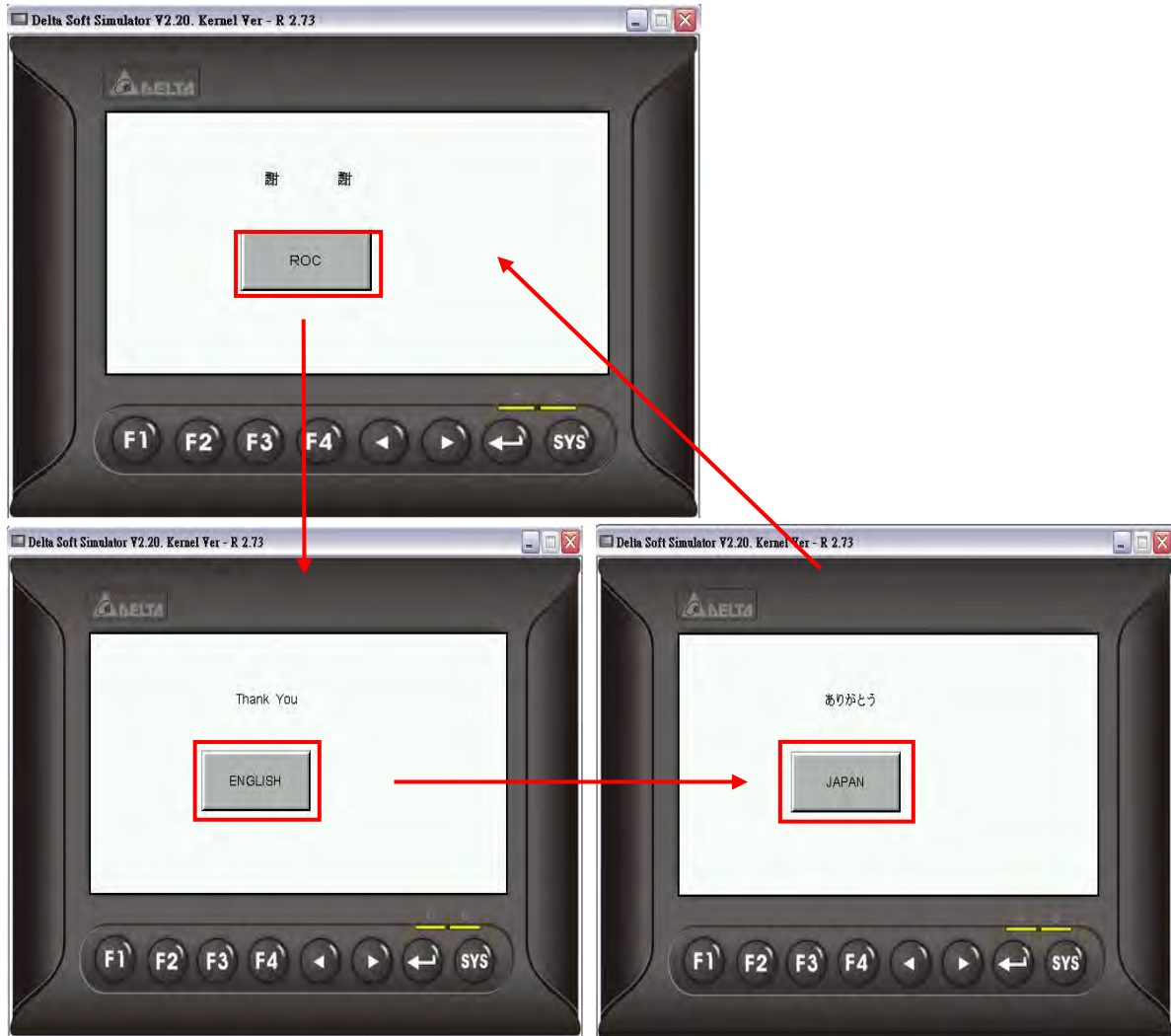
4.5   How to Use Flash Transfer Function

Flash Transfer is a program which is used to read the data of Historical Trend Graph, Historical Data Table and Alarm data. In this case, Historical Trend Graph and Alarm Historical Table are used for explanation.

Create a new project first. After pressing [icon] or click **File > New**, it can create a new project and the user will get a dialog box as shown in the following
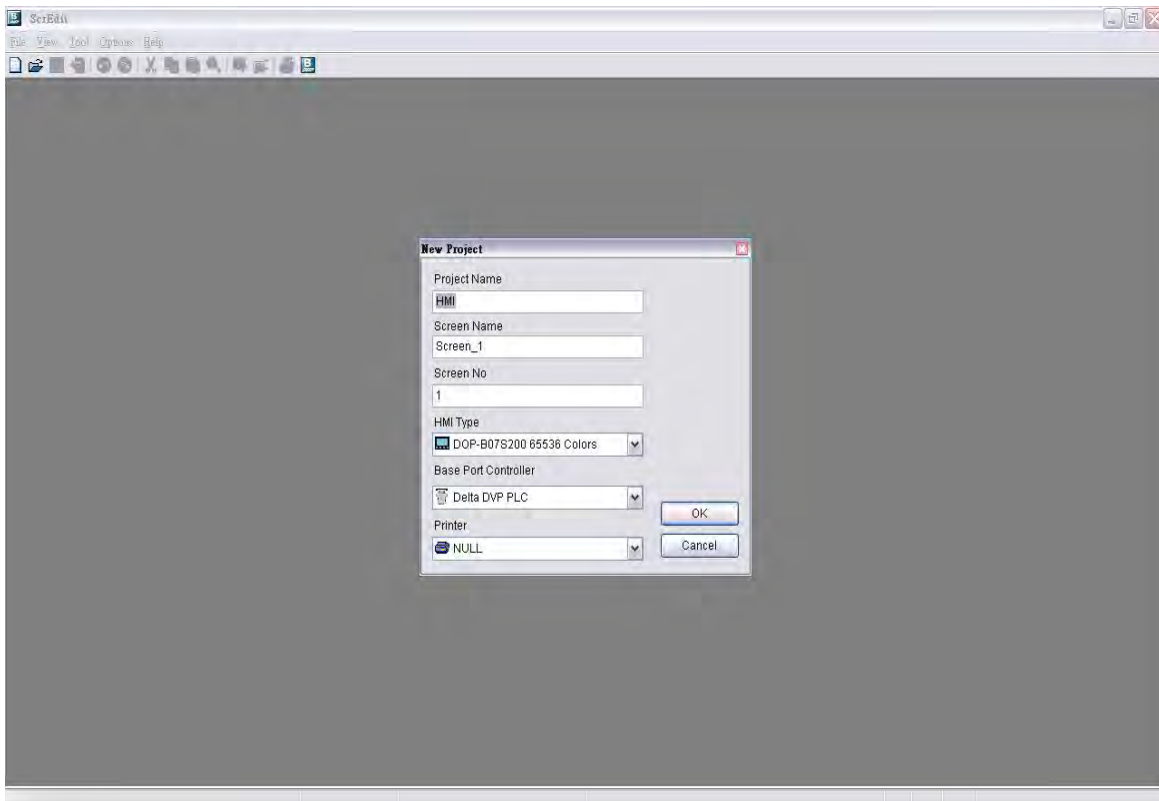
Enter the project name, screen name, screen No. and select connected HMI, controller or printer. Then, click OK. It can create a new project in Screen Editor software program as shown in the following.
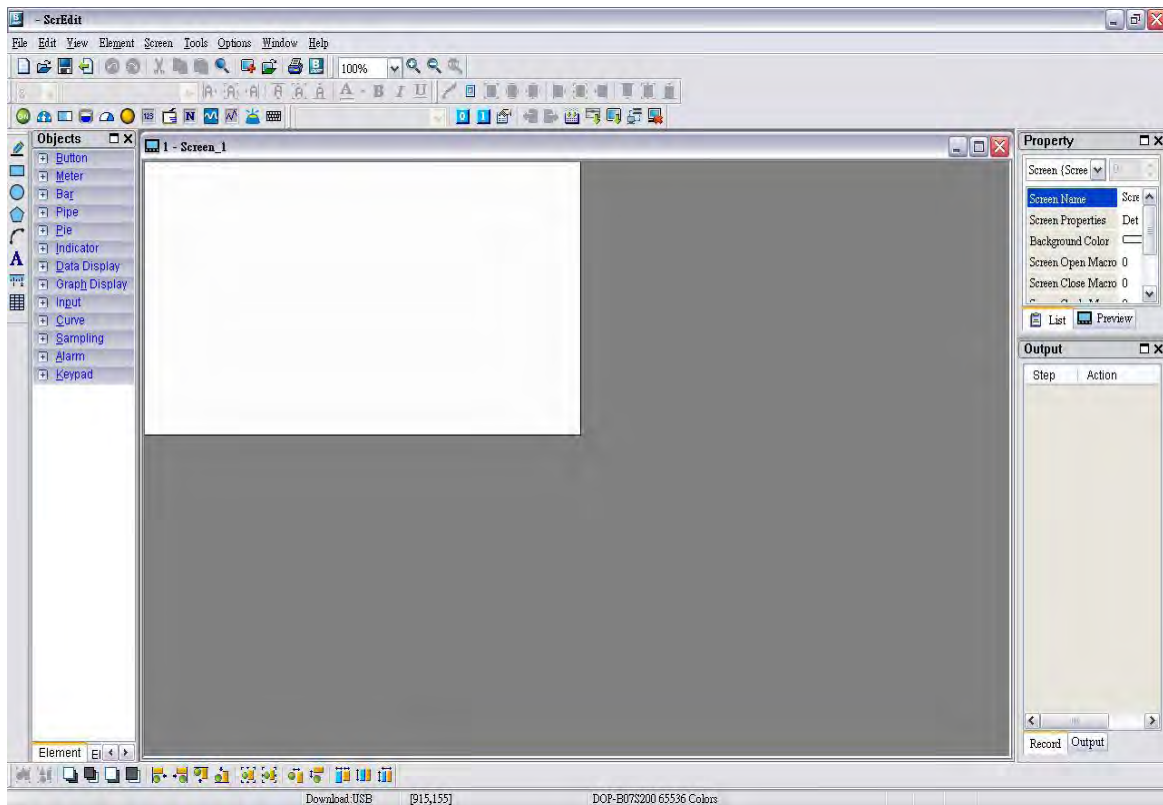
Click **Options > History Buffer Setup** to add a history buffer data for reading the data of PLC corresponding address. Set the Read Address to $0 and select non-volatile area (Retained) to HMI shown as the figure below.
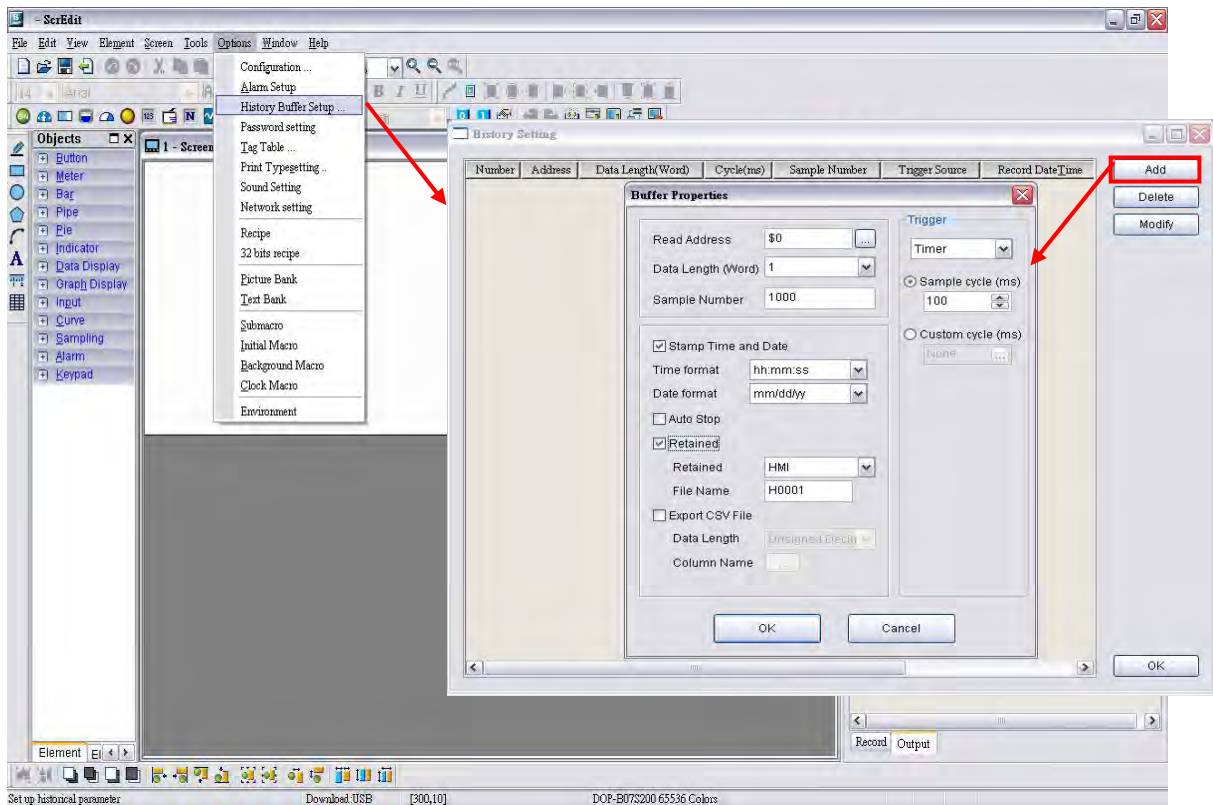
After **OK** button in History Setting dialog box is pressed, a history buffer is created shown as the figure below.
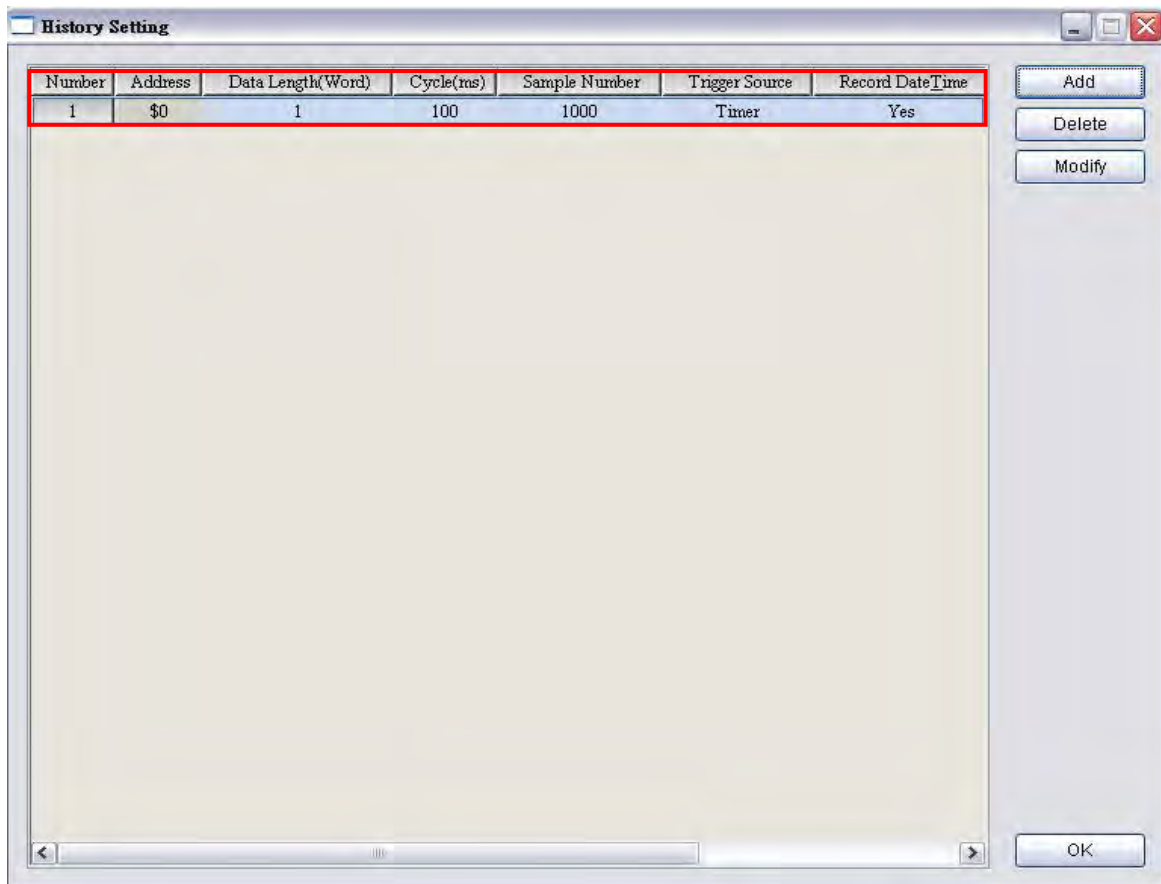
Press OK button in History Buffer Setup dialog box to complete the settings.

Next, click **Options > Clock Macro** to edit clock macro. After HMI is turned on and starting the initial setup, the clock macro is be executed automatically by clock setting time.

Then, click **Options > Alarm Setup** to set the alarm. Two alarms are added. The trigger addresses are Internal Memory Address $100.0 and $100.1, and the non-volatile area is set to HMI shown as the figure below.
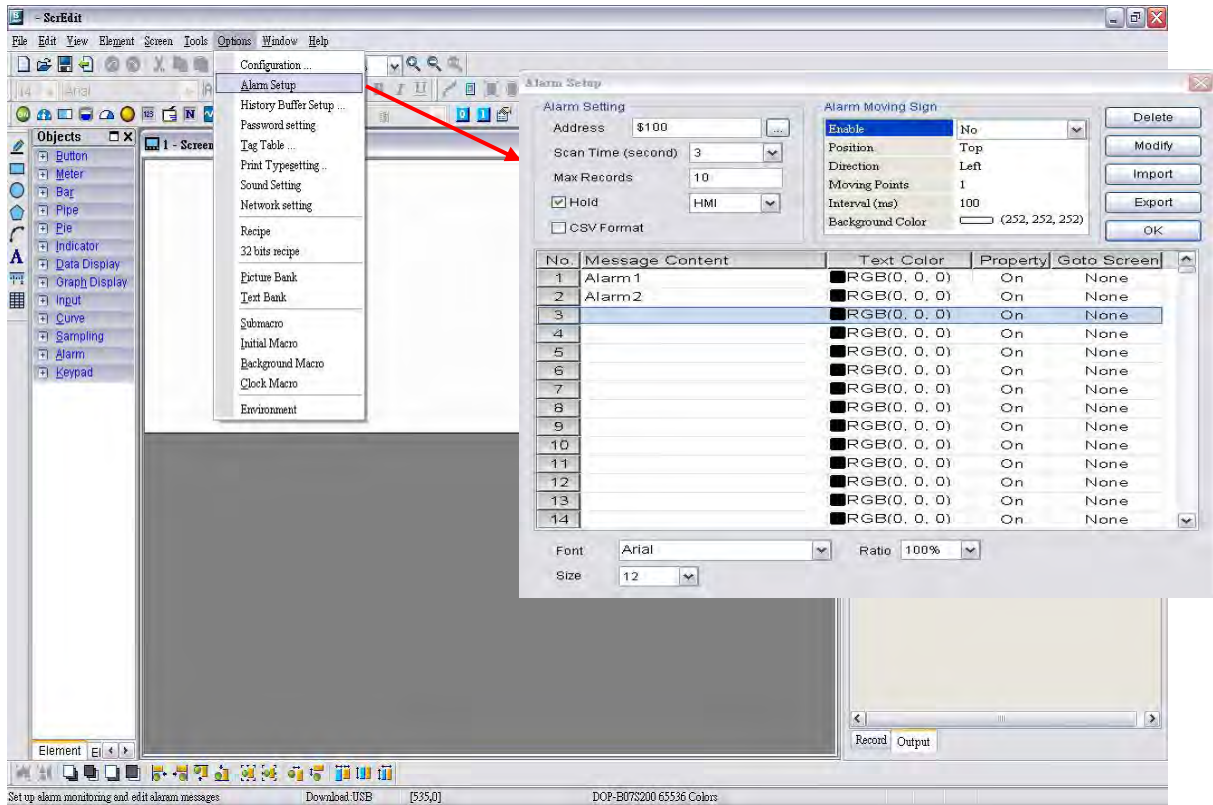
Press **OK** button to complete the alarm settings.

Create a Historical Trend Graph element and an Alarm Data Table element on the screen. Complete the settings of Historical Trend Graph element shown as the figure below. Please make sure that the Buffer ID is selected.
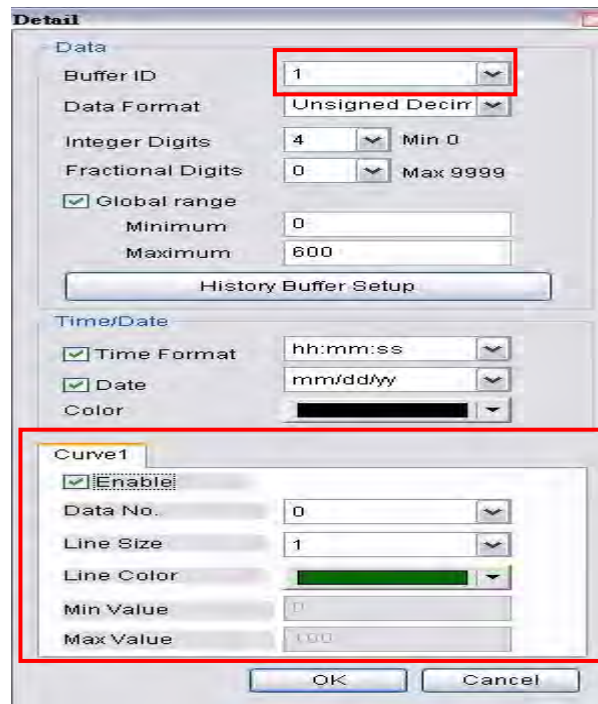
Next, create two Momentary button elements in order to trigger ALARM 1 and ALARM 2. The addresses of ALARM 1 and ALARM 2 are $100.0 and $100.1 respectively. Then, create a Report List element and a Remove storage element on the screen. After complete the above settings, the user's screen will look like the figure below.
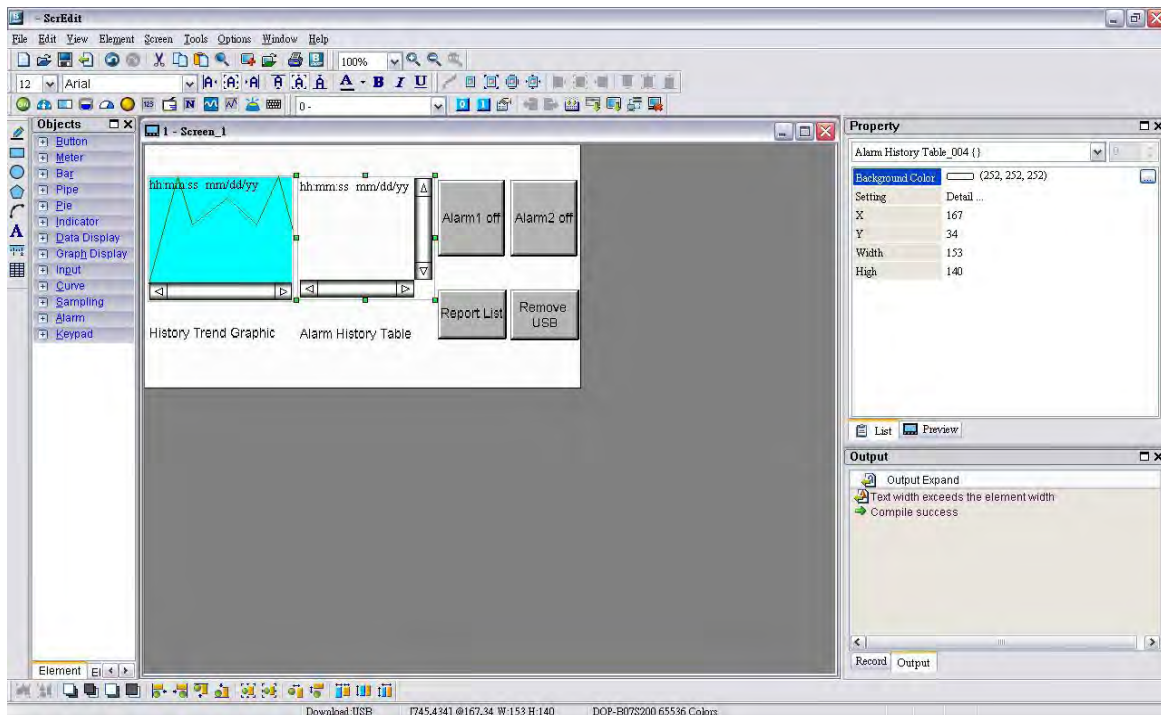
Click **Tools > Compile** command to perform **Compile** operation and download the screen data into HMI.

At this time, user's HMI screen will look like the figure below. Because the Clock Macro command ($0 = $0 + 1) is set, the user can see that there are some changes in Historical Trend Graph.
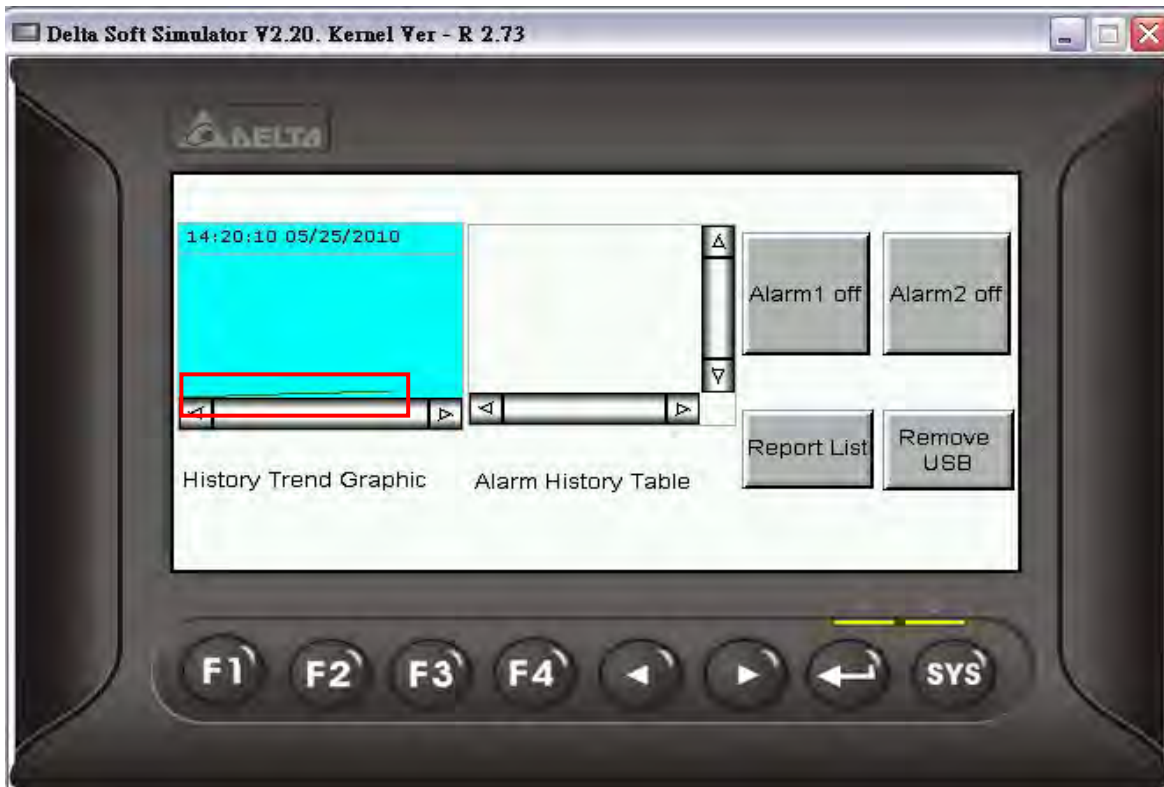
The user can press two Momentary button elements to enable and disable the alarms. The alarm data will be recorded in Alarm Data Table for user's reference.
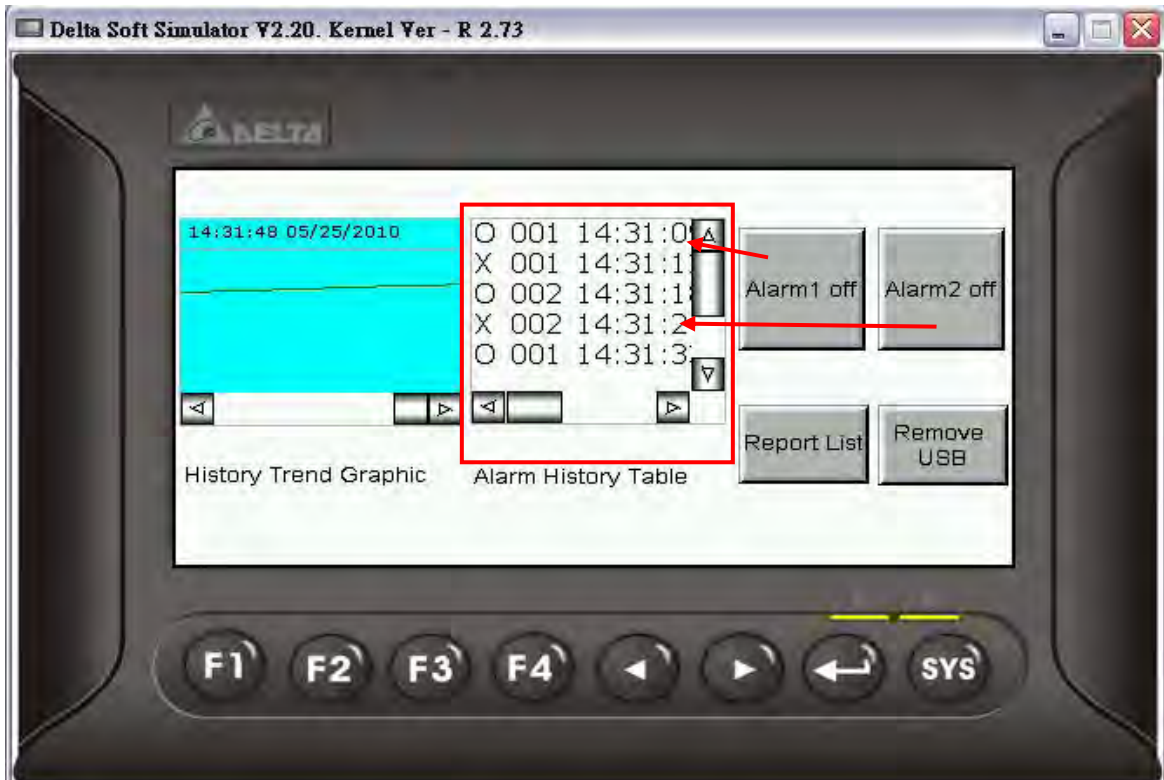
After Report List button is pressed, HMI will transfer the history buffer data and alarm data saved in non-volatile area into the connecting USB disk. When all of the data has been transferred into USB disk, the user can press Remove storage button to remove the USB disk.

Connect the USB disk to user's computer and open it. The user will find an auto-generated file, DopFlash.dft in the USB disk. The user only can use Flash Transfer function to open it.
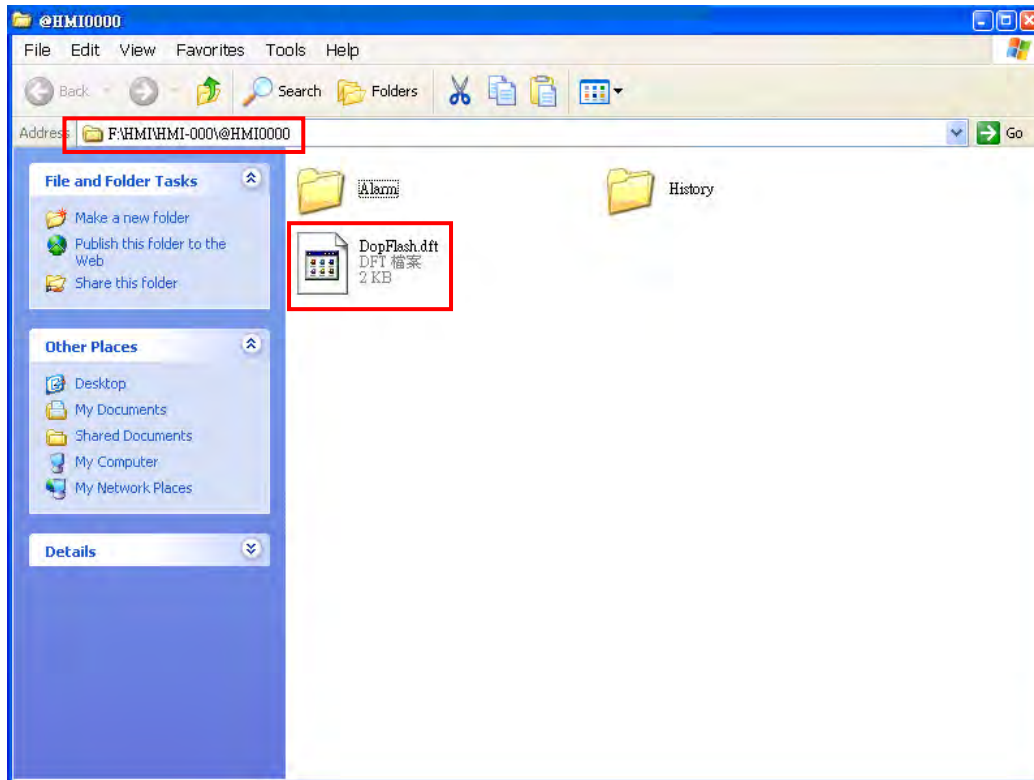
To execute Flash Transfer, select **Start >Programs > Delta Industrial Automation > HMI > Screen Editor 2.00.07 > Flash Transfer** and the following window will open.
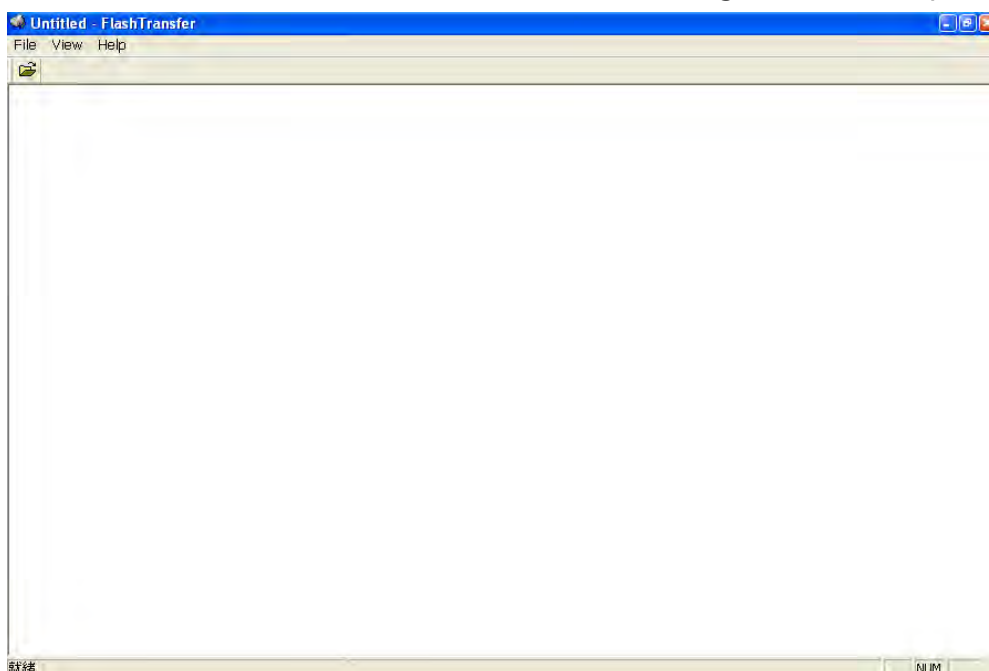
Press Open icon and the following dialog box will show up on the screen.

Select the folder where DopFlash.dft is located.
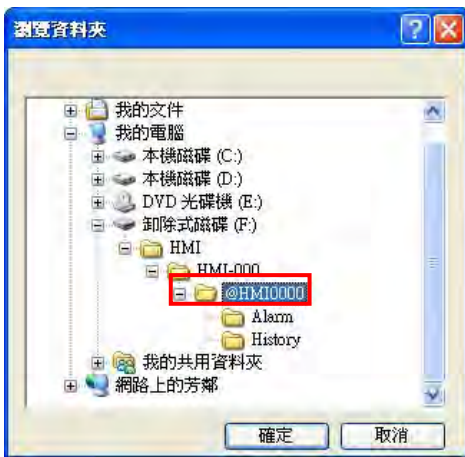
After **OK** button is pressed, the user's screen will look like the figure below.
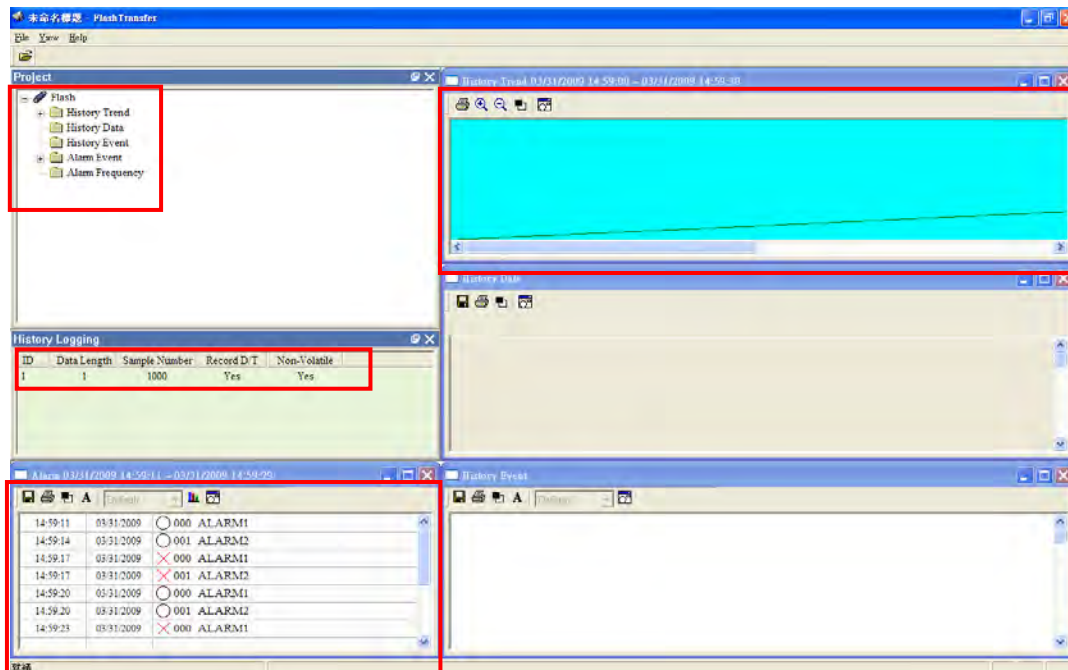
The user can read the exported data from HMI by using Flash Transfer function.

4.6 How to Use Real Image Element

Create a new project first. After pressing [icon] or click **File > New**, it can create a new project and the user will get a dialog box as shown in the following.
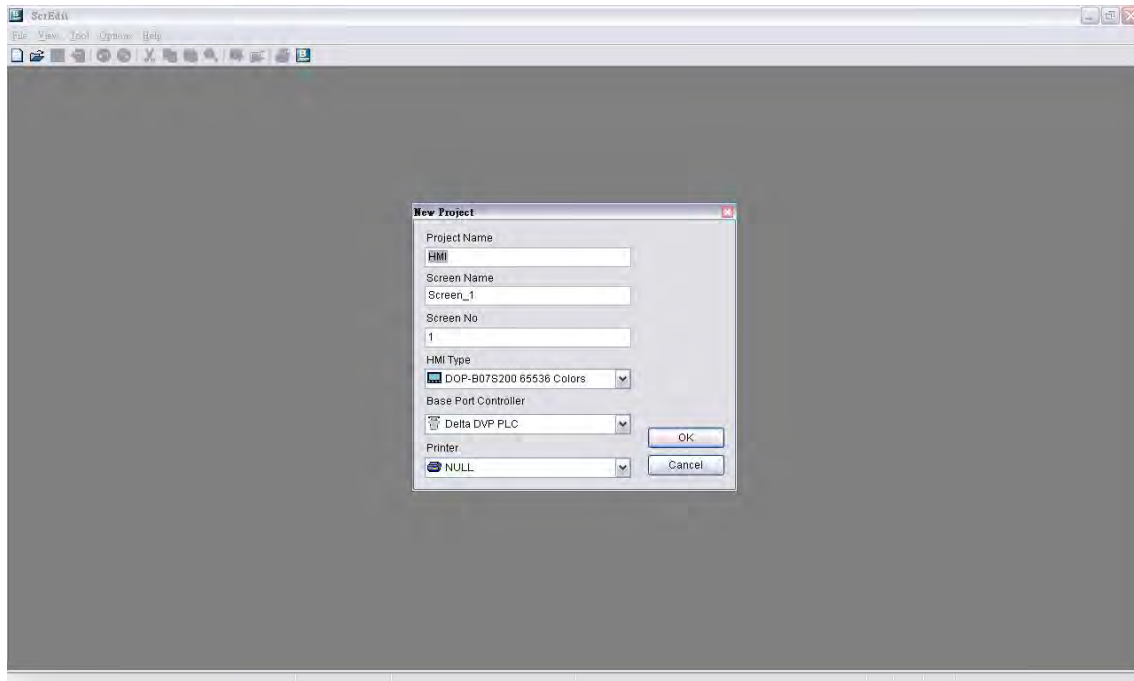
Enter the project name, screen name, screen No. and select connected HMI, controller or printer. Then, click OK. It can create a new project in Screen Editor software program as shown in the following.
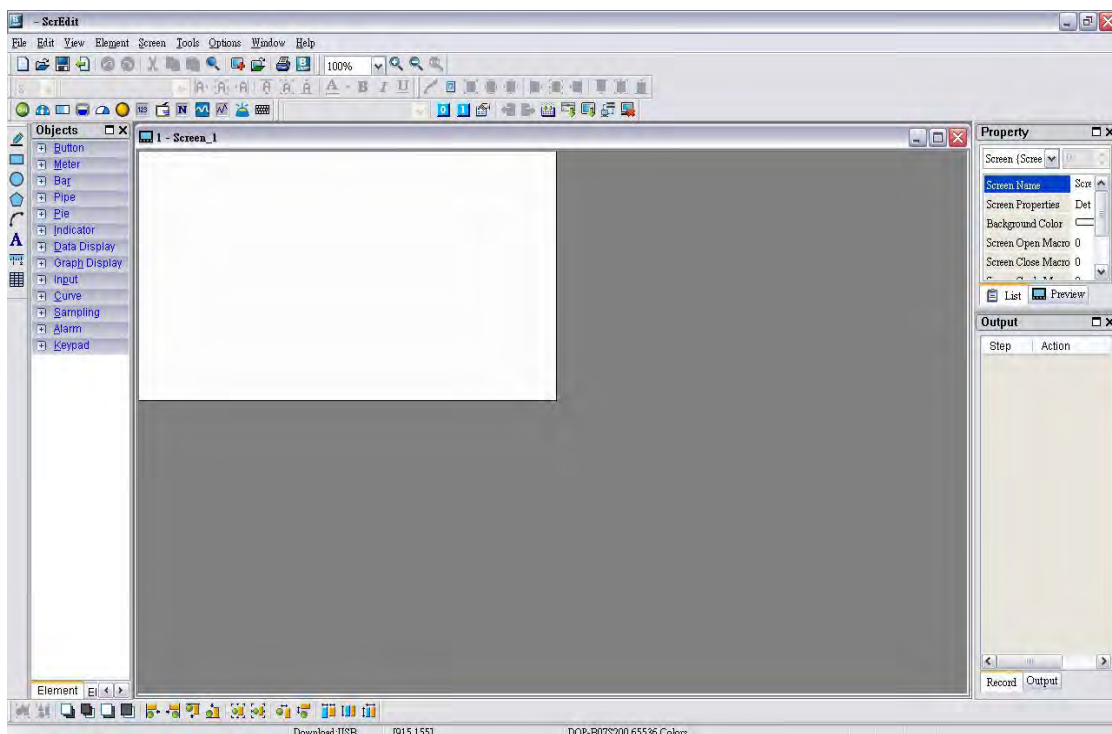
Create a Real Image element on the screen.
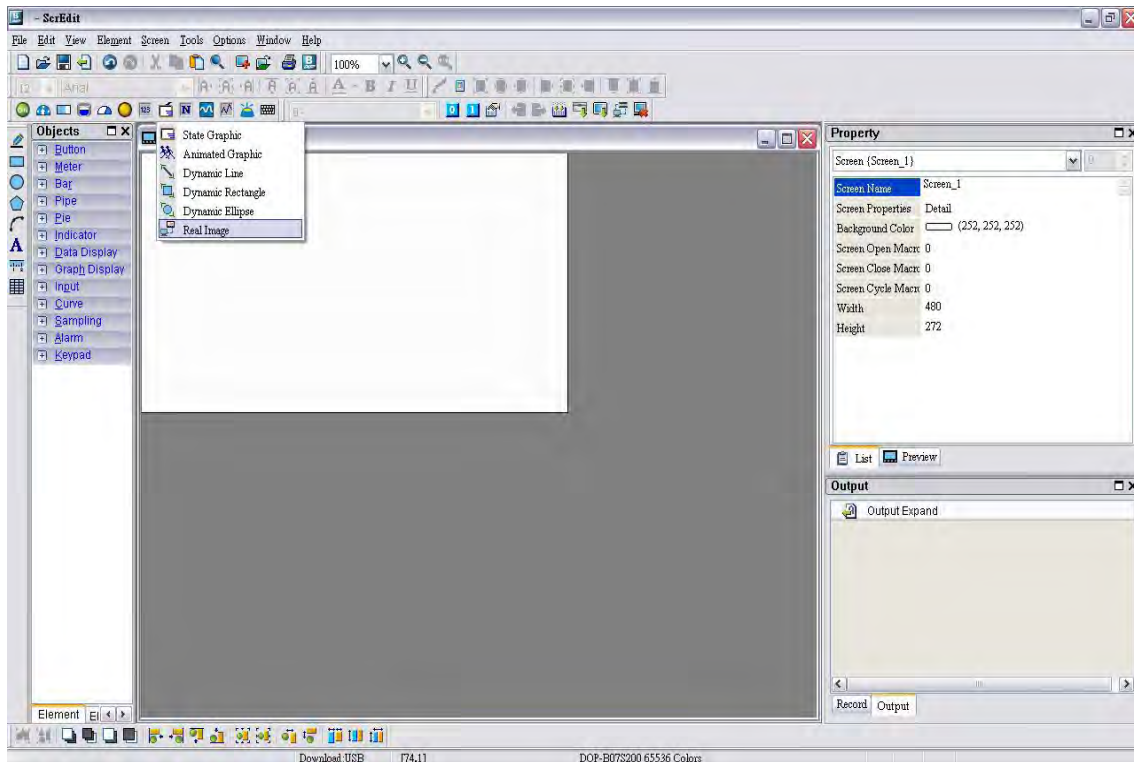
In property settings of the element, set the COM port to **COM1** and the interface to **RS232**.
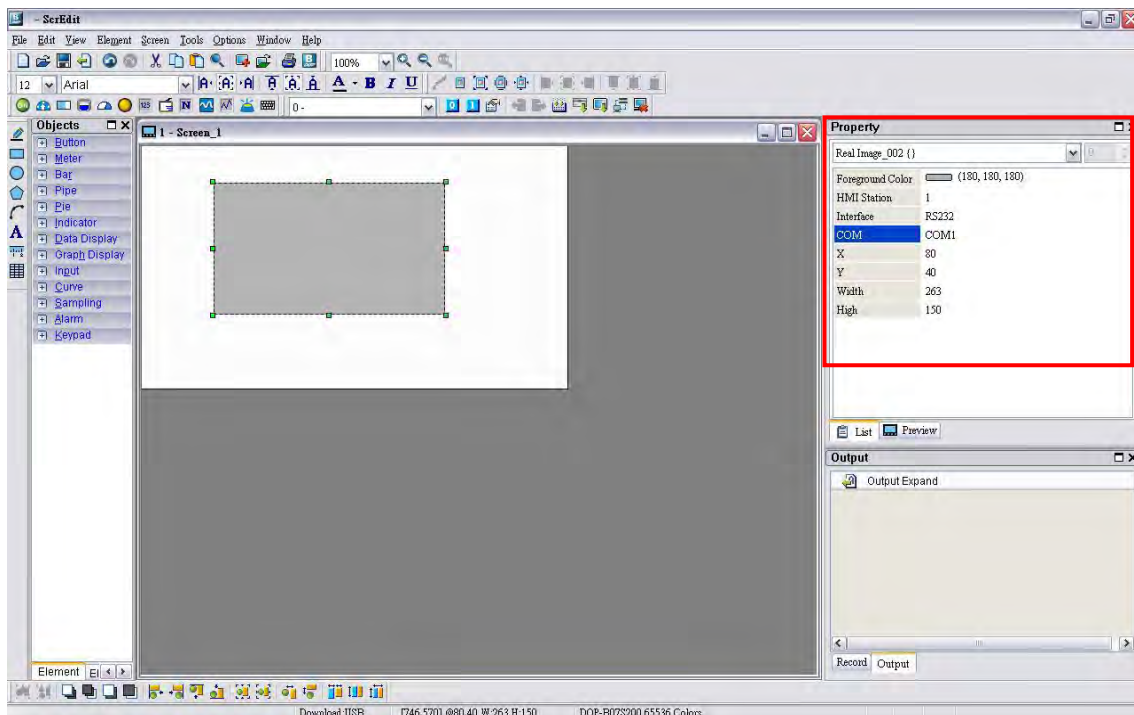
After completing the property settings of the element, click **Tools > Compile** command to perform **Compile** operation and download the screen data to HMI.

Select the picture that the user wants to transfer shown as the figure below.

To transfer the graphic file to HMI, a specified program, TestTransfer.exe is needed. Execute the TestTransfer.exe located at the default directory:

C:\Program Files\Delta Industrial Automation\Screen Editor 2.00.07\Utility\ImgTrans
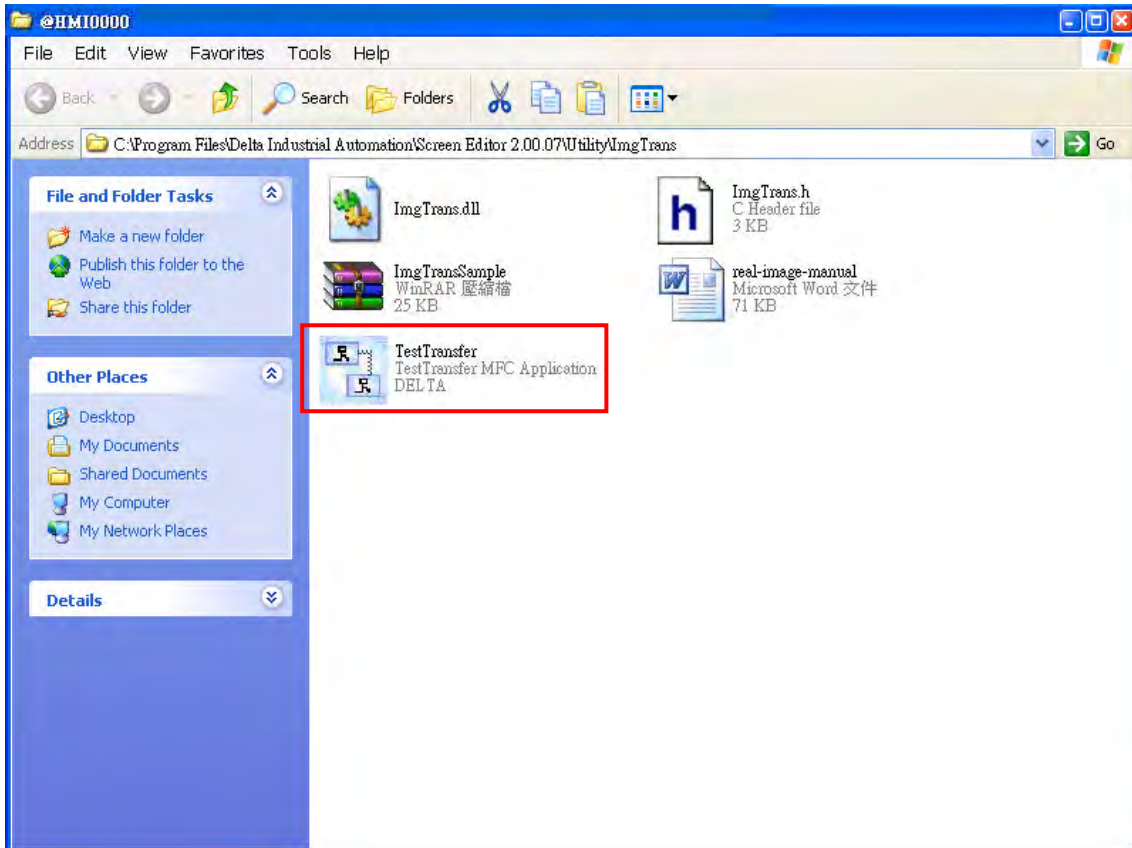
After double-clicking TestTransfer.exe, the following dialog box will appear.

Select the communication protocol and interface, and set the file path of the image. Then, press Transfer button to transfer the image.
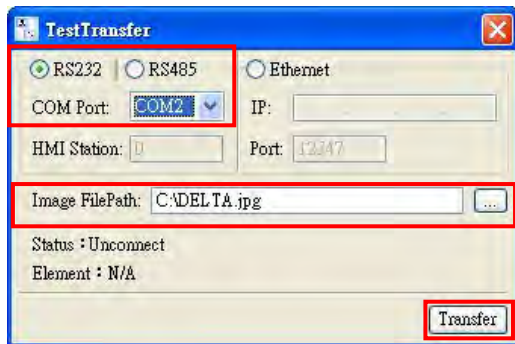
If the image has been transferred successfully, the words, **Connect Success** will show in the dialog box.
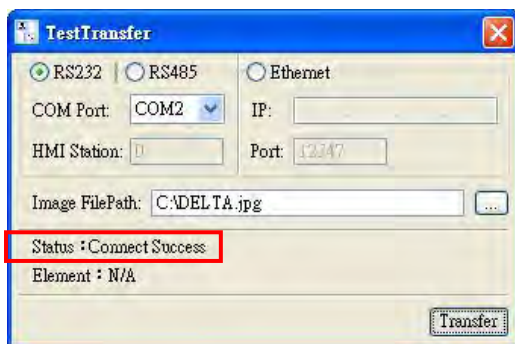
If the transmission has failed, the following error messages will pop up on the screen. At this time, please examine the settings and check if all wirings are well-connected.
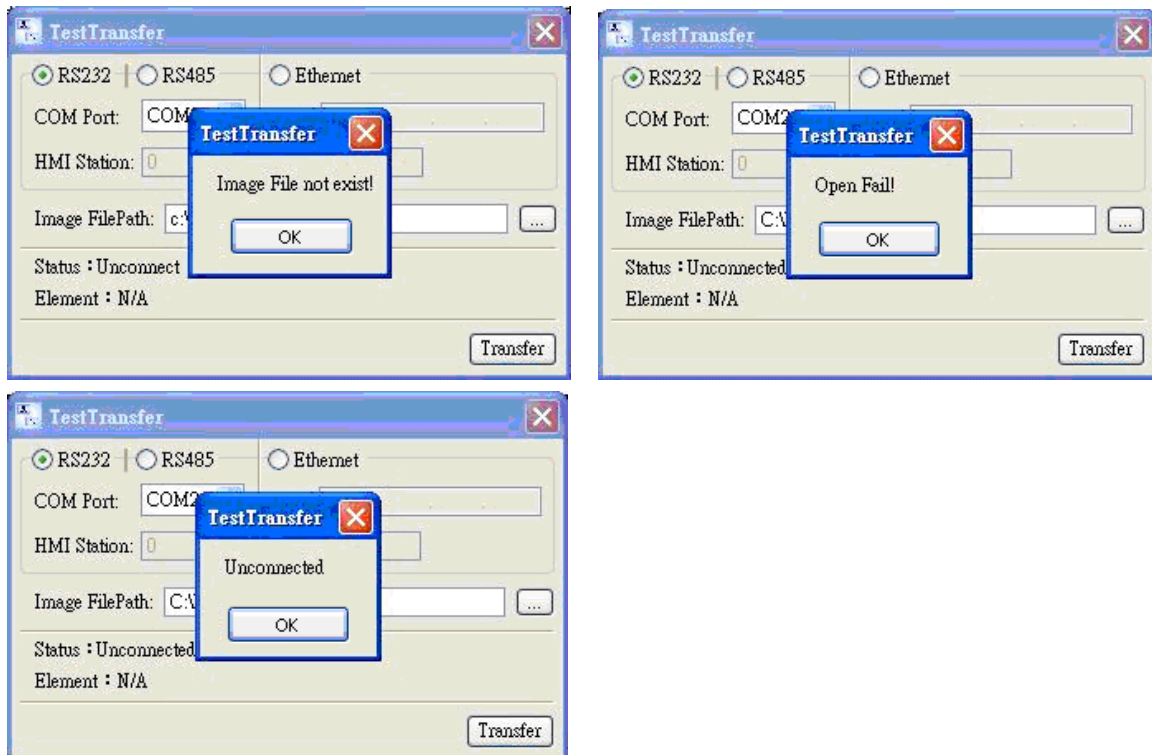
When the image has transferred into HMI successfully, the user's HMI screen will look like the figure below.

4.7   How to Create a Curve Element

Create a new project first. After pressing ⬜ or click **File > New**, it can create a new project and the user will get a dialog box as shown in the following.
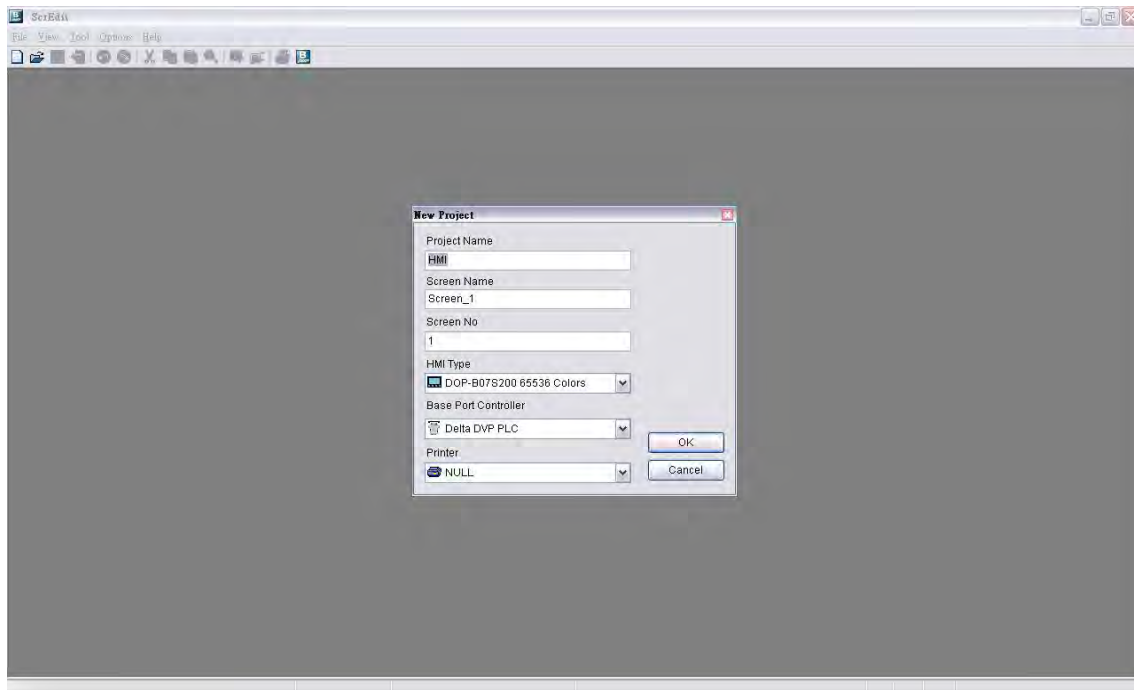
Enter the project name, screen name, screen No. and select connected HMI, controller or printer. Then, click OK. It can create a new project in Screen Editor software program as shown in the following.
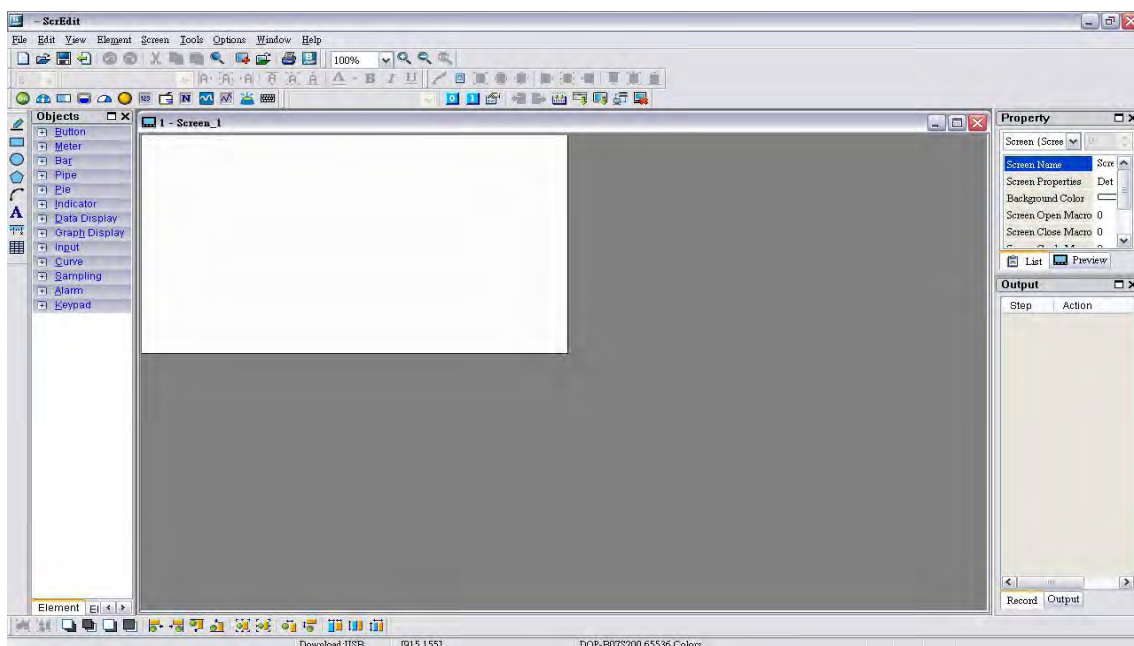
Click **Options > Configuration**, select **Control Block** tab and enable **Auto reset flags** function. To control the element, in this example, Control Address is set to $0 and the Length is set to 8. After complete the above settings, the user's screen will look like the figure shown below.
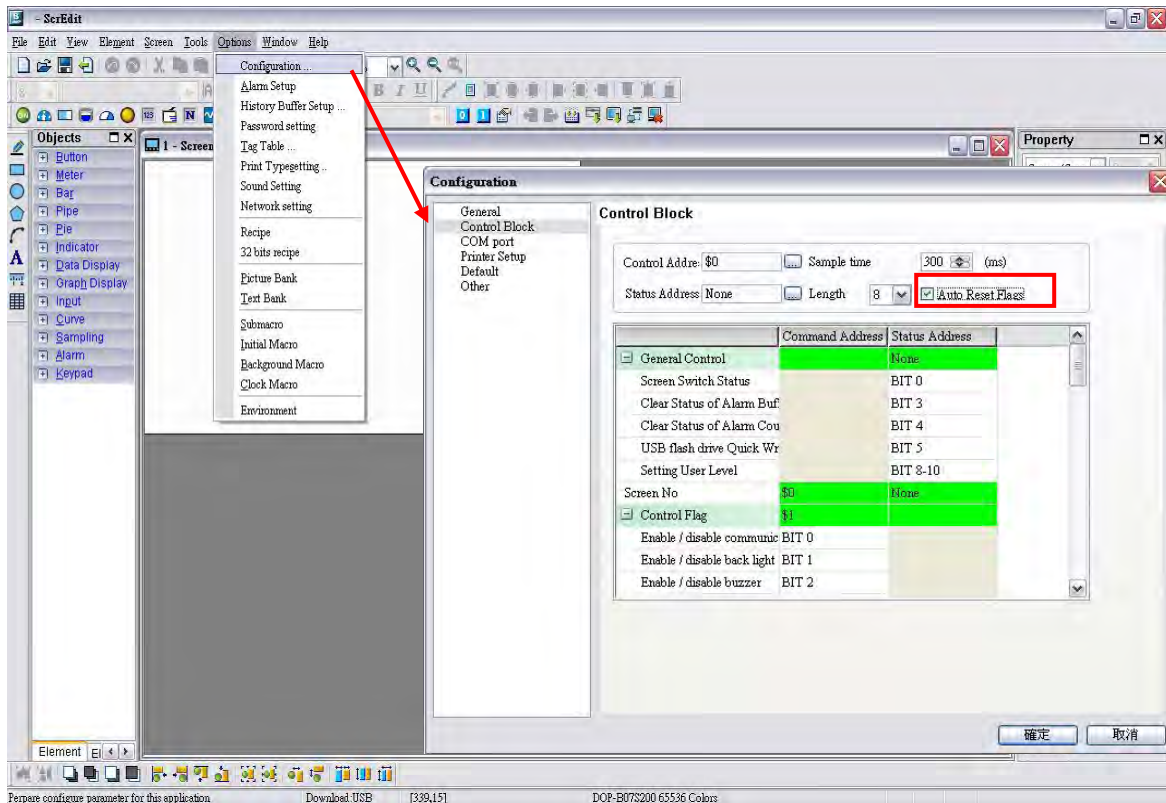
Ensure to check the Auto reset flags box. If this box is unchecked, the user will be required to reset the flags.

Create a trend graph element. Set the Sample Flag to 1, Sample Number to 5, and Read Address to $100. The user's screen will look like the figure shown below.
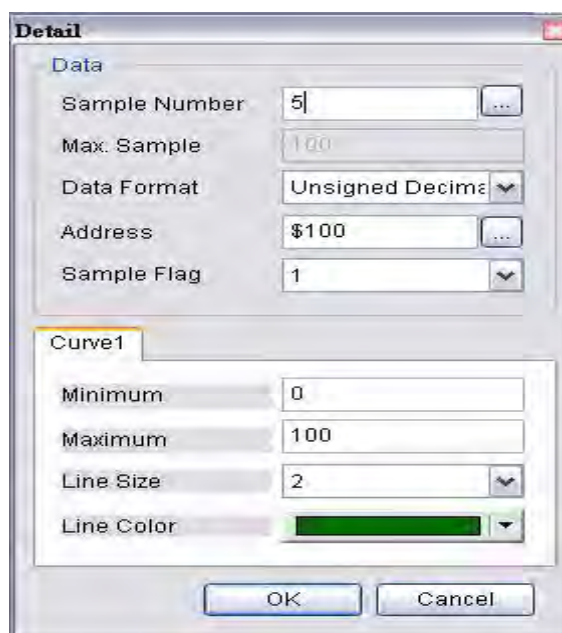
As the read address is set to Internal Memory $100, the sampling point will be $100、$101、 $102、$103 and $104. When Sample Flag is set to 1, it indicates that the sampling is enabled by the Control Block $2.0.

Next, create five numeric entry elements which are used to input the value into $100~$104. Then, create a Set ON button element (Draw button) to trigger the sample flag of the trend graph.
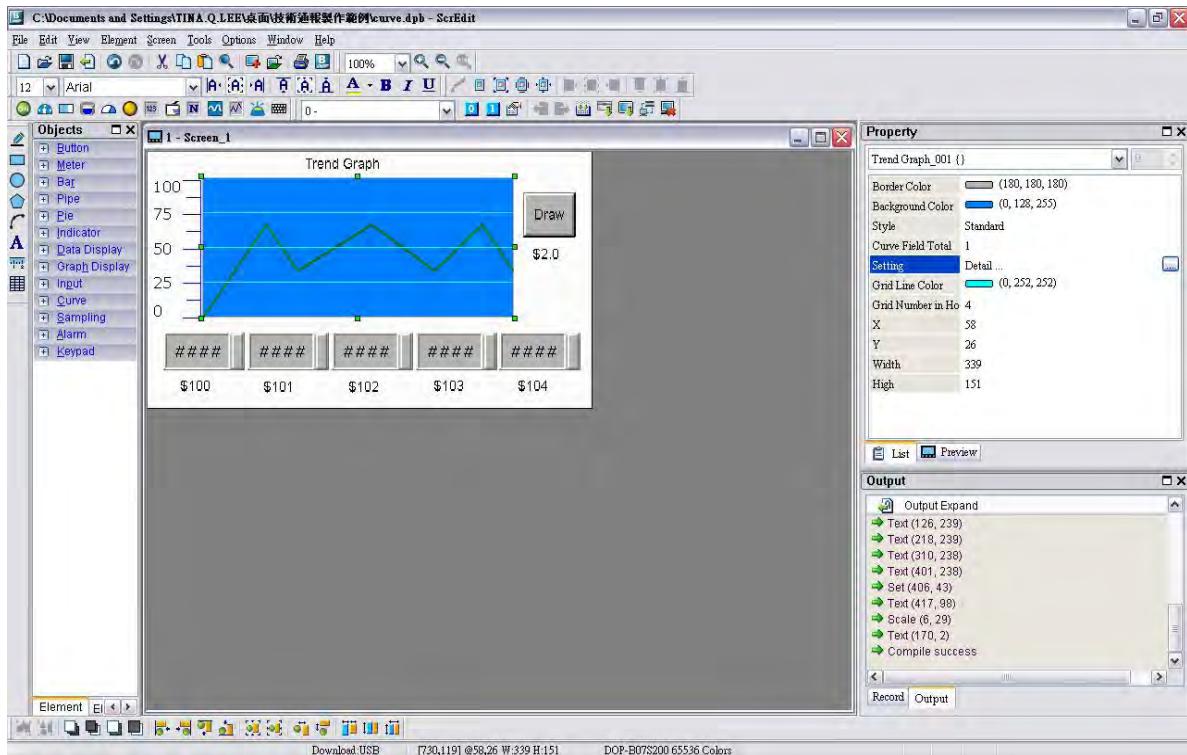
Click **Tools > Compile** command to perform **Compile** operation and download the screen data into HMI.

When sampling operation is performed, after the value is input into $100~$104, the HMI screen will look like the figure below.
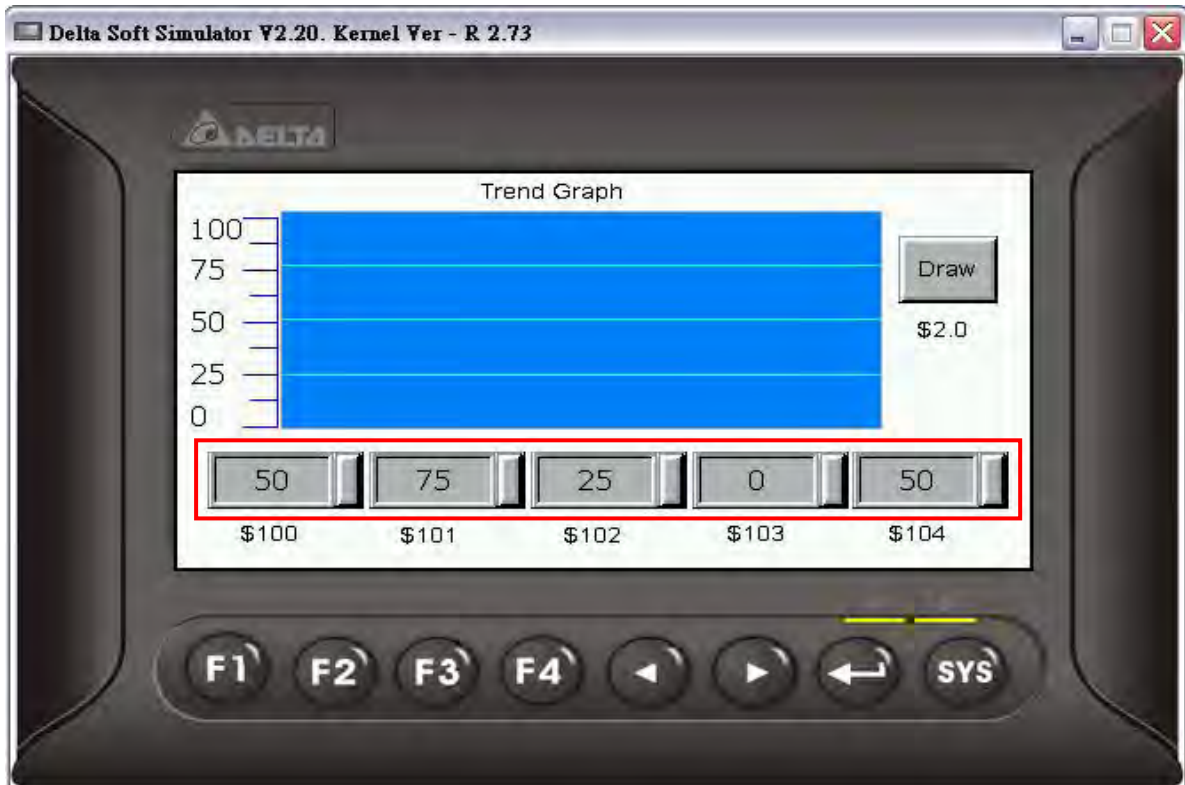
Then, the user can press Draw button to get the Trend Graph shown in the following figure.
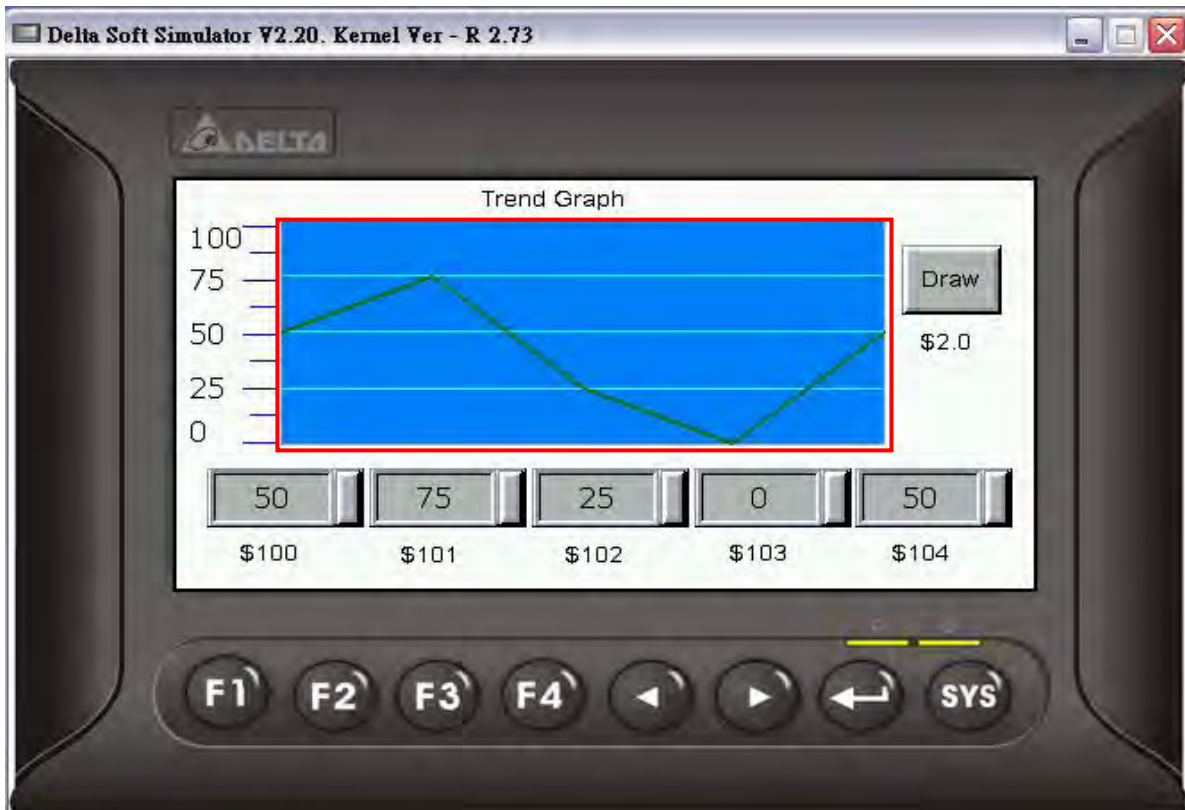
Chapter 5 System Me1B2Bnu

5.1 System Menu Introduction

➢ **Access System Menu**

1. Press **SYS** key on HMI panel for two seconds.
2. Then press the display area on HMI screen
3. The System Menu will then be displayed as shown the figure below.

➢ **Exit System Menu**

Press SYS button again for two seconds and the user can exit the system menu and return to the user screen.

➢ **Operating Methods**

1. The user can touch the icon on the screen directly to bring up the selected function screen.
2. The user can press the function keys on HMI panel to select the desired function.

   Pressing is able to select the desired icon. Pressing is able to enter into the selected option.
   If the system menu is not selected, the ground color of the icon will be white color, e.g.
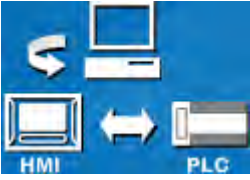
   . If the system menu is selected, the ground color of the icon will be changed to

   yellow color, e.g. .

> ➢ **System Menu Flowchart**

		TP Delay	Set delay time of touch screen
		TP Force	Set pressing force of touch screen
	Touch Panel	TP Calibrate	Touch screen calibration
		Date	Set the date
	Date/Time	Time	Set the time
		Alarm Clock	Set the alarm clock (Reserved)
System Setting		Contrast	Adjust the contrast (Reserved)
	Display	Brightness	Adjust the brightness (Reserved)
		Gamma	Adjust LCD Gamma value

			HMI	Format HMI
		Formatting	USB Disk	Format USB disk (Reserved)
	File Manager		CF Card	Format CFcard (Reserved)
			SD Card	Format SD card (Reserved)
		Copy File		Copy the screen data file

System Setting	**File Manager**	**Multi-Screen File**	Multi boot display setting	
	MISC.	Miscellaneous settings		
	Security	Password table setup		
	Audio	**Volume**	Volume adjustment (Reserved)	
		Buzzer	Buzzer sound effect	
	COM Port	Communication port		
Up/Download	**Standard Mode**	**COM1**	COM1 upload/download	
		COM2	COM2 upload/download	
	Bypass Mode	Mode 1	COM1 → COM2 Bypass	
		Mode 2	COM1 → COM3 Bypass	
		Mode 3	COM2 → COM1 Bypass	
System Info	**System Message**		Next Page	
			Previous Page	
HMI Doctor			White Screen Test	
			Black Screen Test	
			Red Screen Test	
			Green Screen Test	
			Blue Screen Test	

HMI Doctor		Draw Line Test
		Buzzer/LED Test
		ADC Test
		USB Test
		Key Test
		Color Screen Test

5.2   System Setting Menu

When the ground color of the screen is in grayscale, it indicates that this is a preview window and it displays the setting screen. Clicking the icon directly is able to enter into the menu. After clicking the desired icon, a menu bar in blue ground color will show up at the bottom of the screen immediately.

Return to System Menu

Pressing ◄ ► can switch the menu options. When the ground color of the option is in yellow, it indicates that this option is selected, e.g. [icon]. When the ground color of the option is in blue, it indicates that this option is not selected, e.g. [icon].

1.   **Touch Panel**

➢   The Touch Panel option under System Setting menu provides Set delay time of touch screen, Set pressing force of touch screen and Touch screen calibration, etc. functions as the figure shown below.
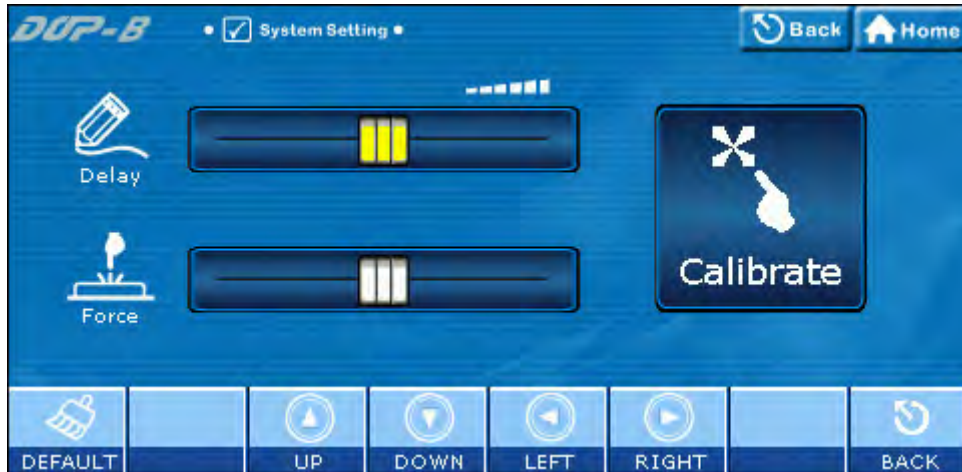
This is the function menu bar. is used to recover the default setting,   options are used to cycle through the options,

 are used to change the setting values of the selected option and

 is to exit this setting page.

➢   Cross Reference of Function Keys and Screen Icons

| DEFAULT	UP	DOWN	LEFT	RIGHT	BACK
F1	F3	F4	◄	►	SYS

1.1 ✎ TP Delay – Set delay time of touch screen

This option is used to set the sensitivity of the touch screen. This means that the user can speed it up or slow it down, based on user's own preference. Touching **RIGHT** icon is to decrease the delay time and speed the screen sensitivity up. Touching **LEFT** icon is to increase the delay time and slow it down.

1.2 TP Force – Set pressing force of touch screen

This option is used to set the pressing force of the touch screen. Touching **LEFT** icon is to reduce the pressing force to allow the user to enable the icon more easily. Touching **RIGHT** icon is to strengthen the pressing force to make the user not to enable the icon so easily.

1.3 Calibrate – Touch screen calibration

This option is used to calibrate the touch screen to ensure accuracy of the touch areas. There are three points on the touch screen that the calibration is based around. When entering into the Calibrate function, the user will find three front sight icons ✳ on the top-left, bottom-right, and the center of the screen. Please touch these three icons in turn to calibrate the touch panel.

✎ NOTE

Please note that if the user does not touch the ✳ on the center of these three calibration positions, a bigger position error may occur. Therefore, we recommend the user to use the specified touch pen to perform the calibration. Please refer to the following figures for correct calibration steps.
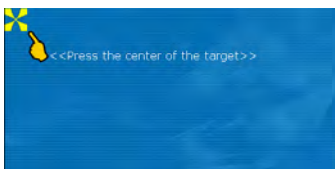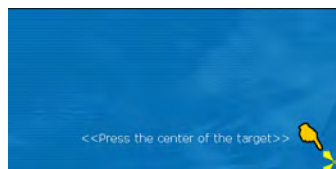
Step 1	Step 2	Step 3
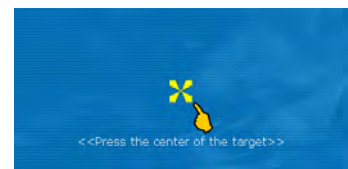
2.   **Date/Time**

➢   Set the date and time of HMI. Each touch of Up and Down icons is to increment and decrement the value by 1. Please note that the selected option will be lit in red color as shown the figure below.

This is the function menu bar. ◀ ▶ are used to cycle

through the date and time settings, ▲ ▼ are used to change

the setting values of the date and time, 🧹 is used to cancel

the setting, and ↻ is to exit this setting page.

➢   Cross Reference of Function Keys and Screen Icons

🧹 CANCEL	▲ UP	▼ DOWN	◀ LEFT	▶ RIGHT	↻ BACK
F1	F3	F4	◀	▶	SYS

2.1 **Date – Set the date**

 Set the values for the calendar fields Year, Month, Day of Month in

order by touching **UP** and **DOWN** icons.

2.2 🕐 **Time – Set the time**

`14` `14` `58` Set the values for the clock fields Hour, Minute, Second in order by touching **UP** and **DOWN** icons.

2.3 🔔 **Alarm Clock – Set the alarm clock (Reserved)**

3. 📺 **Display (LCD Display)**

➢ This option is used to set the LCD display settings. When the ground color of the option is in black, it indicates that this option is reserved and cannot be set. Please refer to the figure below:

This is the function bar. 🧹 is used to recover the default setting, 🔼 🔽 are used to cycle through the options, ◀ ▶ are used to change the setting value, and ↩ is used to exit this setting page.

➢ Cross Reference of Function Keys and Screen Icons

🧹	🔼	🔽	◀	▶	↩
DEFAULT	**UP**	**DOWN**	**LEFT**	**RIGHT**	**BACK**
F1	F3	F4	◀	▶	SYS

3.1 ◐ **Contrast – Adjust the contrast (Reserved)**

3.2 ☀ **Brightness – Adjust the brightness (Reserved)**

3.3 ◩ **Gamma – Adjust LCD Gamma value**

4. ▤ **File Manager**

➢ For the functions provided by File Manager, please refer to the figure below:
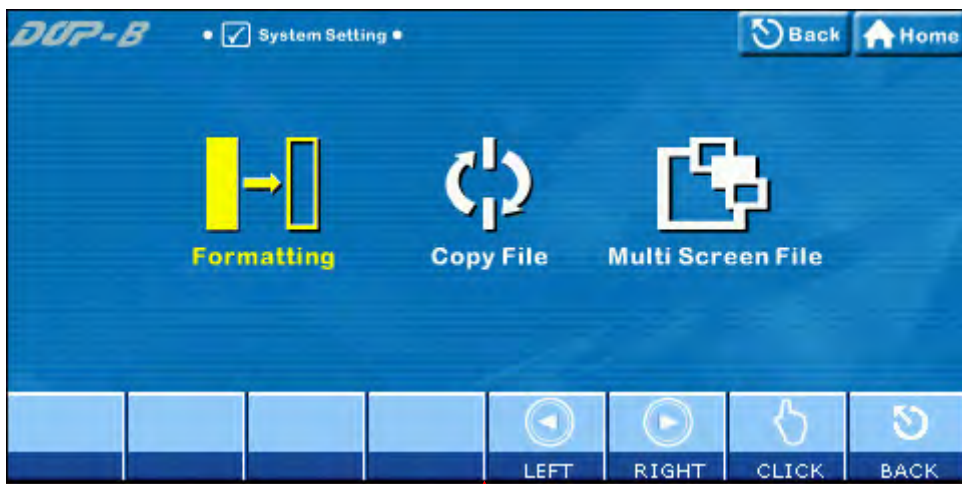
This is the function bar. ◀ ▶ are used to cycle through the functions, 👆 is used to choose the desired functions, and ↺ is used to exit this setting page. When the ground color of the option is in yellow, it indicates that this option is selected, e.g. ⊩.

➢ Cross Reference of Function Keys and Screen Icons

◀	▶	👆	↺
LEFT	**RIGHT**	**CLICK**	**BACK**
◀	▶	↵	SYS

4.1 Formatting

This option is used to format the HMI internal memory or external memory. If the ground color of the icon on the screen is in black, it indicates that this option is reserved and cannot be set.

➢ Cross Reference of Function Keys and Screen Icons

HMI	USB	CF	SD	BACK

4.1.1 HMI – Formatting HMI

Touching icon or press function on HMI panel, a confirm dialog box will display on the screen to ask if the user wants to format HMI memory. Press Sure button is to format HMI memory directly and press Cancel is to cancel the formatting operation.

4.1.2 USB Disk – Format USB disk (Reserved)

4.1.3 CF Card – Format CF card (Reserved)

4.1.4 SD Card – Format SD card (Reserved)

4.2 [icon] Copy File – Copy the screen data file

This option is used to copy the files between internal and external memory. When using this option, entering a highest priority password is needed.

Source Directory Location

Designation Directory Location
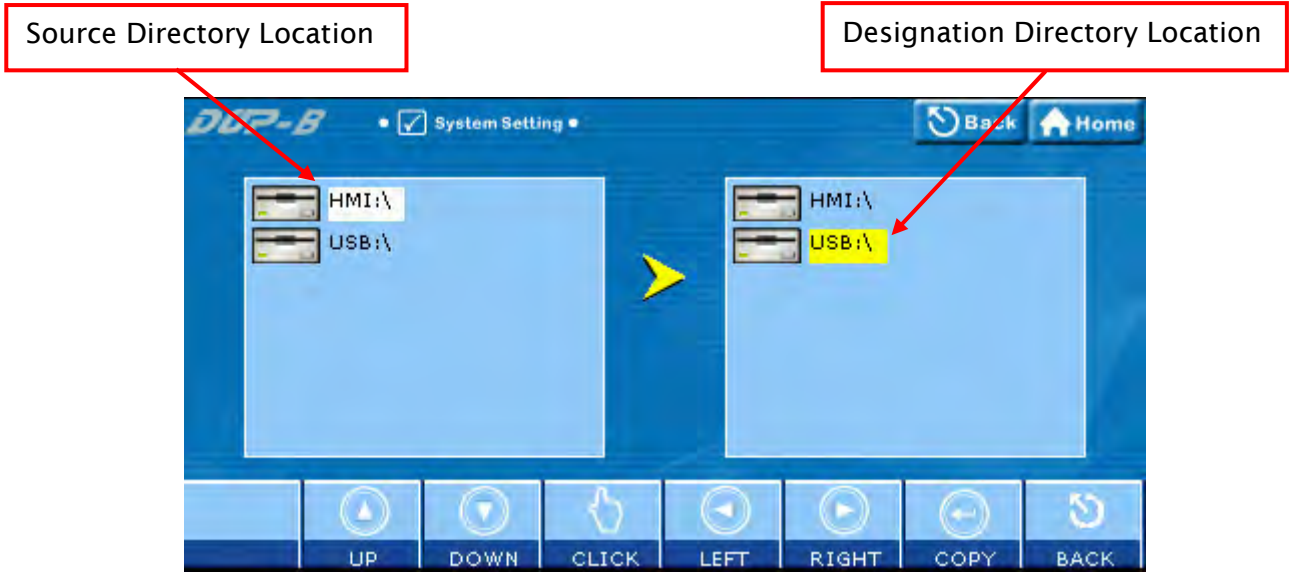
[icon] [icon] are used to cycle through the source/designation directory location,

[icon] [icon] are used to move the disk, [icon] is used to accept the changes, [icon]

is used to copy the files, and [icon] is used to exit this setting page.

➢ Cross Reference of Function Keys and Screen Icons

UP	DOWN	CLICK	LEFT	RIGHT	COPY	BACK
F2	F3	F4	◄	►	←	SYS

➢ Notes

● HMI does not allow the user to copy the disk directly.

● Regarding the file directories, only HMI-000 ~ HMI255 are provided.

● When copying the files, it is recommended to remove the designation directory first and then copy the file source directory.

- When New… is selected, HMI will search the unused directory from HMI-000 and HMI-255 and create a designation directory for use.

- If the screen data file in the source directory is password protected, HMI will ask the user to enter the highest priority password or the copy function cannot be executed.

4.3 Multi-Screen File – Multi boot display setting

This option is used to set the boot display of the screen data files saved in HMI internal and external disk.

Screen data file directory

Preview window
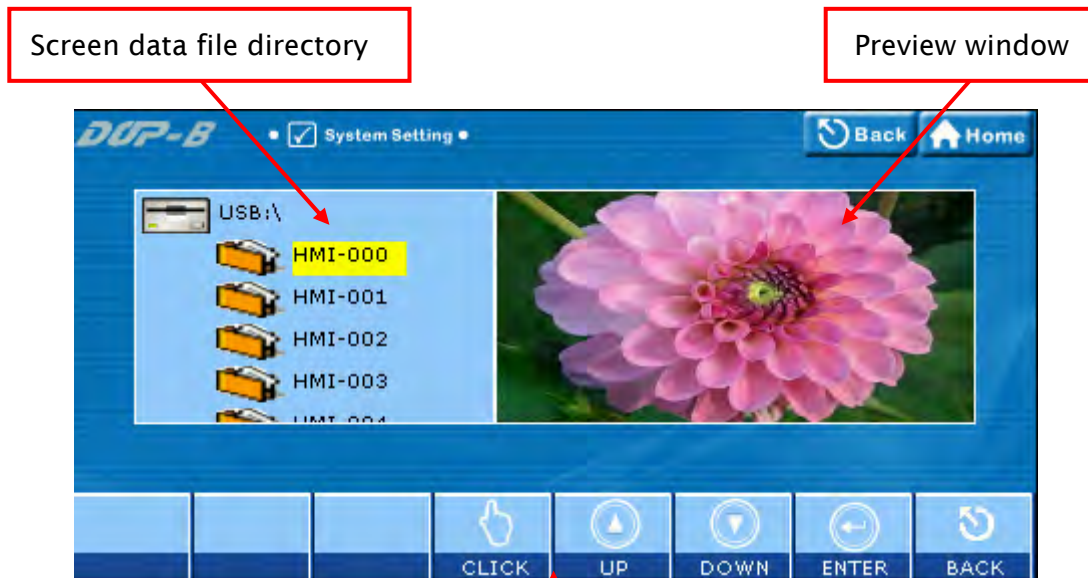
are used to cycle through the file directories, is used to select the desired directory, is used to determine the setting, i.e. set the selected directory to be the directory of boot display, and is used to exit this setting page.

➢ Cross Reference of Function Keys and Screen Icons

CLICK	UP	DOWN	ENTER	BACK
F4	◀	▶	↵	SYS

➢ Notes

- Regarding the file directories, only HMI-000 ~ HMI255 are provided.

- When HMI is powered on and started, if the directory of the boot display is missing, HMI will automatically use the screen data file but will not change the file directory of the boot display. Therefore. If the directory of the boot display is found at next startup, HMI will use it as the default boot display still.

- When the directory of the boot display is stored in the external memory, the non-volatile data will be saved in the directory of the boot display no matter the non-volatile data is set to be saved in internal or external memory.

5.   MISC (Miscellaneous settings)

➢ The settings include the followings:

- Touch Cursor

- ScreenSaver Time

- Boot Delay Times

- Default Language

- Blue LED Function Mode

- Boot Display

> Cross Reference of Function Keys and Screen Icons

DEFAULT	UP	DOWN	LEFT	RIGHT	BACK
F1	F3	F4	◀	▶	SYS

6. **Security (Password table setup)**

> This option is used to set HMI password security level. The highest level is 7 and the lowest level is 0. When this password table is opened, the user can only view or change passwords with security levels lower than the user's. Users cannot change or view those passwords with higher security settings. However, if the user has the highest priority password, then he/her can view and change all the password settings.

▲ ▼ are used to move the password security level.
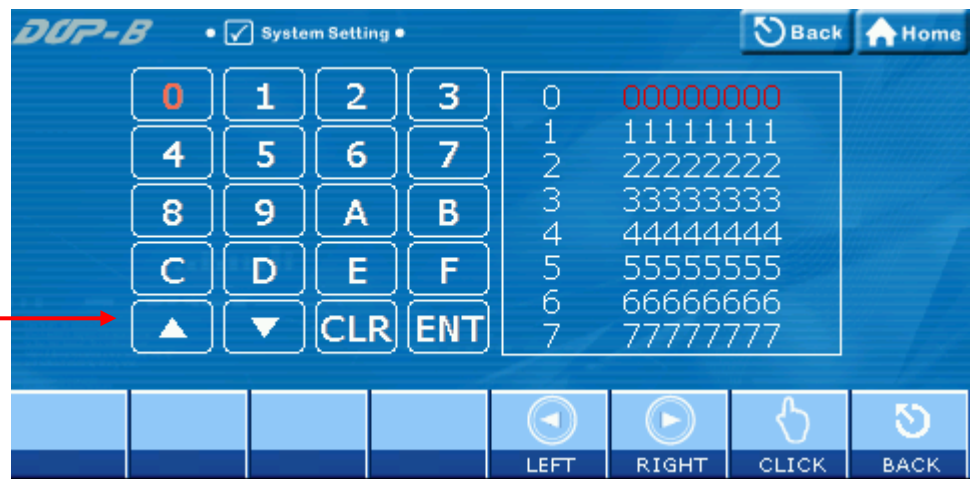
◀ ▶ are used to move the selected button, 👆 is used to press the button, and ↺ is used to exit this setting page.

> Cross Reference of Function Keys and Screen Icons

LEFT	RIGHT	CLICK	BACK
◀	▶	↵	SYS

7. 🔊 **Audio**

> ➢ For the functions provided by this option, please refer to the figure below:

> This is the function bar. 🖌 is used to recovery the default setting, 🔼
>
> 🔽 are used to cycle through Volume and Buzzer options, ◀ ▶ are
>
> used to change the setting values, and ↻ is used to exit this setting page.

> ➢ Cross Reference of Function Keys and Screen Icons

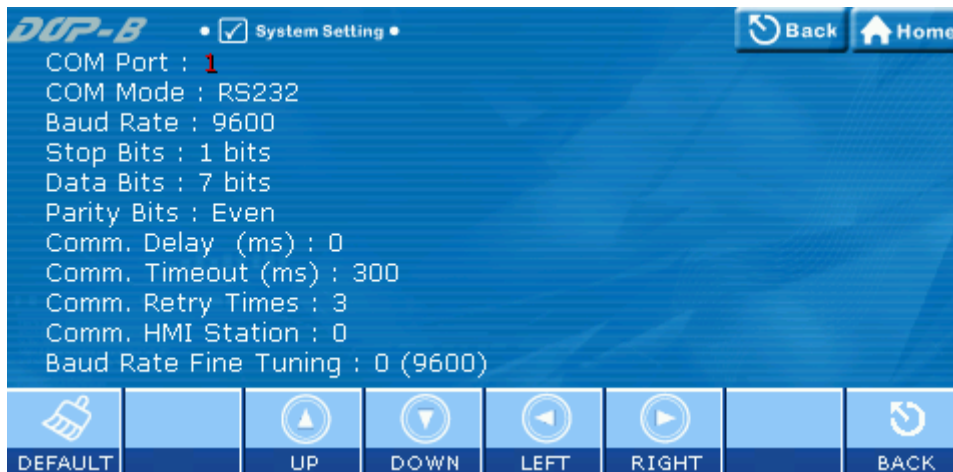| 🖌	🔼	🔽	◀	▶	↻
DEFAULT	**UP**	**DOWN**	**LEFT**	**RIGHT**	**BACK**
F1	F3	F4	◀	▶	SYS

7.1 🔊 Volume – Volume adjustment (Reserved)

This option is used to adjust the volume. Touching **LEFT** icon is to decrease the volume and touching **RIGHT** icon is to increase the volume.

7.2 🐝 Buzzer – Buzzer sound effect

This option is used to adjust the buzzer sound. Touching **LEFT** icon is to decrease the buzzer sound and touching **RIGHT** icon is to increase the buzzer sound.

8. 🖳 **COM Port**

> ➢ For the functions provided by this option, please refer to the figure below:

This is the function bar. 🖌 is used to recover the default setting, 🔼

🔽 are used to cycle through the options, ◀ ▶ are used to change

the setting value, and ↺ is used to exit this setting page.

> ➢ Cross Reference of Function Keys and Screen Icons

DEFAULT	UP	DOWN	LEFT	RIGHT	BACK
F1	F3	F4	◀	▶	SYS

5.3 Up/Download Menu

➢ There are two kinds of communication modes when connecting HMI to PC through COM serial port.
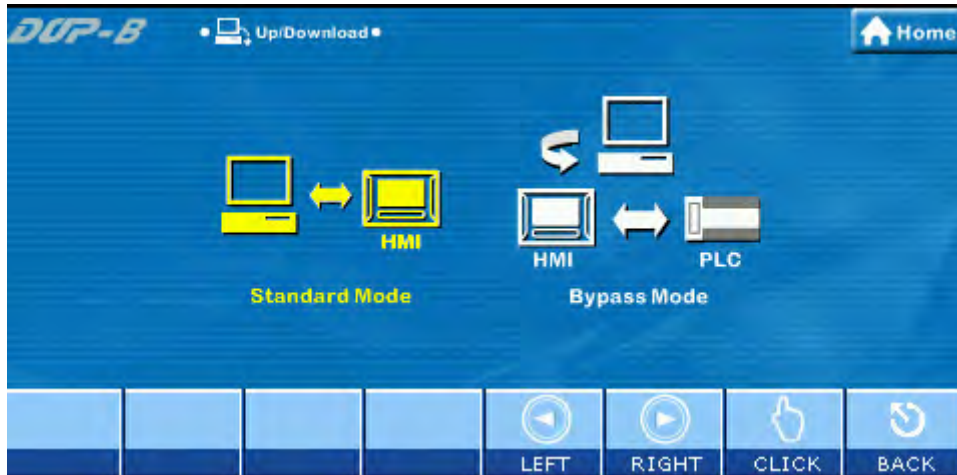
    1. Standard Mode

    2. Bypass Mode

➢ Cross Reference of Function Keys and Screen Icons

LEFT	RIGHT	CLICK	BACK

1. **Standard Mode**

     ➢ When this mode is selected, COM serial port is connected to PC directly and the data upload and download is performed through Screed Editor software program. There are COM1 and COM2 two communication ports for selection.
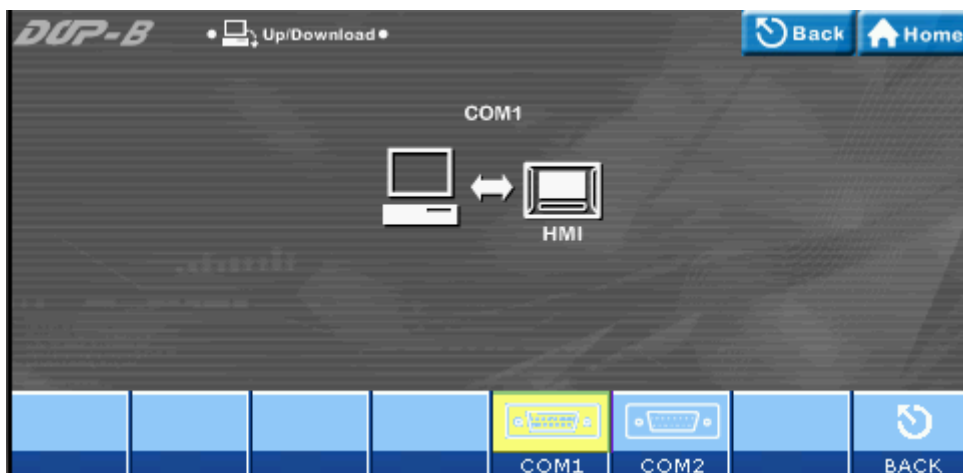
➢ Cross Reference of Function Keys and Screen Icons

COM1	COM2	BACK
F3	F4	SYS

1.1 ⬚ COM1 (COM1 upload/download)

When COM1 is set, it indicates that the data transfer will be accessed through this COM serial port via the settings of Screen Editor software program.

1.2 ⬚ COM2 (COM2 upload/download)

When COM2 is set, it indicates that the data transfer will be accessed through this COM serial port via the settings of Screen Editor software program.

2. ⬚ Bypass Mode -

➢ Using the Bypass mode, the data transferred by the PC can be received by the HMI COM ports and then sent to another COM port of the HMI to the PLC. When planning the system, the user can use this function to update the program of the PLC immediately. For example, when COM1 port of the HMI is connecting to the PLC, and the PLC program needs to be updated during operation, the user can select Bypass mode to transfer the new PLC program in the PC to the HMI via the COM2 port of the HMI and then download the new PLC program to the PLC via the COM1 port of the HMI.

> ➢　Cross Reference of Function Keys and Screen Icons

Mode 1	Mode 2	Mode 3	◀	▶	↵	↺
1 → 2	1 → 3	2 → 1	LEFT	RIGHT	ENTER	BACK
F2	F3	F4	◀	▶	↵	SYS

2.1　Mode 1 – COM1 → COM2 Bypass

When this mode is selected, it indicates COM2 port of HMI is connected to the PLC, the user can transfer the data in the PC to the HMI via COM1 port of the HMI and then transfer the data to the PLC via the COM2 port of the HMI (COM1 is the data source port and COM2 is the data transfer port).

2.2　Mode 2 – COM1 → COM3 Bypass

When this mode is selected, it indicates COM3 port of HMI is connected to the PLC, the user can transfer the data in the PC to the HMI via COM1 port of the HMI and then transfer the data to the PLC via the COM3 port of the HMI (COM1 is the data source port and COM3 is the data transfer port).

2.3　Mode 3 – COM2 → COM1 Bypass

When this mode is selected, it indicates COM1 port of HMI is connected to the PLC, the user can transfer the data in the PC to the HMI via COM2 port of the HMI and then transfer the data to the PLC via the COM1 port of the HMI (COM2 is the data source port and COM1 is the data transfer port).

5.4 System Info Menu

➢ For the functions provided by this option, please refer to the figure below:

Firmware Version

CPU Clock

Model Type

Current Date and Time

Battery Capacity

Flash ROM Sixe

DELTA ELECTRONICS,INC. Copyright
Firmware Version: Ver-2.005
Model Type: DOP-B07S200
Battery(%): 100
FlashRom Size:
CPU Clock:
Checked: D,2008-05-07
Now: 2008-05-07 09:58:47

Connecting External Controller

Connecting USB Interface

Driver 1:None
Driver 2:None
Driver 3:None
No Information about the USB device
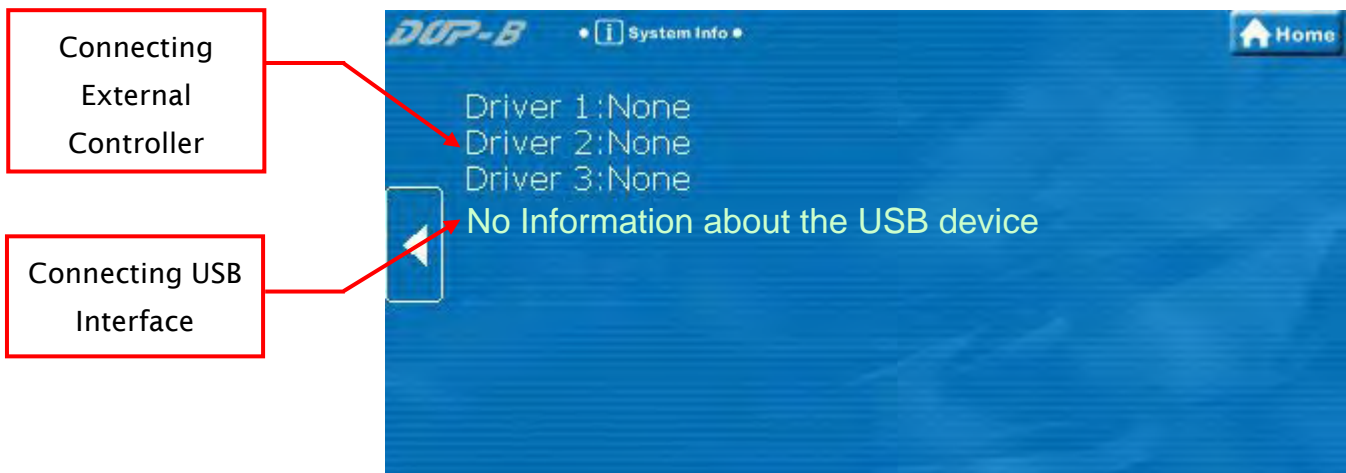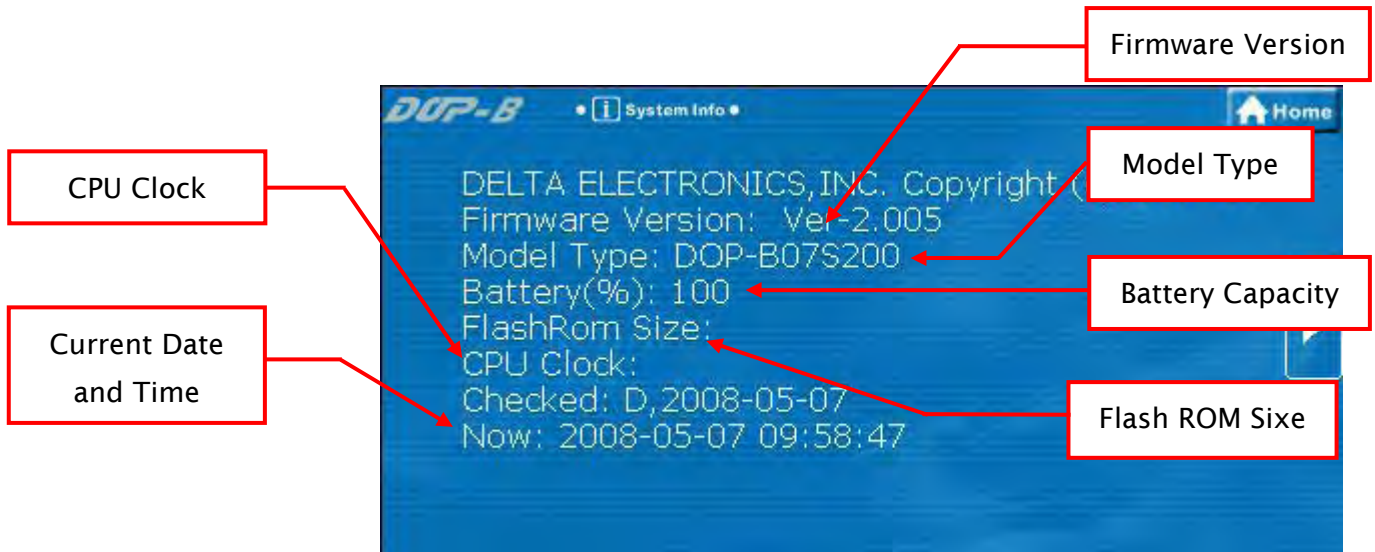
➢ Function Keys

PREVIOUS PAGE	NEXT PAGE	EXIT
◀	▶	SYS

5.5   HMI Doctor Menu

This option provides simple text programs to help the user perform simple and easy hardware testing. There are seven options available: LCD, Touch Panel, Buzzer, LED, USB, ADC Channel, and Hot Key. Please refer to the figure below.

When the ground color of the screen is in grayscale, it indicates that this is a preview window and it displays the setting screen. Clicking the icon directly is able to enter into the menu.

Return to System Menu

When the ground color of the option is in yellow, it indicates that this option is selected, e.g. . When the ground color of the option is in blue, it indicates that this option is not selected, e.g. . Pressing   can switch the menu options.

➢   Function Keys

 are used to cycle through the options, is used to enter into the selected option, and is used to implement HMI Doctor setup.

1. **White Screen Test**

    ➢ This option is used to test and detect if there is any dark pixel (unlit pixel) or the similar defect shown on the screen.

2. **Black Screen Test**

    ➢ This option is used to test and detect if there is any red, blue, green, or white bright pixel shown on the screen.

3. **Red Screen Test**

    ➢ This option is used to test and detect if there is any dark pixel (unlit pixel) or the similar defect shown on the screen.

4. **Green Screen Test**

    ➢ This option is used to test and detect if there is any dark pixel (unlit pixel) or the similar defect shown on the screen.

5. **Blue Screen Test**

    ➢ This option is used to test and detect if there is any dark pixel (unlit pixel) or the similar defect shown on the screen.

6. **Draw Line Test**

    ➢ This option is used to test and detect the displayed drawing line position on the screen and the actual drawing line position of the touch screen. If there is deviation and the deviation is excessive, please use Touch Screen Calibration function to calibrate it.

7. **Buzzer/LED Test**

    ➢ Test if a buzzer sound is heard or not.

    ➢ Test if red, blue and green LEDs is lit or not.

8.   ADC Test

 ➤   Test if ADC channel changes correctly or not. It includes pressing force, system
        voltage and temperature, etc. settings.

9.   USB Test

 ➤   Test if USB disk is connected correctly. Ensure to switch USB Device and USB Host
        when testing.

10.   Key Test

 ➤   Test if the function keys are pressed normally. When pressing ~ keys on
        HMI panel, the corresponding icons will show on the screen. If there is no
        corresponding icon shown on the screen, it indicates this key is damaged.

11.   Color Screen Test

 ➤   Color level and saturation test

Appendix A List of Functions Added

A.1 New Macro Commands

■ **EXPORT**

The function of EXPORT macro command is the same as the function of Report List button element.
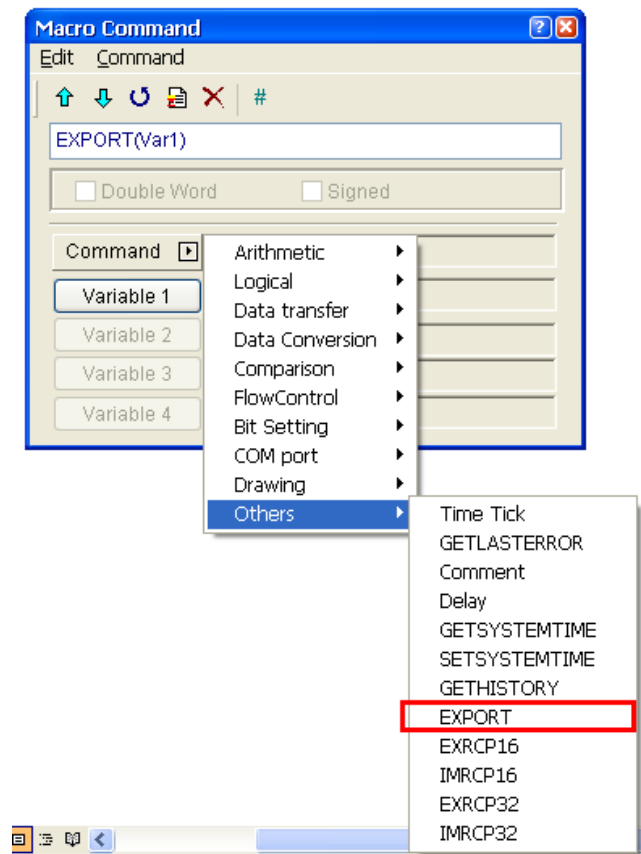
Equation: EXPORT(Var1)

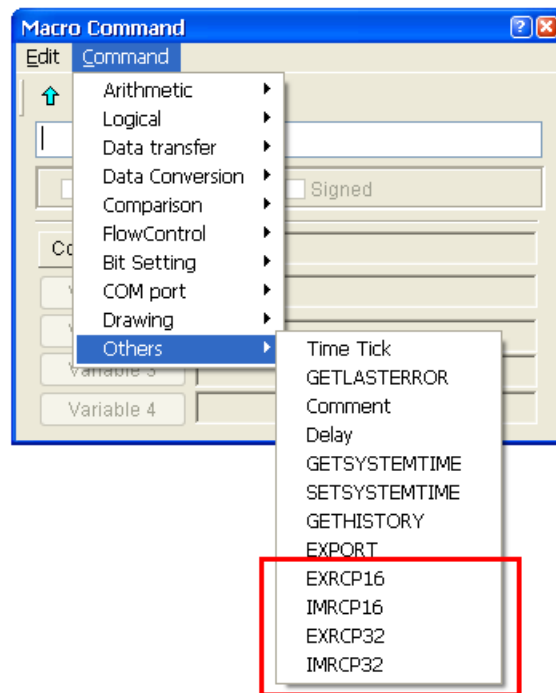Var1: It can be an internal memory or a constant.

0: Export the data to SD card

1: Export the data to USB disk

2: Export the data to the printer for printing it out

■ **IMRCP16/32, EXRCP16/32**

IMRCP16/32 and EXRCP16/32 macro commands are used to import and export the recipe data.

Export 16bits recipe

Equation: Var1 = EXRCP16(Var2, Var3)

Export the 16bits recipe data in Var2 to the external memory Var3 (in Windows Excel CSV file), and store the result in Var1.

Import 16bits recipe

Equation: Var1 = IMRCP16(Var2, Var3)

Import the 16bits recipe data in Var2 from the external memory Var3 (in Windows Excel CSV file), and store the result in Var1.

Export 32bits recipe

Equation: Var1 = EXRCP32(Var2, Var3)

Export the 32bits recipe data in Var2 to the external memory Var3 (in Windows Excel CSV file), and store the result in Var1.

Import 32bits recipe

Equation: Var1 = IMRCP32(Var2, Var3)

Import the 32bits recipe data in Var2 from the external memory Var3 (in Windows Excel CSV file), and store the result in Var1.

Explanation:

Var1: Response value after communication

       1: Completed normally

       0: Failed

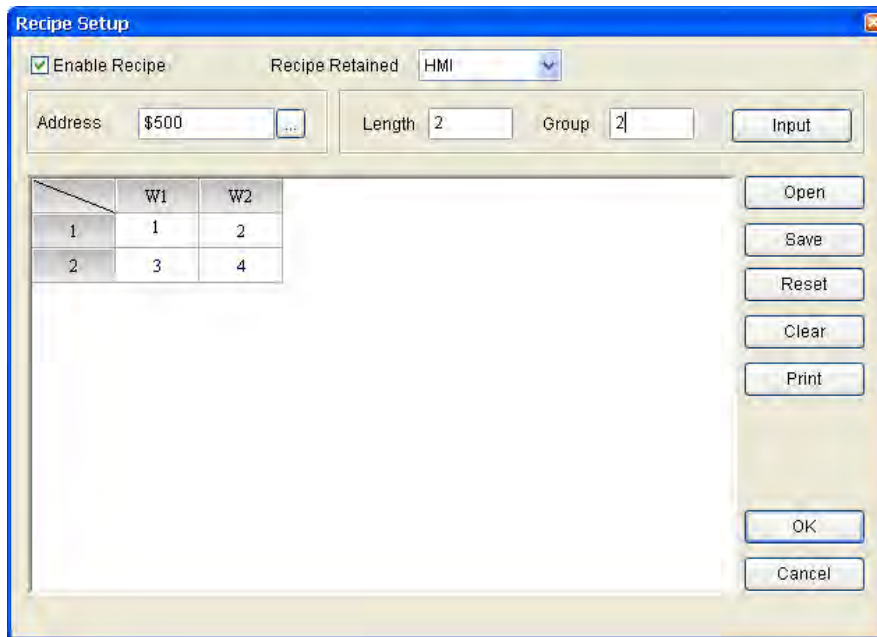Var2: Address of import/export data

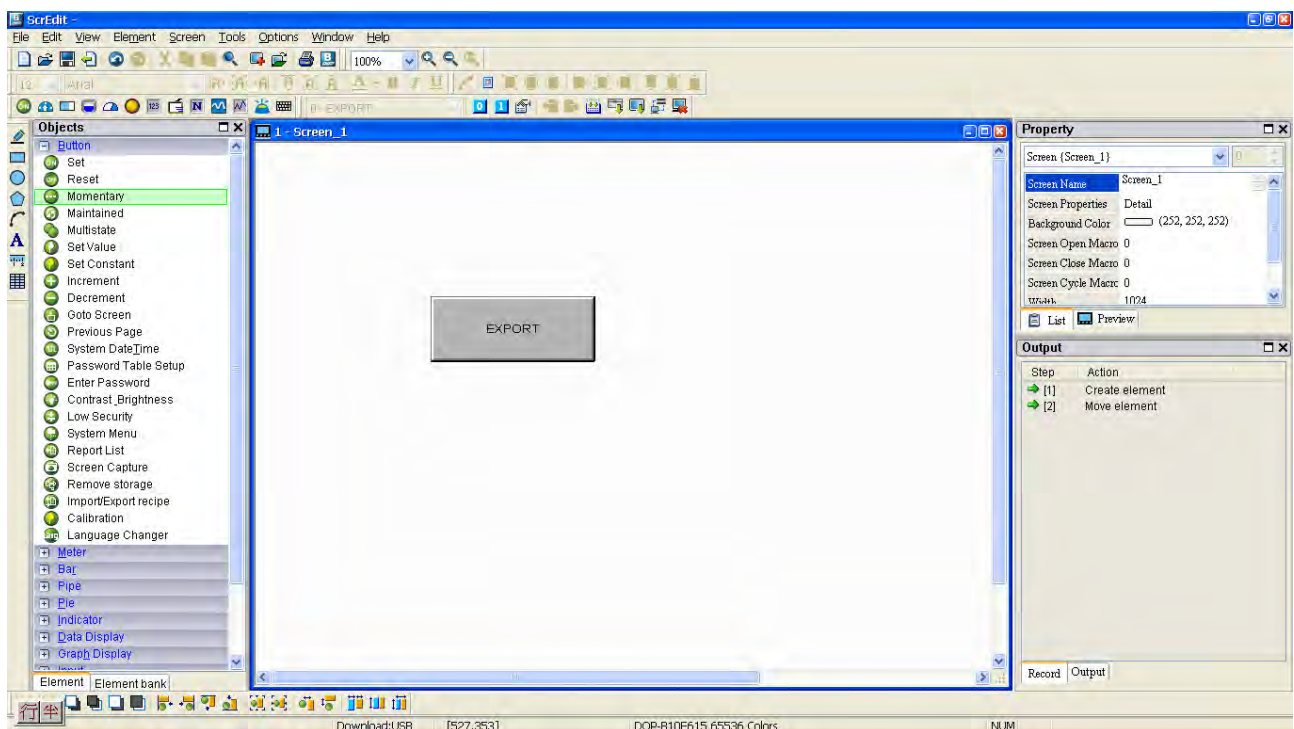Var3: External memory

2: USB disk.

3: SD card.

For example:

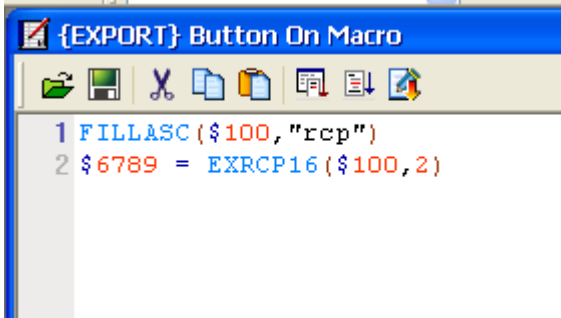Suppose that the user needs to export a 16bits recipe data to the USB disk.

First, click **Options > Recipe** command from the menu bar to create a 16bits recipe data shown as the figure below.

Next, create a **Momentary** button on the screen.

In property setting of the button element, set **On macro** command as follows.

FILLASC($100, "rcp")	Set the file name as RCP.
$6789 = EXRCP16($100, 2)	Export the recipe data in $100 to USB disk and store the result in $6789.

Perform Compile operation and download the screen data to HMI screen. The user's screen will look like the figure below. When the EXPORT button is pressed, the 16bits recipe data will be converted in Windows Excel CSV file and exported into USB disk immediately.
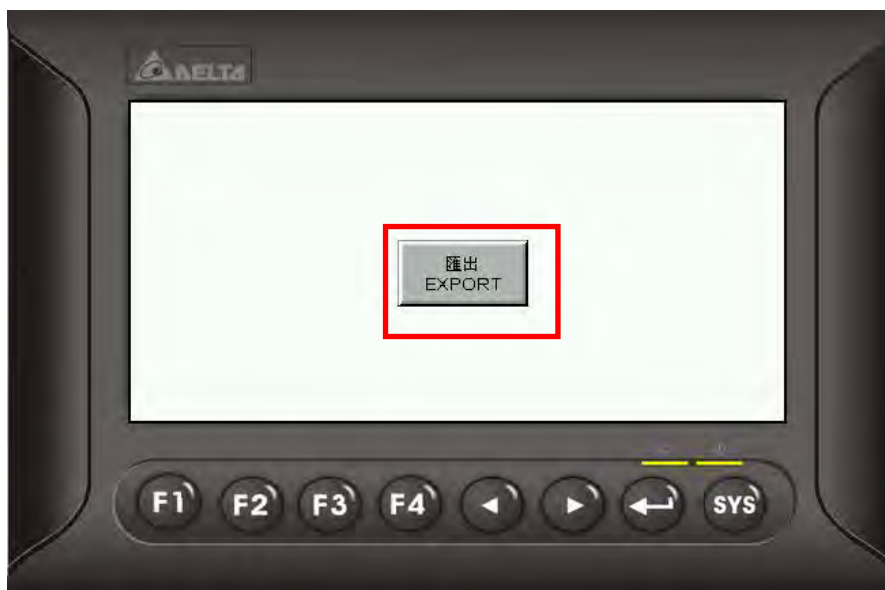
The recipe file which is exported to the USB disk.
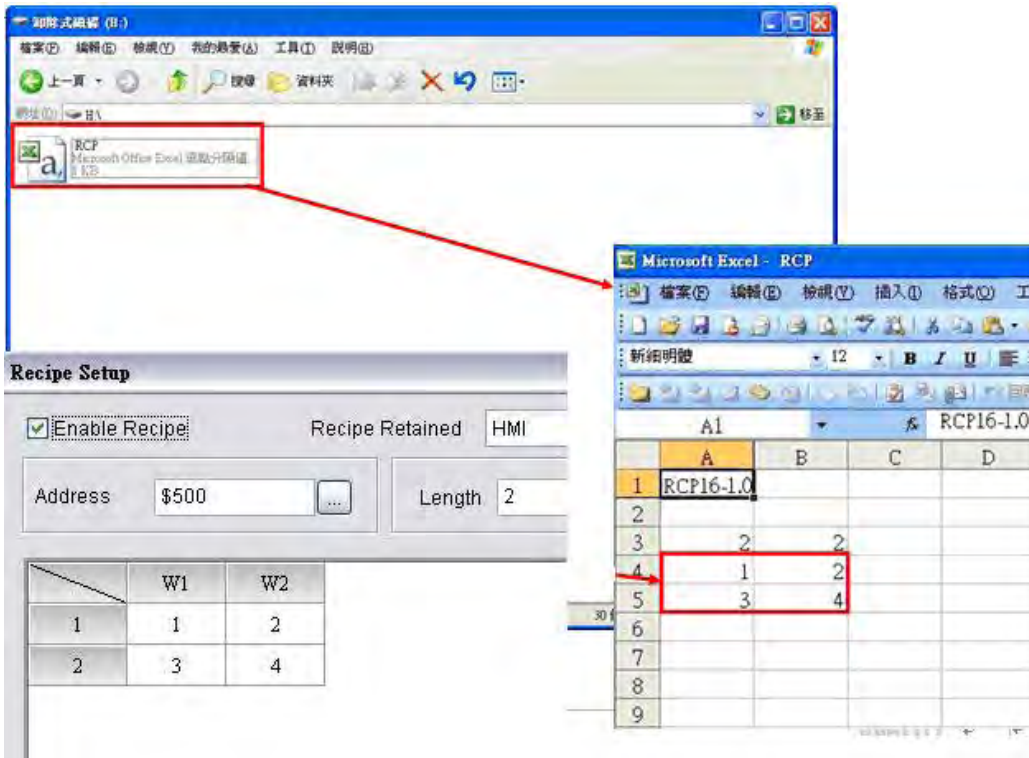
■   **STATIONON/STATIONOFF**

The user can use STATIONON / STATIONOFF macro commands to enable / disable the communication between HMI and the designated external controllers.

  Equation: STATIONON (Var1, Var2)

                    STATIONOFF (Var1, Var2)

  Var1 and Var2 can be an internal memory or a constant.
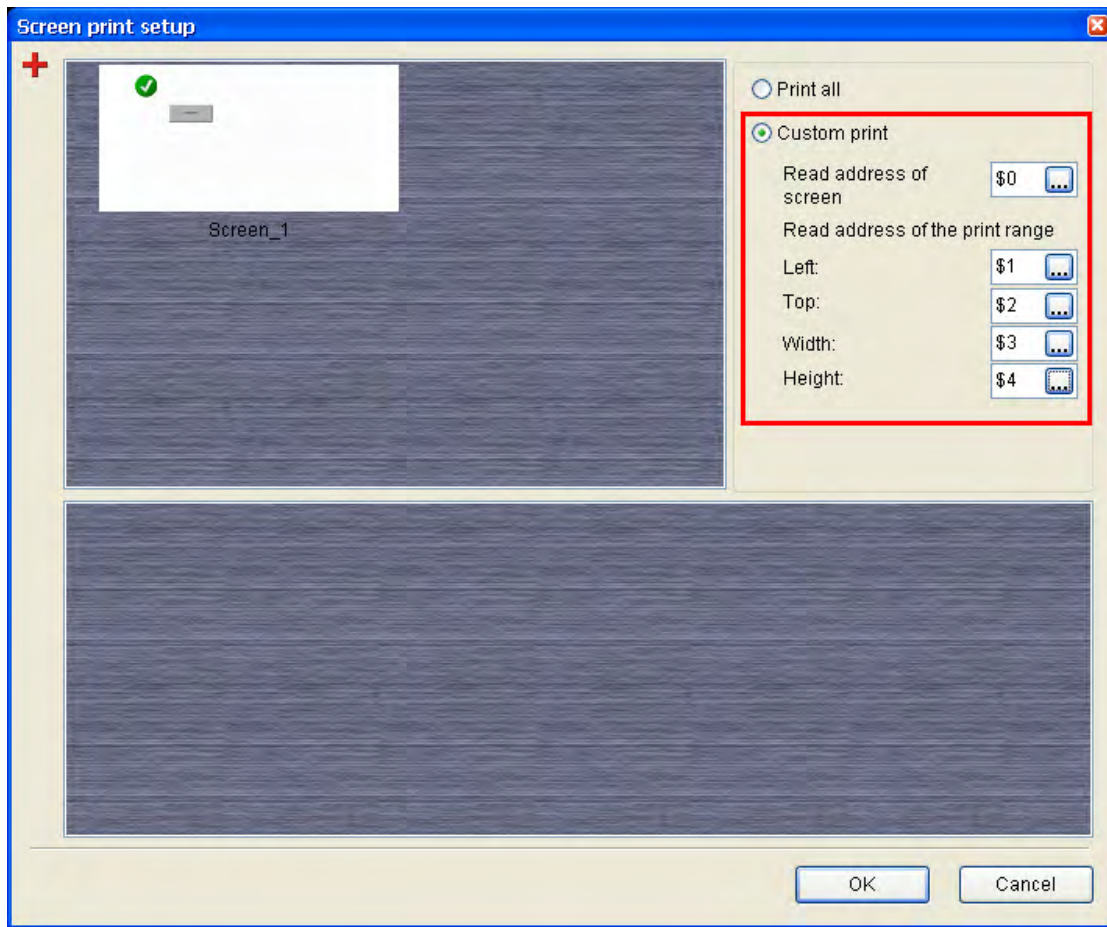
  Var1: Communication port

         0: COM1

         1: COM2

         2: COM3

  Var2: PLC Station number

A.2   Print Typesetting - Custom Print

In Print Typesetting dialog box, **Custom Print** option is available to meet user's total printing needs.

The corresponding functions of each register addresses are described in the following table.

$0	Read address of screen	Designate the desired print screen. When the setting value is 0, all screens shown in the Print Typesetting dialog box will be printed out.
$1	Left	Set the print starting address of X coordinate
$2	Top	Set the print starting address of Y coordinate
$3	Width	Set the width of the printing range.
$4	Height	Set the height of the printing range.

The user can use this function with the functions of printer flag, report list element and export macro command, etc.

A.3   New Button Elements

■   **Calibration**

When the Calibration button element is pressed on the screen, the user is able to execute Calibration function directly and does not need to enter into system menu.
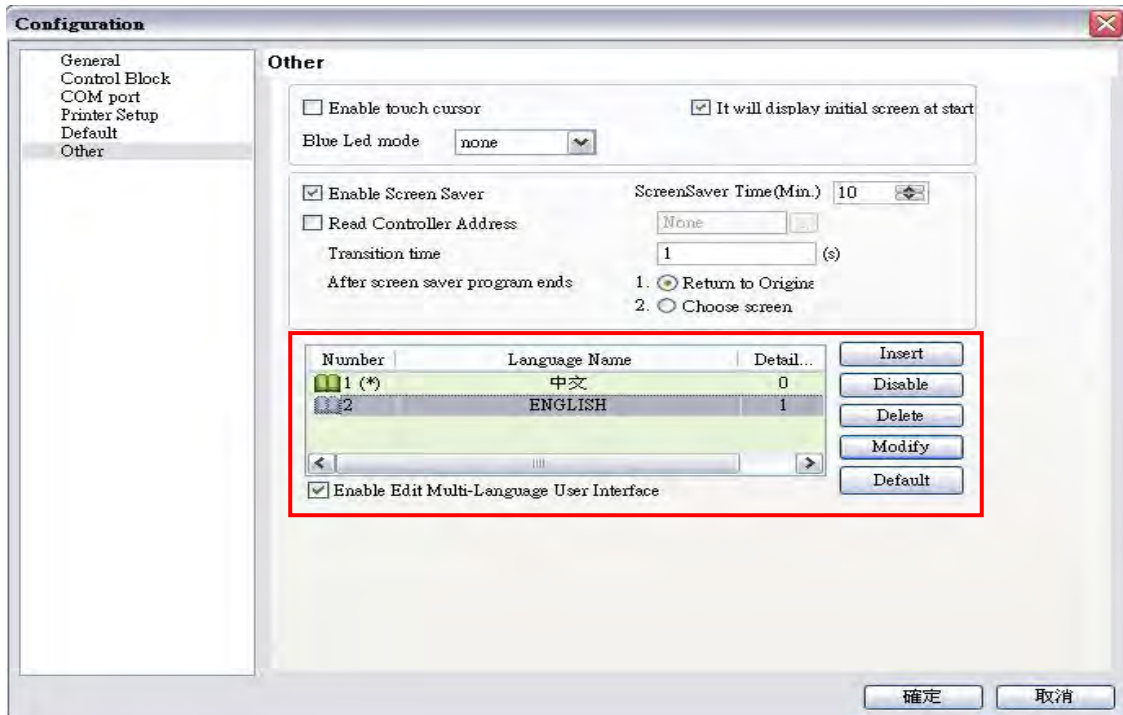

■   **Language Changer**

When the Language Changer button element is pressed on the screen, the user is able to change the display language directly.

How to use Language Changer element:

First, click **Options > Configuration**, select **Other** tab to enable multi-language user interface and add the display languages.

After complete the above settings, create three elements on the screen.

1. Create a Momentary button element. Double click the Chinese tab and enter "中文版" in Chinese. Double click the English tab and enter "ENGLISH VERS" in English.


2. Create a Language Changer button element. In property setting of the Language Changer button element, specify the Language setting to "中文".

3. Create another Language Changer button element. In property setting of the Language Changer button element, specify the Language setting to "ENGLISH".

Then, perform **Compile** operation and download the screen data to the user's HMI screen shown as the figure below.
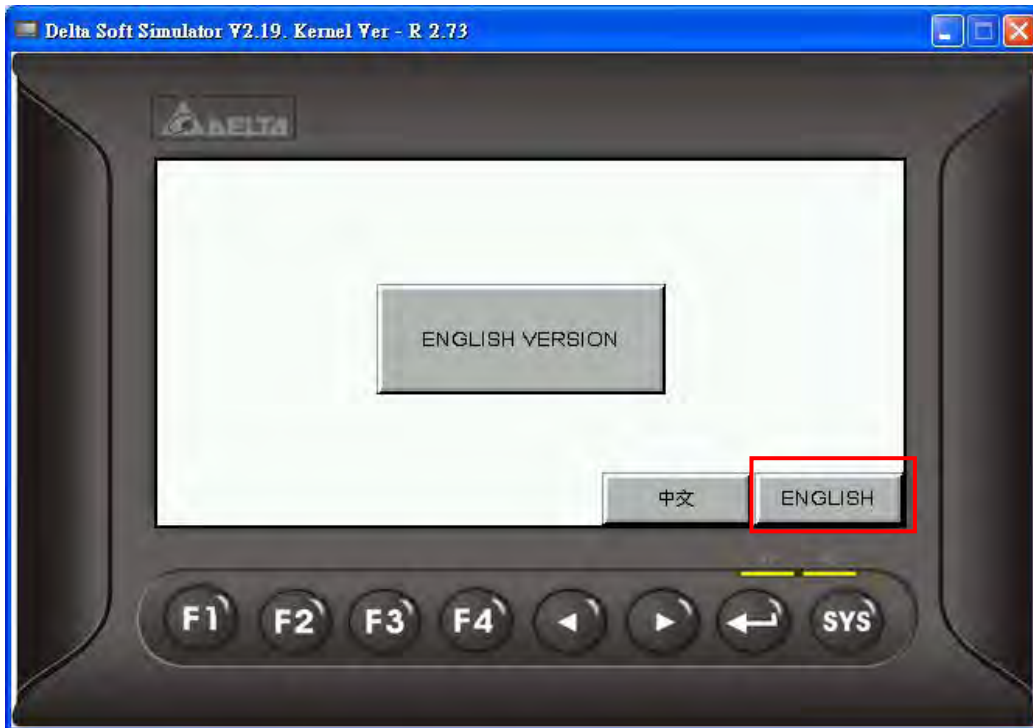
When ENGLISH button is pressed, the above screen will display.
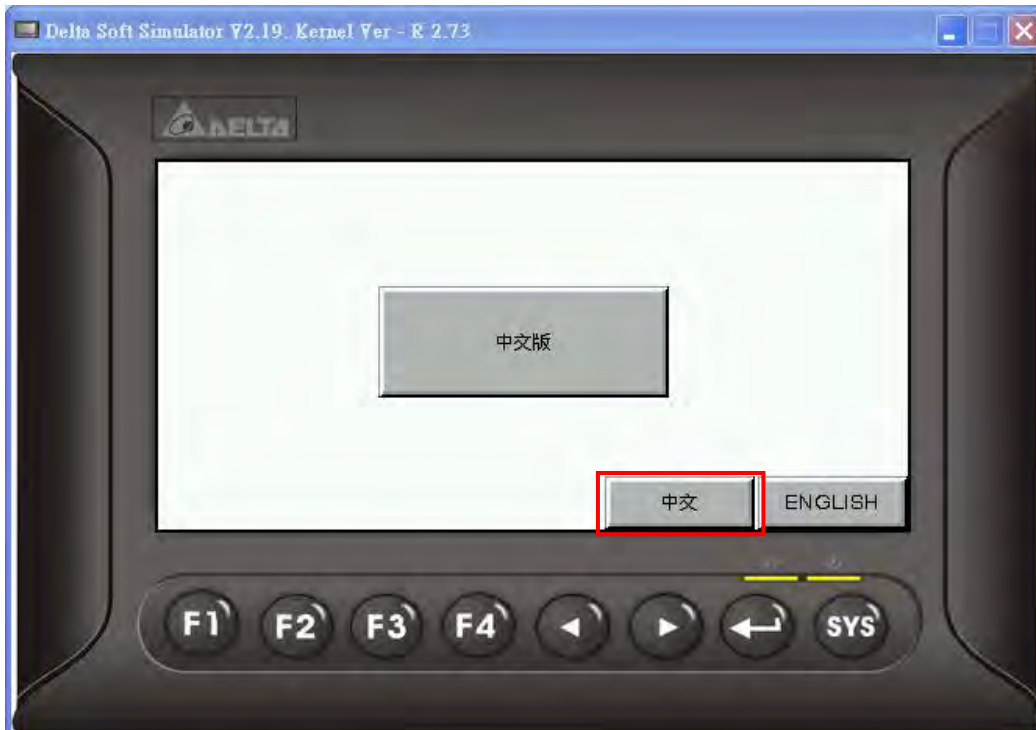
When 中文 button is pressed, , the above screen will display.

A.4   New Input Element

■   **Barcode Input**

This element is used to receive the barcodes which are scanned by a barcode reader through USB interface. There are two options, **Touch** and **Active** in **Input mode** drop-down list.
When Input Mode is set to **Touch**:

If Input Mode is set to **Touch**, when touching the barcode input element on the screen, it will enter into the waiting status to wait to receive the scanned barcodes. Touching the barcode input element again can release the waiting status. If there are more than one barcode input elements on the screen, after the first barcode input element receives the scanned barcode, the system will not receive the next scanned barcode automatically. To receive other scanned barcodes, the user needs to touch the other barcode input elements in sequence manually.
If the user wants to modify the barcode data manually, the user must set Popup Bit option. Once the bit turned to ON, a keypad element will pop up on the screen for the user to enter the values manually.

When Input Mode is set to **Active**:

If Input Mode is set to **Active**, it needs to trigger the InterLock Address first. After the InterLock Address is triggered, the barcode input element will enter into the waiting status to wait to receive the scanned barcodes. If there are more than one barcode input elements on the screen, after the first barcode input element receives the scanned barcode, the system will receive the next scanned barcode automatically. To release the waiting status, the user needs to reset the InterLock Address of the barcode input element.

If the user wants to modify the barcode data manually, the user must create a keypad element on the screen first. Once the InterLock Address of the barcode input element is triggered, the user can use the keypad element to enter the values manually.
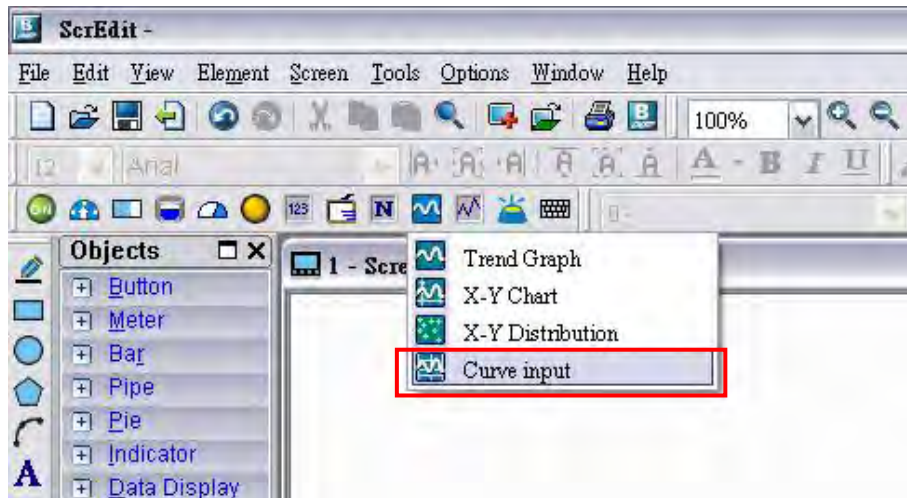Please note that the Popup Bit option is disabled when Input Mode is set to Active.
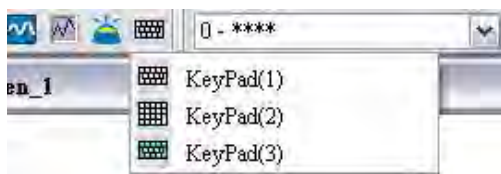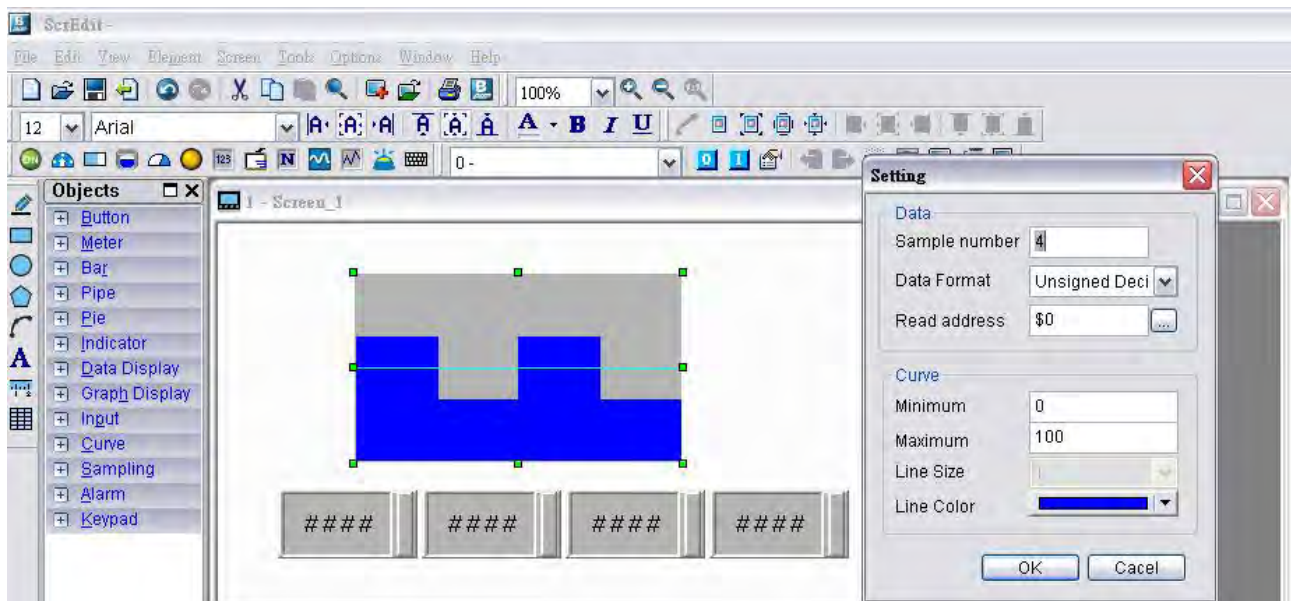
A.5　New Curve Element

■　**Curve Input**

Create a Curve Input element on the screen. Set the Sample Number to 4, and Read Address to $0. When Read Address is set to$0, the addresses for each sample number are $0, $1, $2 and $3 respectively.

Create four numeric entry elements on the screen and the addresses are $0、$1、$2 and $3 respectively. After completing the property settings, perform Compile operation and download the screen data to the user's HMI screen. To set the value, the user can select the desired value on HMI screen directly or use the numeric entry element to enter the setting value.
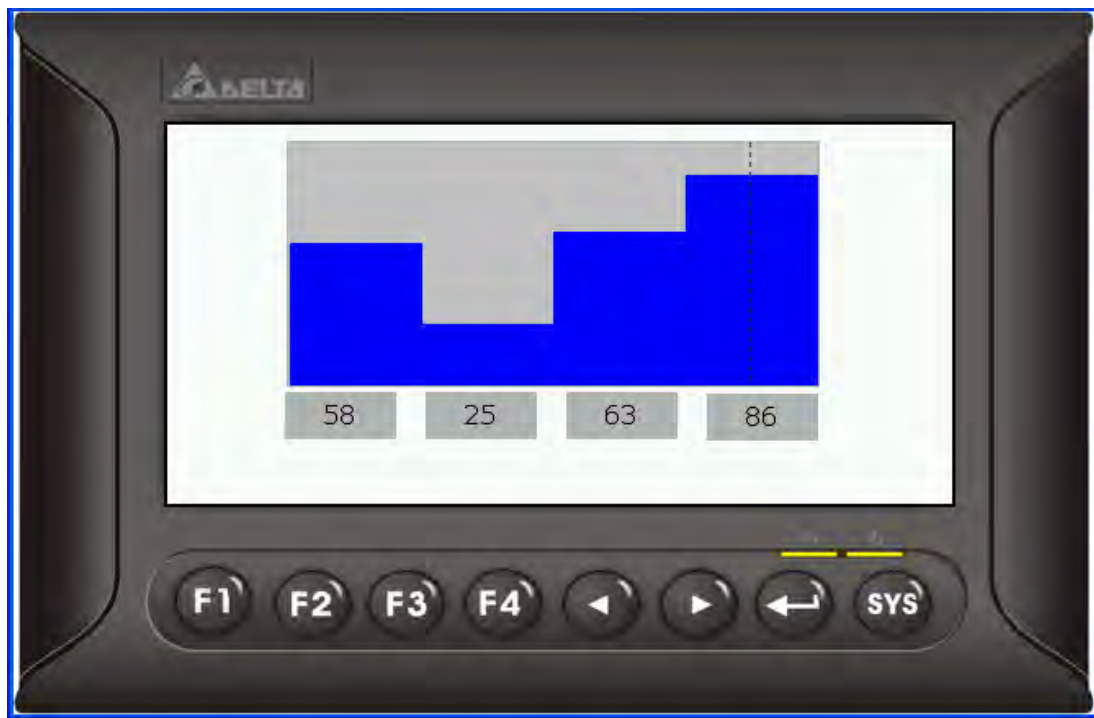
A.6 Show Disk Access Error Message

When this option is set, if an error occurs when accessing the alarm, history buffer, and recipe data via USB disk, an error message will show up on the screen to alert the user.
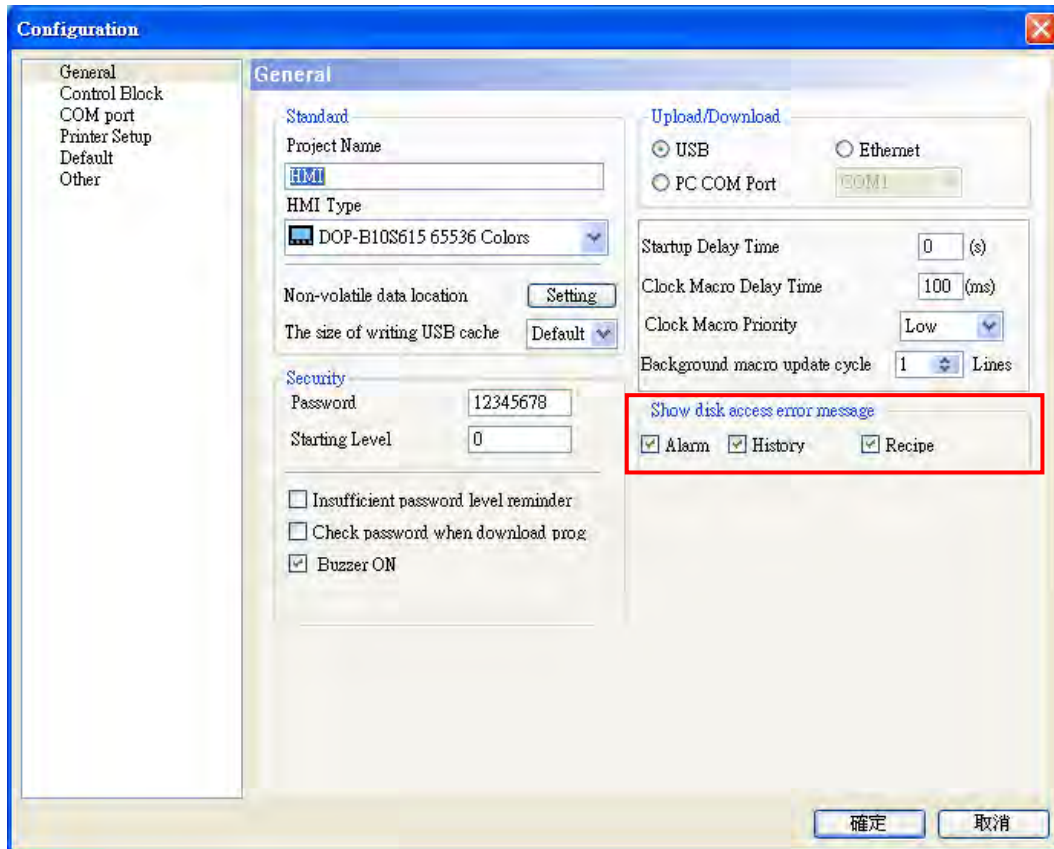
A.7 Additional Internal Parameters

There are several additional internal parameters in the drop-down list. When **Device Type** drop-down list is activated, it displays a list of internal parameters, from which the user may select one.

Name	Explanation	Attribute
TP_Status	Touch Status	Read only
TP_X	Touch X coordinate	Read only
TP_Y	Touch Y coordinate	Read only
Time_Year	Year	Read / Write
Time_Month	Month	Read / Write
Time_Day	Day	Read / Write
Time_Hour	Hour	Read / Write
Time_Minute	Minute	Read / Write

| Name	Explanation	Attribute
Time_Second	Second	Read / Write
Battery_Voltage	Remained voltage percentage of backup battery	Read only
NET_IP1	HMI IP Address	Read only
NET_IP2	For example, if HMI IP address is set to 192.168.0.1,	Read only
NET_IP3	NET_IP1 = 192	Read only
NET_IP4	NET_IP2 = 168 NET_IP3 = 0 NET_IP4 = 1	Read only

A.8   Invisible Address

When this option is set to On, this button element will be invisible. The elements which support this function include: all button elements, multistate indicator element, numeric entry element, character element, and barcode input element.
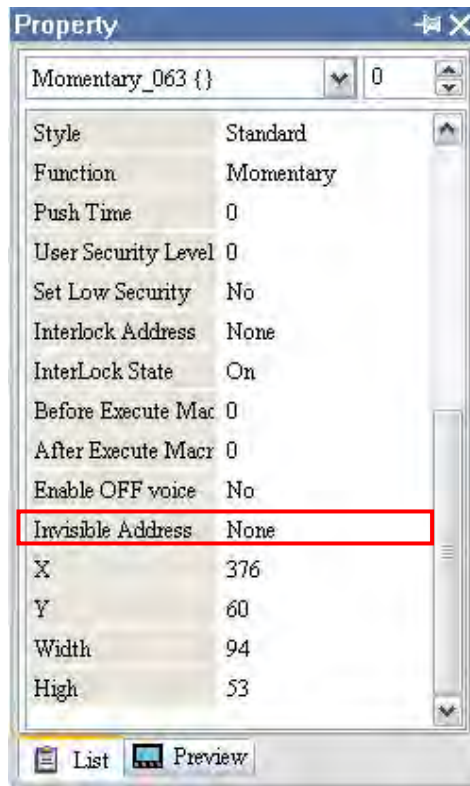
A.9   Auto Reboot After Firmware Upgrading

When this option is selected, HMI will automatically restart (power off and then on) after the firmware upgrading is completed.
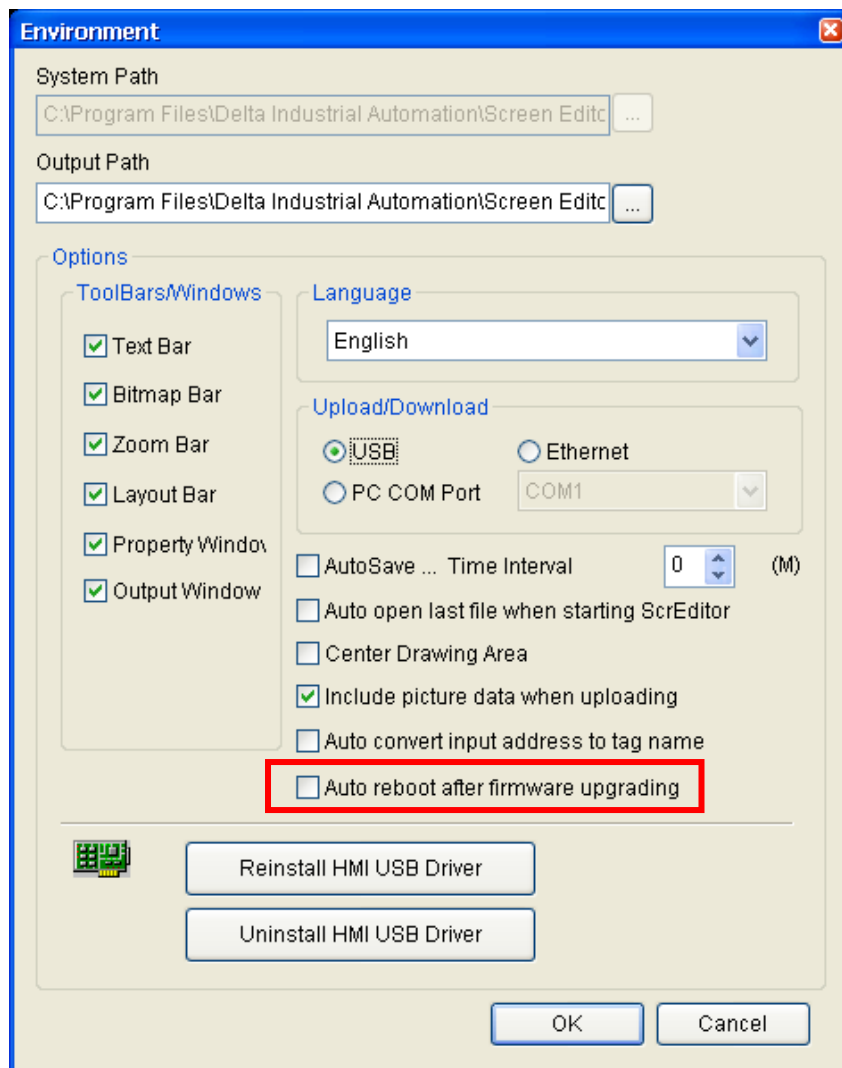
A.10 USBCommMode (Data Transfer via USB Disk)

USBCommMode is a new option provided in HMI System Menu and used to transfer (upload and download) the data via USB disk. After the firmware is updated, the user can press SYS key to enter into the System Menu. Touch System Setting icon on the screen to enter into System Setting Menu. In the System Setting Menu, choose MISC. icon shown as the figure below. Then, change the setting value of USBCommMode to 1 and connect HMI to PC USB port again.


Touch MISC. icon

Select USBCommMode option

When USBCommMode is set to 0, it indicates the traditional data transfer mode is selected.
When USBCommMode is set to 1, it indicates the new data transfer mode via USB disk is selected.
After setting USBCommMode to 1, connect HMI to PC USB port again. Then, double click "My Computer" icon on the desktop to see if a removable device named DELTA is connected or not. If it is connected, it means that the user can upload and download files from and to USB disk by using Screen Editor software program.

This new function is compatible with Microsoft Windows XP, Windows Vista, and Windows 7 operating systems.

System (C:)   Data (D:)

Devices with Removable Storage

DVD Drive (D:)   DELTA (F:)
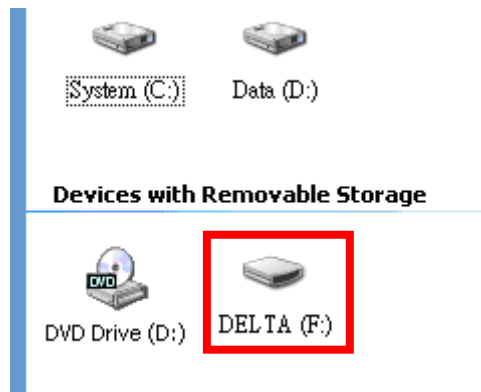
Appendix B New Upload/Download Function

B.1   Upload and Download DVP Series PLC Programs

There is a new upload and download button provided on the system menu for upload and download the Delta DVP series PLC programs. The users can use this new function to upload and download the PLC programs directly. The following sections describe how to use this new function.
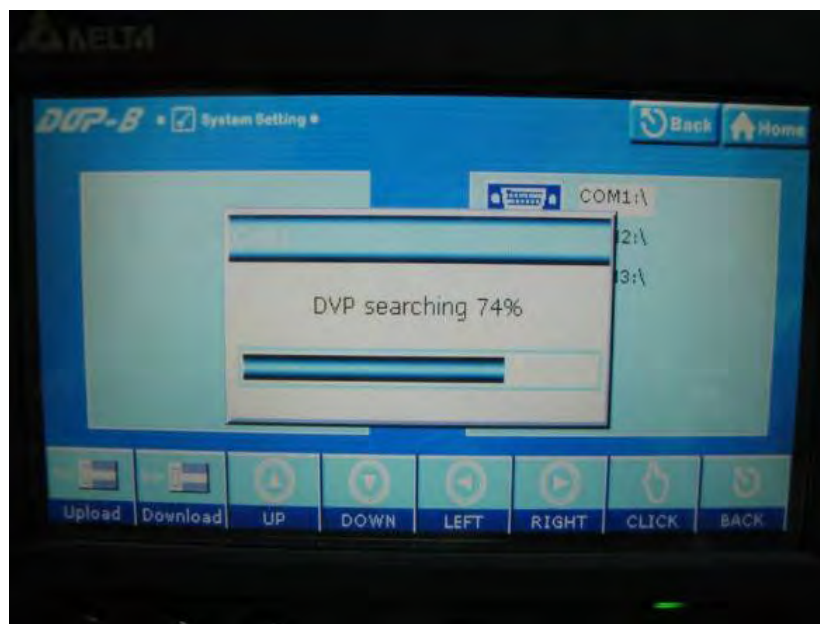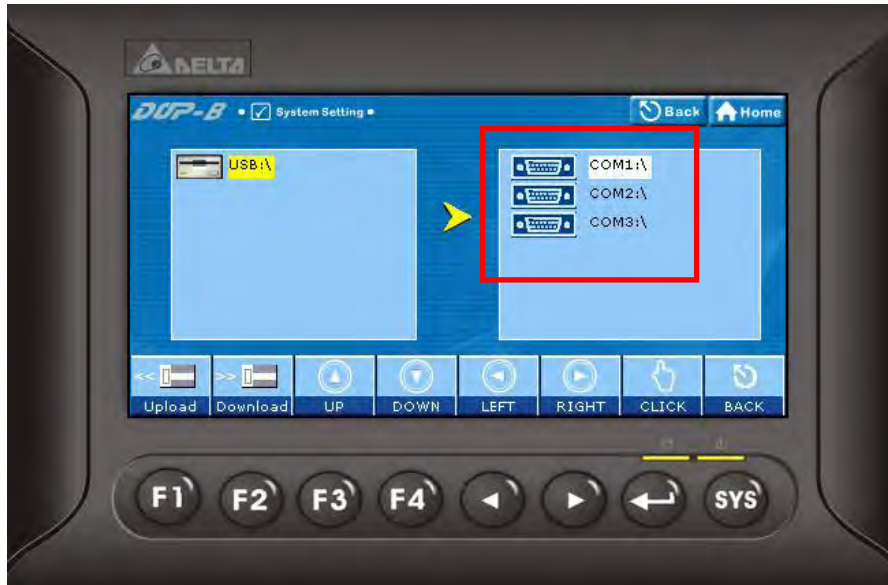
1. Press SYS key for two seconds to enter into the system menu and touch **Up/Download** icon.

2. Press button to enter into Transfer Mode.
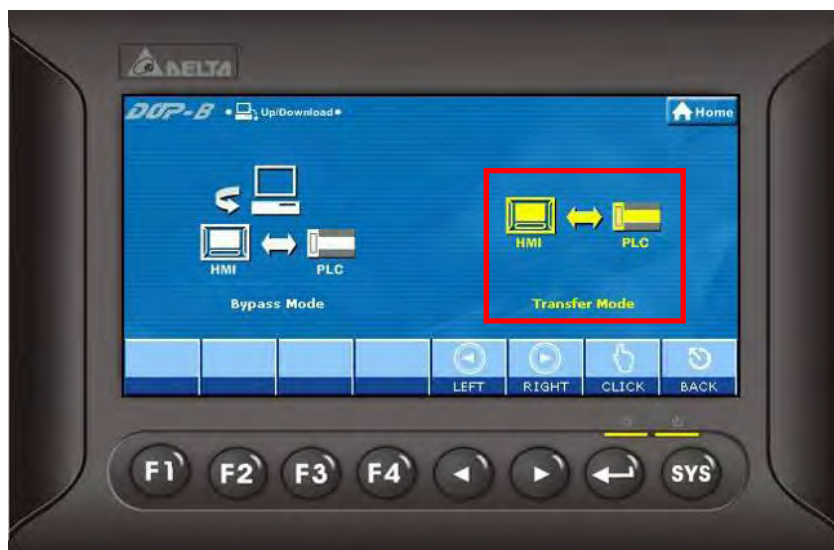
3. As shown as the figure below, to transfer PLC programs, the user should select the COM Port First. After COM port is selected, HMI will search the connecting DVP series PLC automatically.

4. When the connecting DVP series PLC is found, the user can touch **Upload** icon to upload the PLC programs or touch **Download** icon to download the PLC programs.
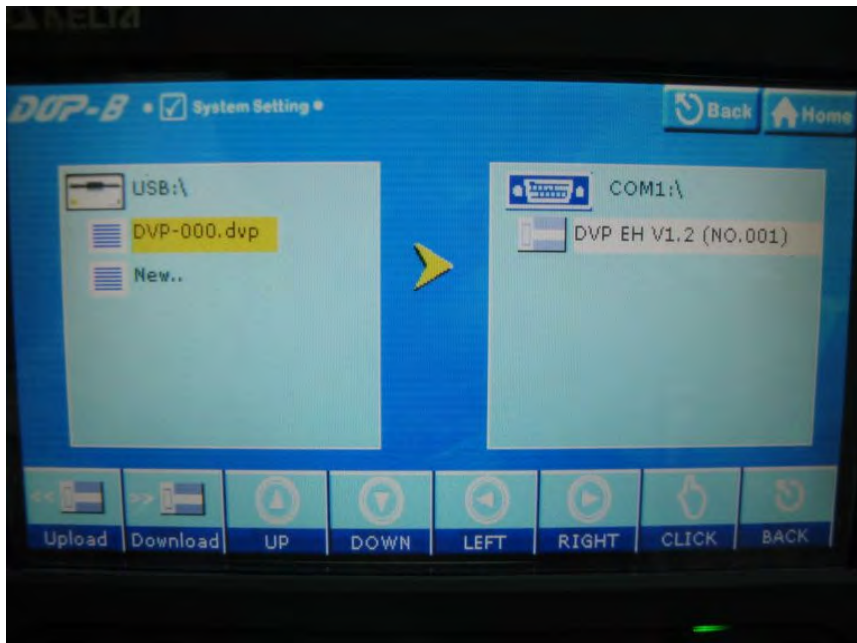
Notes:

1. The file name of PLC programs should be DVP-xxx.dvp (xxx must be a number between 000 to 999).

2. If the PLC program is a new file, select **New..** and then touch **Upload** icon on the screen to add it into the file directory.

3. The supporting version and series of DVP series PLCs are listed in the table below:

| DVP Series PLC	Support Password Examination Limit Function	Support Verification Code Limit Function
ES	X	X
ES2	V1.0 and later version	V1.0 and later version
EX	X	X
EC	X	X
SS	X	X
SA	V 1.7 and later version	V 1.7 and later version
SX	V 1.7 and later version	V 1.7 and later version
SC	V 1.5 and later version	V 1.5 and later version
SV	V 1.2 and later version	V1.3 and later version
EH	X	X
EH2	V 1.1 and later version	V1.3 and later version
EH2-L	V1.0 and later version	V1.0 and later version

4. HMI Transfer Mode is available for uploading and downloading DVP series PLC programs (*.dvp) only. It is not provided for the upload and download of the subroutine, ladder diagram, SFC chart, note of device name and row, non-volatile data, label structure, symbol structure, etc. data.

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Appendix C Multi-Link Connection

This chapter describes the connecting methods used to connect multiple HMIs to one or mor external controllers, i.e. PLCs.

The connecting method for multi-link connection is shown as the figure below. The Ethernet and COM2 serial port of HMIs are used.
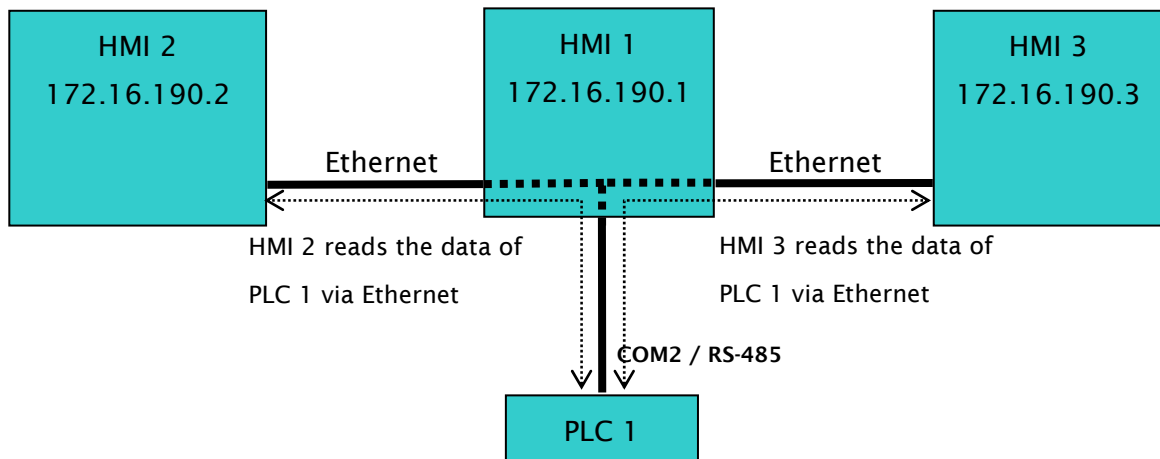

In the figure above, three HMIs, HMI 1, HMI 2 and HMI 3 are connected via Ethernet.

Only HMI 1is connected to PLC 1 by using COM2 serial port through RS-485 communication.

HMI 2 and HMI 3 are not connected to any external controller. However, through 1:N connection, HMI 2 and HMI 3 are able to access the registers of PLC 1 via Etherent.
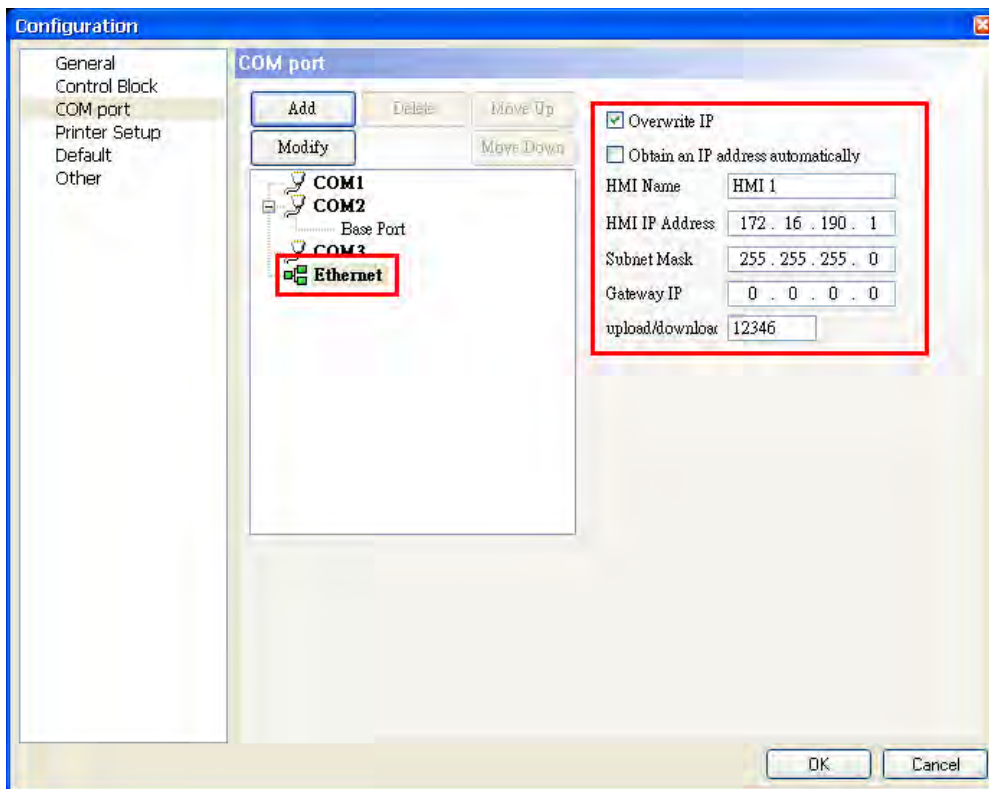
The methods for setting each unit are as follows:

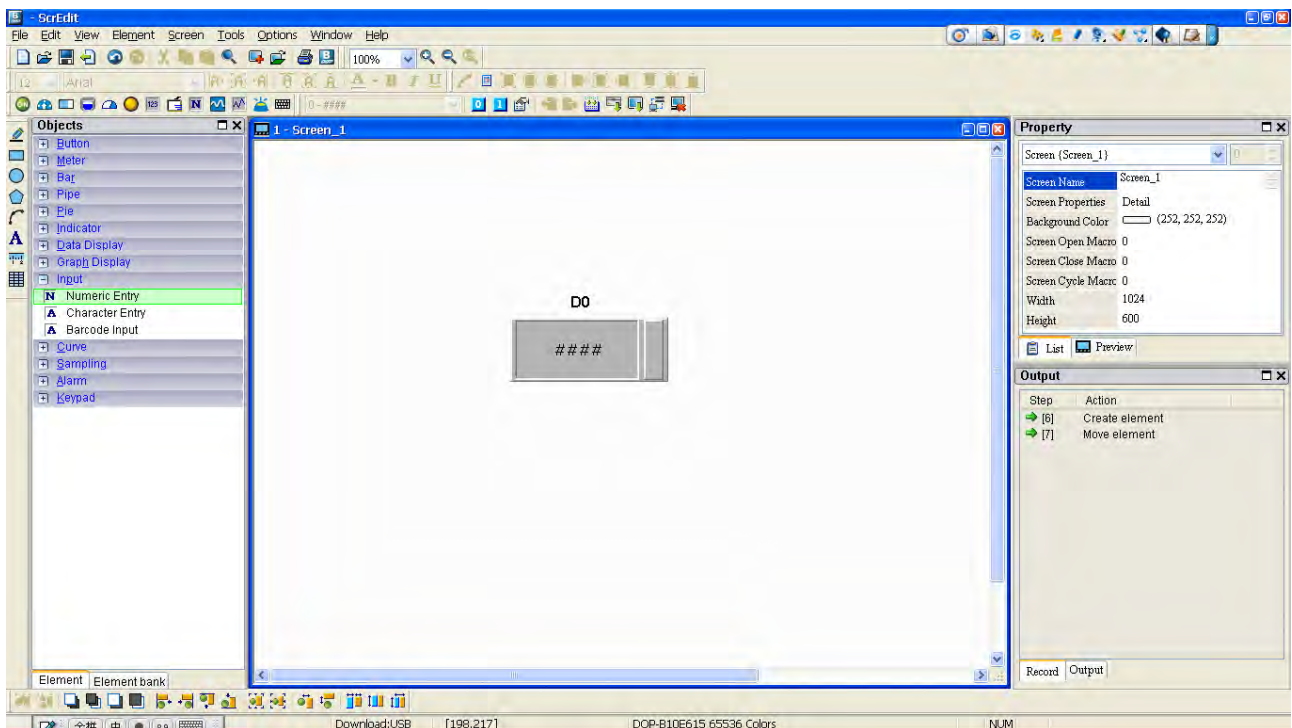**Setting Methods of HMI 1**

1. Click **Options > Configuration > COM Port**.

2. Press Add button to add a PLC connection under **COM2** Base Port

3. Set HMI station number to **1**, select **RS-485** interface and set the communication protocol settings as [**9600, 7, Even, 1**].

4. In Multi-link option, set Active mode to **Host**.
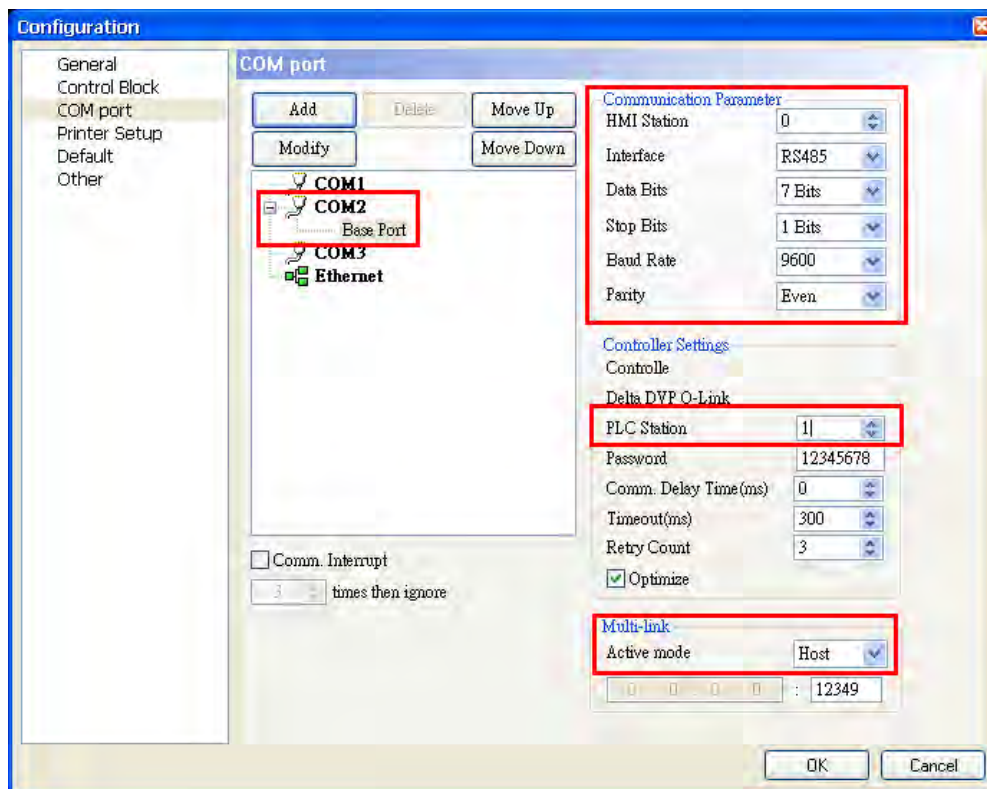
5. Set HMI IP address for Ethernet to 172.16.190.1 and press OK to complete the settings.
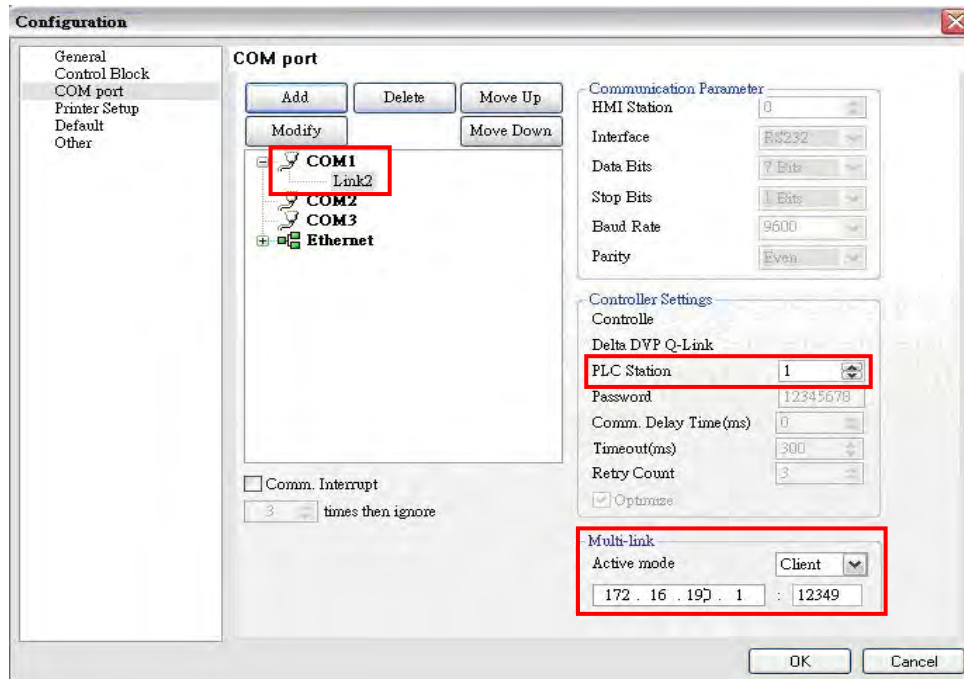

6. Create a Numeric Entry element on the screen so as to read the internal register D0 of PLC 1.

7. After finishing the element settings, perform the compile operation and download the screen data to HMI 1.

Setting Methods of HMI 2

1. Click **Options > Configuration > COM Port**.

2. Press Add button to add a PLC connection under **COM1** Base Port

3. Set PLC station number to **1**.

4. In Multi-link option, set Active mode to **Client** and set IP address to 172.16.190.1 (IP address of HMI 1).

5. Set HMI IP address for Ethernet to 172.16.190.2 and press OK to complete the settings.

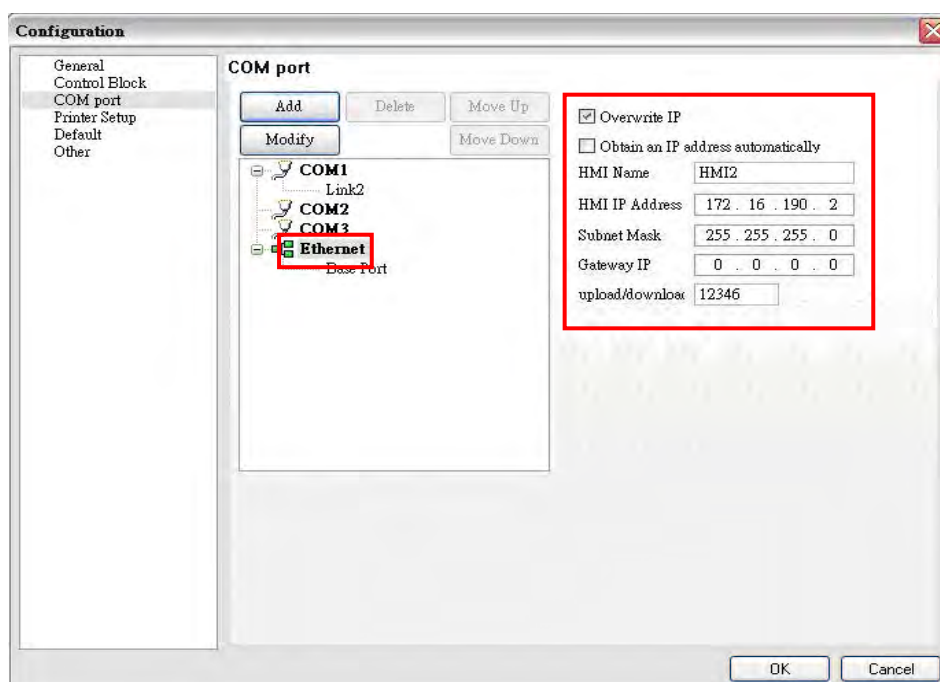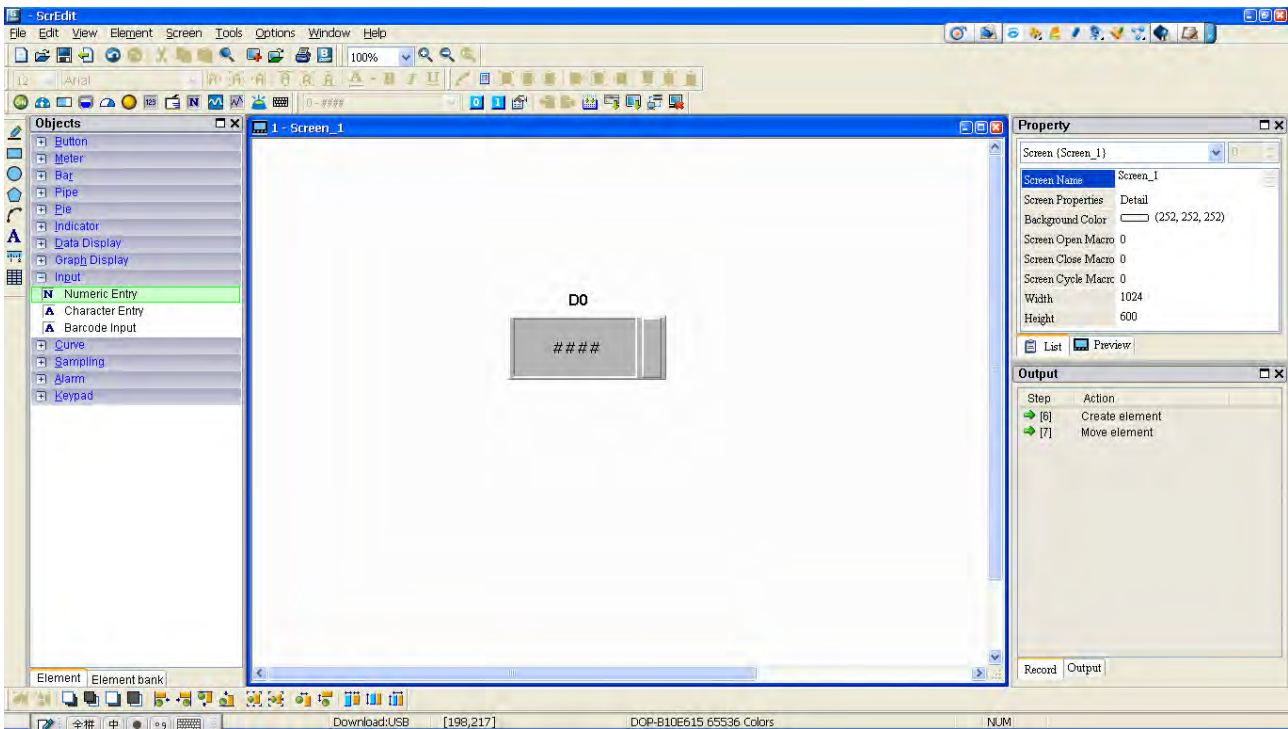6. Create a Numeric Entry element on the screen so as to read the internal register D0 of PLC 1.

7. After finishing the element settings, perform the compile operation and download the screen data to HMI 2.

Setting Methods of HMI 3

1. Click **Options** > **Configuration** > **COM Port**.

2. Press Add button to add a PLC connection under **COM3** Base Port

3. Set PLC station number to **1**.

4. In Multi-link option, set Active mode to **Client** and set IP address to 172.16.190.1 (IP address of HMI 1).

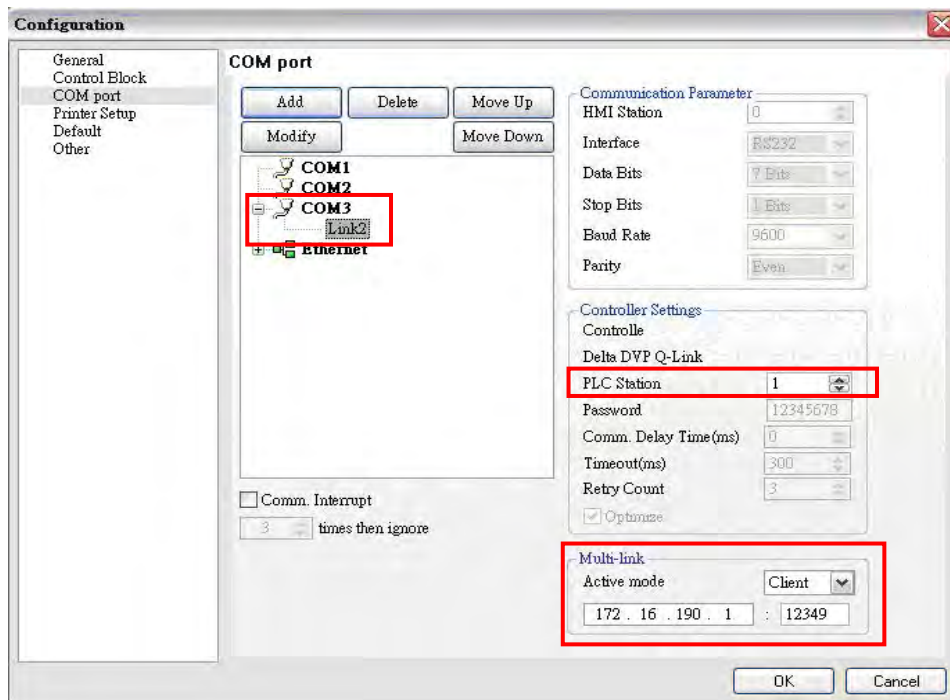5. Set HMI IP address for Ethernet to 172.16.190.3 and press OK to complete the settings.

6. Create a Numeric Entry element on the screen so as to read the internal register D0 of PLC 1.
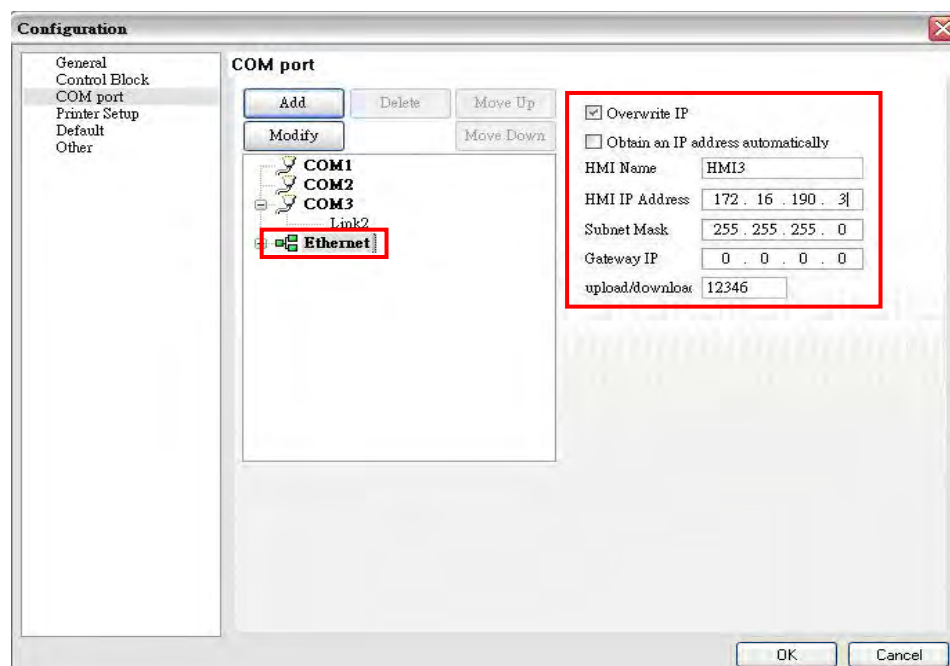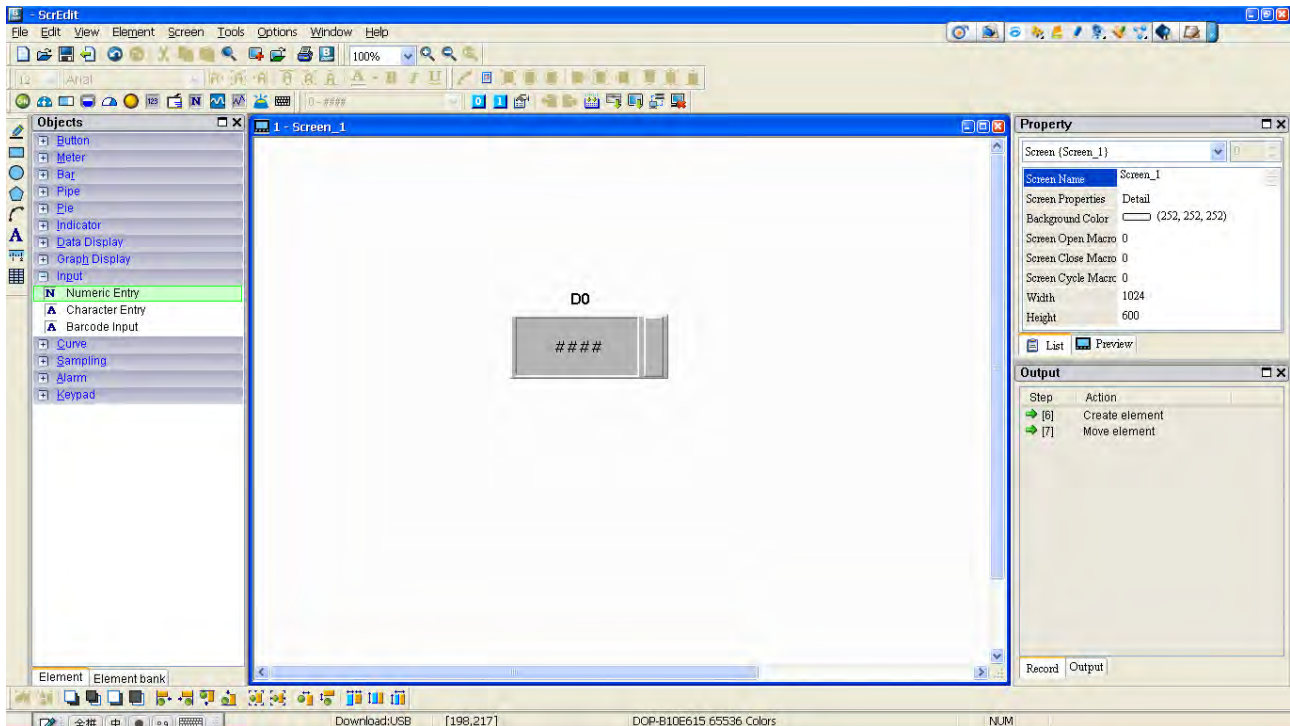

7. After finishing the element settings, perform the compile operation and download the screen data to HMI 3.

Then, connect PLC 1 to HMI 1, and connect HMI1 to HMI 2 and HMI 3. After power on all the connecting devices, a multi-link connection is established.

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